

Ecology Report

Pellissippi Parkway Extension (SR 162) **Blount County, Tennessee**

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List of Acronyms

ARAP	Aquatic Resources Alteration Permit
BMP	Best Management Practices
CFR	Code of Federal Regulations
DHI	Division of Natural Heritage
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
GIS	Geographic Information System
HUC	Hydrologic Unit Code
LRM	Little River Mile
LRTP	Long Range Transportation Plan
FR	Federal Register
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act of 1969
NOI	Notice of Intent
NWI	National Wetland Inventory
OHWM	Ordinary High Water Mark
PND	Pond
SR	State Route
SSURGO	Soil Survey Geographic database
STR	Stream
TDEC	Tennessee Department of Environment and Conservation
TDOT	Tennessee Department of Transportation
TPO	Transportation Planning Organization
TVA	Tennessee Valley Authority
USACE	U. S. Army Corps of Engineers
USC	United States Code
USFWS	U. S. Fish and Wildlife Service
USGS	U. S. Geological Survey
WTL	Wetland
WWW	Wet Weather Conveyance

1.0 Introduction

Studies to determine the impacts of the proposed alternative alignments on the local ecology were conducted by Parsons Brinckerhoff (PB) Biologists Jonathan Sell and Travis Garnto from September 22 through October 3, 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 caves, springs, and sinkholes which could harbor protected species or influence water quality.

2.0 Project Description

Pellissippi Parkway (SR 162) is a major northwest/southeast route connecting Interstate 40 (I-40)/I-75 and SR 33 in Knox and Blount Counties, Tennessee. Pellissippi Parkway (designated as I-140) between I-40/I-75 and SR 33 was designed and built in four sections between 1987 and 2005. The section of Pellissippi Parkway between SR 33 and US 321/SR 73 is the remaining undeveloped portion of the parkway that was identified in the State's 1986 Urgent Highway Needs Plan. The TDOT proposes to extend the existing Pellissippi Parkway from SR 33 to US 321/SR 73, a distance of approximately 4.5 miles (Appendix A – Figure 1 - Project Location Map).

The project is proposed by TDOT for the purpose of:

- Provide travel options for motorists to the existing radial roadway network;
- Enhance regional transportation system linkages;
- Assist in achieving acceptable traffic flows (level of service) on the transportation network; and
- Enhance roadway safety on the roadway network, including the Maryville core.

In April 2006, TDOT initiated an Environmental Impact Statement (EIS) for the project with the publication of a formal Notice of Intent (NOI) to prepare an EIS in the Federal Register. Public and agency scoping was conducted in the spring and summer of 2006. At that time, TDOT asked the public to provide input on the purpose and need for the project and to identify potential alternatives for consideration in the Draft EIS. Additional public meetings were held in November 2007 and February 2008 to gather public input on the refined purpose and need and potential project corridors and alternatives.

An initial range of alternatives and corridors were developed as a result of public input and input from local and regional agencies, including the Knoxville Regional Transportation Planning Organization (TPO). The alternatives and corridors were refined based on windshield reviews and reviews of existing data sources including Geographic Information Systems (GIS) information from local, state and federal agencies.

Based on the results of the screening analysis and application of evaluation criteria, public input during the 2007 and 2008 public meetings and comment periods, and participating agency comments and concurrence, TDOT has determined the following alternatives that would be carried forward, refined and evaluated in the DEIS. These alternatives are illustrated on Figure 1- Project Location Map.

No-Build Alternative: The No-Build Alternative would not extend Pellissippi Parkway beyond its existing terminus at SR 33; however, the No-Build Alternative would include projects in the study area that are identified in the Knoxville Region Long Range Transportation Plan (LRTP) 2005 to 2030, including those projects listed below:

- Improving SR 33, including widening to four lanes and making intersection improvements at Brown School Road;
- Improving sections of US 411, including adding a center turn lane and reconstructing substandard two-lane sections;
- Reconstructing substandard two-lane sections of Peppermint Hills Road, Sam Houston School Road, and Ellejoy Road;
- Constructing new six-lane Relocated Alcoa Highway; and
- Improving Alcoa Highway (SR 115) by adding turn lanes and traffic signals and widening four-lane sections to six-lanes.

The **Build Alternatives** are defined below.

Extend Pellissippi Parkway. Under this concept, existing Pellissippi Parkway would be extended from SR 33 to US 321 as a four-lane divided roadway, with interchanges at SR 33, US 411 and US 321. The two alternate alignments under consideration for the DEIS, Alternative A and Alternative C, are:

- **Alternative A:** This alternative alignment generally follows the corridor identified and investigated in the 2002 Environmental Assessment (EA) and selected as the preferred alternative. This alternative starts on the east side of SR 33, opposite the existing half interchange of Pellissippi Parkway and SR 33. From this terminus, the route follows a generally easterly and southeasterly path to Wildwood Road, passing through former farmlands that are now the site of the proposed Pellissippi Center Research and Development Park. Alternative A also runs west of Mount Lebanon Road in this area. After crossing Wildwood Road, the alignment continues in a generally southerly direction, crossing Brown School Road, US 411 east of the Davis Ford Road intersection with US 411, and Davis Ford Road, and then passing along the northeastern edge of the Kensington Place mobile home park. The alignment intersects with US 321 just east of Flag Branch. Alternative A is approximately 4.38 miles in length.
- **Alternative C:** This alternative shares the route of Alternative A from SR 33 to the vicinity of Brown School Road, at which point Alternative C diverges to the east. Alternative C then runs in a southeasterly direction, crossing US 411 about 0.6 mile east of Alternative A. It continues southeasterly to cross Davis Ford Road and proceeds southerly, crossing Centennial Church Road about 500 feet west of Helton Road, crossing John Helton Road and terminating with US 321 at Hubbard School Road. The alternative is approximately 4.68 miles in length.
- **Alternative D:** The alternative concept of upgrading a two-lane network of existing roads to serve as a two-lane connection between SR 33 and US 321 emerged during the course of this study based on discussions with the public about travel needs and environmental concerns. This upgraded network was seen as a way to improve some of the currently deficient two-lane roads in the study area and provide a more direct connection between SR 33 and US 321 east of Maryville without having a new freeway-type facility. A route using portions of existing Sam Houston, Peppermint Road, Hitch Road, and Helton Road was identified. Under this alternative, now referred to as Alternative D, an improved two-lane roadway with adequate shoulders would be constructed using the

existing roadway alignment where possible, while straightening curves and realigning intersections and using new location to provide a continuous route with a 50 mile per hour design speed. The length of this corridor is approximately 5.77 miles.

3.0 Project Setting

The proposed project is located near the cities of Maryville and Alcoa in north central Blount County, Tennessee. It is shown on the Maryville United States Geological Survey 7.5 minute topographic quadrangle. This portion of the county is within the Ridge and Valley physiographic unit. The region's roughly parallel ridges and valleys have a variety of widths, heights, and geologic materials, including limestone, dolomite, shale, siltstone, sandstone, chert, mudstone, and marble (Miller 1974). Soils in the areas are primarily in the Decatur-Dewey-Waynesboro and the Talbott-Rock outcrop-Etowah soil associations described in the Soil Survey Geographic (SSURGO) database for Blount County Area, Tennessee. The proposed project lies within the Fort Loudoun Lake watershed, Hydrologic Unit Code (HUC) 06010201.

4.0 Terrestrial Ecology

Most of the land in the project corridor has been disturbed at one time or another. A small percentage of the land is forested or in shrub/scrub thickets. The majority of the land is being utilized for agricultural activities such as cash crop production or as pastureland for grazing livestock. A conversion of agricultural land to residential use is also evident by the presence of the numerous, existing and currently being constructed, single-family home subdivisions throughout the alternative corridors. Some old field habitats are also present where pastureland has been left fallow.

Plant communities found in the area are characteristic of communities formed over limestone and sandstone. Different communities may develop on different strata; elevation differences also have an influence. 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, spiders and other arachnids, and insects.

Old-field habitats in various stages of succession are also useful to many types of wildlife. 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.

4.1 Affected Environment

Industrial, Commercial, and Residential Communities

The industrial and commercial areas were primarily located along the existing roadway networks that are intersected by the proposed alternative corridors. The most significant concentration of commercial businesses were located at the southern terminus of the proposed project along US 321/SR 73/East Lamar Alexander Parkway and included gasoline service stations, professional buildings (e.g. dentist office, lawyer's office, Blount County Records Management, etc.), churches, and retail stores. The residential areas were located throughout the proposed alternative corridors and were typically single-family home subdivisions. Common vegetation observed in these maintained and manicured areas were mature hardwood trees that included tulip poplar (*Liriodendron tulipifera*), white oak (*Quercus alba*), and maples (*Acer spp.*). Ornamental shrubs and bushes were also common and included Bradford pear (*Pyrus calleryana*) and American holly (*Ilex opaca*).

Agricultural

Agriculture represented the largest land use type within the proposed alternative corridors and consisted of cash crop fields and pastureland used for grazing livestock. Dominant vegetation within the pastureland areas and along the edge of the cash crop fields included fescue (*Festuca sp.*), red and white clover (*Trifolium pratense* and *T. repens*), goldenrods (*Solidago spp.*), queene anne's-lace (*Daucus carota*), and purple top (*Tridens flavus*). The most common cash crop encountered within the proposed project corridor was corn.

Forested Communities

The forested and shrub/scrub areas primarily occur in small fragmented tracts within the agricultural fields and along the numerous stream corridors and fence rows located within the proposed alternative corridors. The forested areas were typified by mixed upland hardwood forests with varying degrees of succession. The dominant canopy species included red maple (*Acer rubrum*), water oak (*Quercus nigra*), tulip poplar, sweetgum (*Liquidambar styraciflua*),

and southern red oak (*Quercus falcata*). Common sub-canopy species observed in the forested areas included small tree, shrub, and vine species such as flowering dogwood (*Cornus florida*), strawberry bush (*Muntingia calabura*), Chinese privet (*Ligustrum sinense*), common greenbrier (*Smilax rotundifolia*), and Japanese honeysuckle (*Lonicera japonica*). The forest floor consisted of herbaceous species that included Christmas fern (*Polystichum acrostichoides*), wild ginger (*Asarum canadense*), poison ivy (*Toxicodendron radicans*), and trumpet creeper (*Campsis radicans*).

Old Field Communities

The old field communities were abandoned pastureland areas that are gradually being over taken by various tree, shrub, and vine species including hawthorns (*Crataegus spp.*), Chinese privet, smooth sumac (*Rhus glabra*), blackberry (*Rubus sp.*), and Japanese honeysuckle.

4.2 Direct impacts

Alternatives A and C are new location corridors and would likely have the greatest impacts to the terrestrial vegetation communities that occur within the area. The most significant impact would be the reduction of forested communities and open spaces that are within the proposed project corridor. Forested habitats typically provide the greatest value for wildlife in terms of habitat, refuge, and foraging opportunities. Currently, forest communities make up approximately 21 percent of Alternative A and 18 percent of Alternative C, and primarily occur as small (1 to 2 acres) fragmented tracts, or along stream corridors and fence rows. The agricultural and old field communities also provide foraging opportunities as well as nesting potential for numerous bird species. The agricultural and old field communities would incur the largest impact from the proposed project as they constitute approximately 77 percent of Alternatives A and C. The remaining land use is comprised of residential and commercial areas that are located throughout Alternatives A and C and along many of the existing roadway networks. These areas also provide some foraging and nesting opportunities for birds as they often consist of fruit producing trees and shrubs. Alternative D would also impact forest, agriculture, and old field habitats; however, the impact would mainly occur to the edges of these communities as it is primarily an upgrade of existing roadway networks. Table 4.1 represents the current terrestrial habitat acres that would likely be impacted by the proposed project.

Table 4.1 - 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	37 ac.	132 ac.	3 ac.	172
Alternative C	33 ac.	145 ac.	9 ac.	187
Alternative D	20 ac.	79 ac.	21 ac.	120

Note: These acreage amounts were calculated based on typical sections 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 Peppermint Road, Sam Houston Road, Hitch Road, and Helton 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 would actually be disturbed, since lands outside those needed for actual construction or work zones or for other reasons would not be cleared.

Additionally, 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 (i.e. disease, habitat degradation, or elimination, etc.), then traffic-related mortality can contribute to the demise of the population. Although vegetated rights-of-way would be maintained after project construction, these areas would not be planted with wildlife-attracting plant species as a means to reduce vehicle-wildlife collisions. As a result, rights-of-way would not effectively serve to provide refuge for local wildlife as the surrounding areas continue to urbanize and habitats are further reduced in size and number.

Highway noise can affect the utilization of habitats by wildlife. Although the proposed project is located within a largely rural area, low density residential development occurs throughout the proposed alternative corridors. In addition, the proposed project corridor is traversed by several major roadways (Wildwood Road, Sevierville Road, and East Lamar Alexander Parkway) which carry large volumes of traffic and is bordered by moderate densities of commercial and residential development. Therefore, noise is already a factor within many of the existing habitats, particularly those in the vicinity of the existing East Lamar Alexander Parkway.

4.3 Indirect Impacts

The proposed project would likely accelerate development within the area as accessibility is improved. Therefore, forest communities and open spaces would likely be further reduced as these areas are converted to developed land uses. The loss of habitat would further displace 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.

4.4 Cumulative Impacts

The proposed project occurs in an area that is currently rural and is characterized by agricultural fields and pastureland. Forested acres in the area are minimal due to the historic and current agricultural use of the land. Although the area is rural, it is experiencing growth pressures from the cities of Maryville and Alcoa, Tennessee. The greatest impact from these growth pressures is the conversion of the agricultural fields and pastures to single-family home subdivisions. This conversion trend is likely to continue as the local economies of Maryville and Alcoa continue to grow making the area more attractive to individuals and businesses. The completion of the proposed project would also contribute to the development of the area as it would make this region more accessible to the traveling public. Therefore, the completion of the proposed project and the current development trends would likely contribute to the overall loss of open spaces (i.e. agricultural fields and pastures) and forested acres.

4.5 Potential Impacts to Migratory Bird Species

As directed under Executive Order 13186, in furtherance of the Migratory Bird Treaty Act (16 U.S.C. 703-711), actions must be taken to avoid or minimize impacts to migratory bird resources and to prevent or abate the detrimental alteration of the environment for the benefit of migratory birds, as practicable.

The Migratory Bird Treaty Act protects over 1,500 migratory bird species (see 50 C.F.R. 10.13, List of Migratory Birds) in the U.S. and its territories. Large tracts of undeveloped, forested habitat are required for the successful nesting of many migratory bird species. Forest fragmentation is thought to be one of the leading contributors to the decline in migratory bird populations. The edge habitat created by fragmentation contributes to increasing populations of disturbance-tolerant predators, such as opossums (*Didelphis virginiana*), raccoons (*Procyon lotor*), domestic cats (*Felis catus*), and parasitic birds such as the brown-headed cowbird (*Molothrus ater*) a brood parasite that lays its eggs in the nests of many migratory bird species, reducing the success for the host bird species.

The proposed project corridors traverse an area of Blount County that is experiencing significant growth due to its location to the metro Knoxville area and the developing cities of Maryville and Alcoa, Tennessee. Therefore, the land use is being converted into residential and commercial development in an area that was historically dominated by agricultural fields and forested vegetative communities. The existing vegetative communities along the proposed project corridor consist of upland hardwood forests, scrub-shrub communities, and agricultural fields/pasture communities. Typically, forested habitats, such as the upland hardwood communities, provide the best foraging and nesting habitat for a majority of the migratory bird species. However, the upland hardwood communities that occur along the proposed project corridor have been drastically disturbed by past and present land use activities resulting in the fragmentation and degradation of this vegetative community. While the upland hardwood forests would provide foraging and nesting opportunities for migratory bird species, the significance of these forested areas has been greatly diminished due to their small size and degraded condition.

Given the existing conditions of the proposed project corridors, migratory bird species currently utilizing the area for nesting and foraging are likely adapted to frequent disturbances, habitat

alteration, and other anthropogenic activities and any impacts to migratory bird species from the construction of the proposed project would likely be minimal. Furthermore, it is not likely that the area is of great significance to migratory bird species as it does not contain large amounts of undisturbed forested habitat, which is preferred by most migratory bird species.

5.0 Aquatic Ecology

Aquatic ecology of the proposed project corridors is associated with resources known as “jurisdictional waters of the U.S.” Jurisdictional Waters of the U.S. are defined by 33 CFR Part 328.3(b) and are protected by Section 404 of the Clean Water Act (33 USC 1344), which is administered and enforced by the U.S. Army Corps of Engineers (USACE). An assessment of jurisdictional Waters of the U.S. that would be impacted by the proposed project was performed using USGS topography maps, National Wetland Inventory maps and county soil survey maps in-house and then refined during field visits. Wetland locations were determined using the Corps of Engineers Wetlands Delineation Manual (USACE 1987). This multi-parameter approach requires positive evidence of three criteria: 1) hydrophytic vegetation, 2) hydric soils, and 3) wetland hydrology.

Areas were considered wetlands if they exhibited evidence of all three of the above wetland parameters. Other waters of the U.S. (i.e. non-wetland waters) were considered jurisdictional streams if they exhibited a definable channel and showed evidence of water flow at times other than major storm events, and the lack of terrestrial vegetation. Jurisdictional limits for non-wetland waters were based upon the “ordinary high water mark” (OHWM), defined by:

“...that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas” (33CFR 328.5(f))

Stream channels below the OHWM are currently considered regulated waters of the U.S. by the USACE. For the USACE purposes, perennial streams and a subclass of intermittent streams are considered “streambed.” Intermittent streams with the channel bed generally below the normal groundwater table and capable of supporting aquatic life are considered streambed. Intermittent

streams with an OHWM and a channel above the normal groundwater table are considered wet-weather conveyances, or non-streambed. Wet-weather conveyances strictly have stream flow for a short duration following storm events and do not support aquatic organisms under normal conditions.

The proposed project alternatives have been located, and the chosen alternative would be designed, to avoid major impacts to waters of the state to the extent practicable. Efforts to further minimize impacts would continue throughout the design, permitting, and construction processes. Unavoidable impacts would 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 would be included in the project construction plans. TDOT would also implement its Standard Specifications for Road and Bridge Construction, which includes 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. All waters of the U.S. locations were mapped in the field using a Trimble® GeoXT™ handheld global positioning system (GPS) unit. The locations of identified water resources are shown on Figures 2A – 2I and the hydric soils are shown in Figures 3A – 3G, which are provided in Appendix A. Photographs of the jurisdictional waters of the U.S. are provided in Appendix B.

5.1 Non-Wetland Waters of the U.S.

Non-wetland waters of the U.S. occurring within the proposed Alternatives A, C, and D corridors include ponds (man-made and impounded), perennial streams, intermittent streams, and certain ephemeral streams (wet weather conveyances). Streams were determined to be perennial based upon (1) symbology shown on USGS 7.5-minute topographic quadrangles, (2) presence of flowing water, and (3) the presence of aquatic organisms, most notably fish and benthic macroinvertebrates. A non-flowing stream was deemed intermittent streambed if the channel intercepted the groundwater table or standing water was present. Watercourses considered wet weather conveyances lacked standing or flowing water and showed evidence of flow only after a short duration of rainfall events.

Streams, springs, seeps, impoundments and other watercourses and waterbodies (i.e. non-wetland waters of the U.S.) which are known at this time to be potentially affected by the project alternatives are described in the following paragraphs and listed in Tables 5.1 through 5.9 of this report, along with the potential direct impacts. In addition, field data sheets (Appendix C – Field Data Sheets) were prepared for each non-wetland water of the U.S. that may be impacted by the proposed alternatives. The determinations as to which are waters of the State and/or of the U.S. have not been confirmed by Tennessee Department of Environment and Conservation (TDEC) and the USACE. These determinations would be made during the final design phase of the proposed project. All aquatic impacts identified as project development continues would be avoided, minimized, or mitigated to the extent possible, and incorporated into the permitting.

Alternative A

Stream (STR)-1 is an unnamed warm-water intermittent tributary to the Little River. It is located approximately 0.4 miles north of Eagleton Village. This medium-quality stream was 2.5 feet wide with moderately stable 2.0 - foot tall banks with minor scouring. The average wetted width and depth are 2.0 feet and 1.0 feet, respectively. STR-1 had negligible flow. The substrate consisted of sand and silt. There was no canopy cover or riparian buffer present along STR-1. Dominant vegetative species observed along STR-1 consisted of fescue (*Festuca* sp.), common cat-tail (*Typha latifolia*), dotted smartweed (*Polygonum punctatum*), ironweed (*Vernonia* sp.), and bahiagrass (*Paspalum* sp.). Approximately 340 linear feet of STR-1 would

be permanently impacted by the proposed project. The impact would result from the placement of a culvert under the proposed roadway.

STR-2 is an unnamed warm-water intermittent tributary to the Little River. It is located approximately 0.4 miles north of Eagleton Village. This medium-quality stream was 2.5 feet wide with 4.0 - foot tall eroded unstable banks with sloughing present. The average wetted width and depth are 2.0 feet and 1.0 feet, respectively. STR-2 had negligible flow. The substrate consisted of organic debris with areas of exposed sand. There was no canopy cover over this portion of STR-2. The riparian buffer consisted of fescue, common cat-tail, dotted smartweed, ironweed, bahiagrass, American beech (*Fagus grandifolia*), shortleaf pine (*Pinus taeda*), American sycamore (*Platanus occidentalis*), common hackberry (*Celtis occidentalis*), and flowering dogwood (*Cornus florida*). Approximately 147 linear feet of STR-2 would be permanently impacted by the proposed project. The impact would result from the placement of a culvert under the proposed roadway.

STR-3 is an unnamed warm-water perennial tributary to the Little River. It is located approximately 0.57 miles slightly southwest of the intersection of Sam Houston School Road and Mount Lebanon Road. This medium-quality stream was 6.0 feet wide with 5.0 - foot tall moderately stable banks with scouring and sloughing present. The average wetted width and depth are 3.0 feet and 0.2 feet, respectively. STR-3 had a flow of 1.0 foot per second. The substrate consisted of sand, silt, gravel, cobble, and bedrock. There was no canopy cover over this portion of STR-3. There was a 150-foot riparian buffer present on the left and right banks of STR-3. Dominant vegetative species included panic grass (*Panicum* sp.), white oak (*Quercus alba*), white ash (*Fraxinus Americana*), basswood (*Tilia Americana*), common greenbrier (*Smilax rotundifolia*), American beech, Chinese privet (*Ligustrum sinense*), blackberry (*Rubus* sp.), and flowering dogwood. Approximately 640 linear feet of STR-3 would be permanently impacted by the proposed project. The impact would result from channel relocation and the placement of a culvert under the proposed roadway.

STR-4 is an unnamed warm-water perennial tributary to the Little River. It is located approximately 0.26 miles slightly northwest of the intersection of Melody Road and Mount Lebanon Road. This medium-quality stream was 3.0 feet wide with 2.0 - foot tall moderately stable and gently sloping banks. The average wetted width and depth are 0.1 feet. STR-4 had a

stream flow of 1.0 foot per second. The substrate consisted of sand, silt, gravel, cobble, and bedrock. Canopy cover over STR-4 was approximately 40 percent. There was a riparian buffer present of greater than 200 feet on the left bank and 20 feet on the right bank of STR-4. Dominant vegetative species included American beech, Chinese privet, flowering dogwood, blackberry, panic grass, white oak, white ash, basswood, and common greenbrier. STR-4 is located outside of the proposed project. Sediment run-off is the only potential impact to STR-4 by the proposed project.

STR-5 is an intermittent tributary to the Little River. It is located approximately 0.26 miles slightly northwest of the intersection of Wildwood Road and Mount Lebanon Road. The conveyance has a width of 2.0 feet and a depth of 1.0 foot. This channel is represented by a dashed blue line on the Maryville USGS topographic quarter quad. This stream currently flows through a straightened channel, which is likely the result of the surrounding land-use activities. At the time of survey no water was present within the channel, nor any remnants of aquatic life. However, a field survey conducted on December 17, 2009 by the Division of Water Pollution Control (WPC), observed water in the stream channel and identified several aquatic species from the orders Trichoptera, Ephemeroptera, Odonata, Diptera, and Gastropoda. The dominant vegetation in the buffer around STR-5 consisted of blackberry, Chinese privet, Canada goldenrod (*Solidago Canadensis*), and Japanese honeysuckle (*Lonicera japonica*). The soil within the channel was mostly clay with a high chroma indicating non-hydric soils. Approximately 300 linear feet of STR-5 would be permanently impacted by the proposed project. The impact would result from the placement of a culvert under the proposed roadway.

STR-6, Peppermint Branch, is a warm-water intermittent tributary to the Little River. It is located approximately 0.7 miles northwest of the intersection of Peppermint Road and Sevierville Road. This medium-quality stream was 6.0 feet wide with 4.0 - foot tall somewhat unstable banks with minor scouring and sloughing. No water was present within the channel at the time of the survey. The substrate consisted of sand, silt, and gravel. Canopy cover over STR-5 was approximately 80 percent. There was a riparian buffer present of 100 feet on the left bank and 200 feet on the right bank of STR-6. Dominant vegetative species included Chinese privet, panic grass, American sycamore, black tupelo (*Nyssa Sylvatica*), poison ivy (*Toxicodendron radicans*), Christmas fern (*Polystichum acrosichoides*), flowering dogwood,

American elm (*Ulmus Americana*), common ivy (*Hedera helix*), common greenbrier, and mockernut hickory (*Carya tomentosa*). Approximately 336 linear feet of STR-6 would be permanently impacted by the proposed project. The impact would result from channel relocation and the placement of a culvert under the proposed roadway.

STR-7 is an intermittent tributary to the Little River. It is located approximately 0.3 miles northwest of the intersection of Davis Ford Road and Nina Delozier Road. The stream channel has a width of 8.0 feet and a depth of 3.0 feet. This channel is represented by a solid blue line on the Maryville USGS topographic quarter quad indicating that STR-7 is a perennial stream. However, past and present land-use activities, upstream of this location, have likely altered the area hydrology, resulting in less frequent flows in the stream channel. Therefore, STR-7 is likely an intermittent stream channel, at this location of the stream, as no water was observed or any remnants of aquatic life during the field surveys. However, a field survey conducted on December 17, 2009 by the WPC, observed water in the stream channel and identified aquatic species from the orders Trichoptera and Diptera. The dominant vegetation in the buffer around STR-7 consisted of white oak, Chinese privet, red maple, sweetgum (*Liquidambar styraciflua*), blackberry, poison ivy, American elm, and slippery elm. The soil within the channel was mostly clay with a high chroma indicating non-hydric soils. Approximately 335 linear feet of STR-7 would be permanently impacted by the proposed project. The impact would result from the placement of a culvert under the proposed roadway.

STR-8, Gravelly Creek, is a warm-water perennial tributary to the Little River. It is located approximately 0.47 miles north of Morning Star Church. This medium-quality stream was 12.0 feet wide with 3.0 - foot tall gently sloping moderately stable banks. STR-8 had a moderate stream flow of approximately 3.0 feet per second. The stream channel substrate consisted of sand, silt, gravel, and bedrock. Canopy cover over STR-8 was approximately 30 percent. There was a riparian buffer present of 25 feet on both the left and right banks of STR-8. Dominant vegetative species included American elm, water oak (*Quercus nigra*), goldenrod (*Solidago* sp.), Chinese privet, red maple (*Acer rubrum*), black tupelo, poison ivy, eastern red cedar (*Juniperus virginiana*), and eastern redbud (*Cercis Canadensis*). Approximately 640 linear feet of STR-8 would be permanently impacted by the proposed project. The impact would result from channel relocation and the placement of a culvert under the proposed roadway.

STR-9, Flag Branch, is a warm-water perennial tributary to the Little River. It is located approximately 0.23 miles north of Morning Star Church. This medium-quality stream was 15.0 feet wide with 8.0 - foot tall moderately stable banks. STR-9 had stream flow that was mostly riffle and run. The stream channel substrate consisted of sand, silt, gravel, and bedrock. Canopy cover over STR-9 was approximately 20 percent. There was a riparian buffer present of 25 feet on both the left and right banks of STR-9. Dominant vegetative species included strawberry bush (*Euonymus americanus*), slippery elm (*Ulmus rubra*), poison ivy, Virginia creeper (*Parthenocissus quinquefolia*), black tupelo, Chinese privet, cucumber tree (*Magnolia acuminata*), chestnut oak (*Quercus prinus*), eastern red cedar, water oak, and green ash (*Fraxinus pennsylvanica*). Approximately 480 linear feet of STR-9 would be permanently impacted by the proposed project. The impact would result from channel relocation and the placement of a culvert under the proposed roadway.

Wet Weather Conveyance (WWC)-1 is a wet weather conveyance and tributary to the Little River. It is located approximately 0.3 miles northeast of the intersection of Old Knoxville Highway and Jackson Drive. The conveyance has a width of 2.0 feet and a depth of 1.0 foot. This channel is represented by a solid blue line on the Maryville United States Geological Society (USGS) topographic quarter quad. Although the channel is represented as a stream, recent land practices have destroyed all features that would designate the channel as jurisdictional. At the time of survey no water was present within the channel. The channel was covered by fescue. The soil within the channel was mostly clay with a high chroma indicating non-hydric soils. The munsell color for the soil was 7.5 YR 4/6. Approximately 415 linear feet of WWC-1 would be permanently impacted by the proposed project. The impact would result from the placement of a culvert under the proposed roadway.

WWC-2 is a wet weather conveyance and tributary to the Little River. It is located approximately 0.3 miles south of the intersection of Davis Ford Road and Nina Delozier Road. The conveyance has a width of 3.0 feet and a depth of 1.0 feet. This channel is not designated on the Maryville USGS topographic quarter quad as any type of resource. It was created due to existing topography, land uses, and property maintenance. At the time of survey no water was present within the channel, nor any remnants of aquatic life. The dominant vegetation in the buffer around WWC-2 consisted of giant goldenrod, fescue, foxtail grass (*Alopecurus* sp.), and

purpletop (*Tridens flavus*). The soil within the channel was mostly clay with a high chroma indicating non-hydric soils. Approximately 426 linear feet of WWC-2 would be permanently impacted by the proposed project. The impact would result from the placement of a culvert under the proposed roadway.

WWC-3 is a wet weather conveyance and tributary to the Little River. It is located approximately 0.57 miles southeast of the intersection of Davis Ford Road and Nina Delozier Road. The conveyance has a width of 20.0 feet and a depth of 1.0 foot. This channel is not designated on the Maryville USGS topographic quarter quad as any type of resource. It was created due to existing topography, land uses, and property maintenance. At the time of survey no water was present within the channel, nor any remnants of aquatic life. The dominant vegetation in the buffer around WWC-3 consisted of fescue, smooth paspalum (*Paspalum leave*), American blue-eyed grass (*Sisyrinchium montanum*), and foxtail grass. The soil within the channel was mostly clay with a high chroma indicating non-hydric soils. WWC-3 is located outside of the proposed project limits, and would not be impacted by the proposed roadway.

Pond (PND)-1 is a 1.3 acre freshwater man-made impoundment of STR-4. PND-1 was designated as a blue polygon on the Maryville USGS topographic quad. Water depth was undeterminable. Water quality was good, and water color had a slight green tint. Dominant vegetation around PND-1 included American beech, Chinese privet, red maple, American winterberry (*Ilex verticillata*), Christmas fern, and fescue. A picture of PND-1 can be seen in Appendix B as Photo 7. PND-1 is located outside of the proposed project limits, and would not be impacted by the proposed roadway.

PND-2 is a 0.4 acre isolated man-made depression. PND-2 was designated as a blue polygon on the Maryville USGS topographic quad. Water depth was undeterminable. Water quality was good, and water color had a slight green tint. Dominant vegetation around PND-2 included giant goldenrod and American pokeweed (*Phytolacca Americana*). A picture of PND-2 can be seen in Appendix B as Photo 9. PND-2 is located outside of the proposed project limits, and would not be impacted by the proposed roadway.

Alternative C

STR-1 is an unnamed warm-water intermittent tributary to the Little River. It is located approximately 0.4 miles north of Eagleton Village. This medium-quality stream was 2.5 feet wide with moderately stable 2.0 - foot tall banks with minor scouring. The average wetted width and depth are 2.0 feet and 1.0 feet, respectively. STR-1 had negligible flow. The substrate consisted of sand and silt. There was no canopy cover or riparian buffer present along STR-1. Dominant vegetative species observed along STR-1 consisted of fescue, common cat-tail, dotted smartweed, ironweed, and bahiagrass. Approximately 340 linear feet of STR-1 would be permanently impacted by the proposed project. The impact would result from the placement of a culvert under the proposed roadway.

STR-2 is an unnamed warm-water intermittent tributary to the Little River. It is located approximately 0.4 miles north of Eagleton Village. This medium-quality stream was 2.5 feet wide with 4.0 - foot tall eroded unstable banks with sloughing present. The average wetted width and depth are 2.0 feet and 1.0 feet, respectively. STR-2 had negligible flow. The substrate consisted of organic debris with areas of exposed sand. There was no canopy cover over this portion of STR-2. The riparian buffer consisted of fescue, common cat-tail, dotted smartweed, ironweed, bahiagrass, American beech, shortleaf pine, American sycamore, common hackberry, and flowering dogwood. Approximately 147 linear feet of STR-2 would be permanently impacted by the proposed project. The impact would result from the placement of a culvert under the proposed roadway.

STR-3 is an unnamed warm-water perennial tributary to the Little River. It is located approximately 0.57 miles slightly southwest of the intersection of Sam Houston School Road and Mount Lebanon Road. This medium-quality stream was 6.0 feet wide with 5.0 - foot tall moderately stable banks with scouring and sloughing present. The average wetted width and depth are 3.0 feet and 0.2 feet, respectively. STR-3 had a flow of 1.0 foot per second. The substrate consisted of sand, silt, gravel, cobble, and bedrock. There was no canopy cover over this portion of STR-3. There was a 150-foot riparian buffer present on the left and right banks of STR-3. Dominant vegetative species included panic Chinese privet, blackberry, and flowering dogwood. Approximately 640 linear feet of STR-3 would be permanently impacted by the

proposed project. The impact would result from channel relocation and the placement of a culvert under the proposed roadway.

STR-4 is an unnamed warm-water perennial tributary to the Little River. It is located approximately 0.26 miles slightly northwest of the intersection of Melody Road and Mount Lebanon Road. This medium-quality stream was 3.0 feet wide with 2.0 - foot tall moderately stable and gently sloping banks. The average wetted width and depth are 0.1 feet. STR-4 had a stream flow of 1.0 foot per second. The substrate consisted of sand, silt, gravel, cobble, and bedrock. Canopy cover over STR-4 was approximately 40 percent. There was a riparian buffer present of greater than 200 feet on the left bank and 20 feet on the right bank of STR-4. Dominant vegetative species included American beech, Chinese privet, flowering dogwood, blackberry, panic grass, white oak, green ash, basswood, and common greenbrier. STR-4 is located outside of the proposed project. Sediment run-off is the only potential impact to STR-4 by the proposed project.

STR-5 is an intermittent tributary to the Little River. It is located approximately 0.26 miles slightly northwest of the intersection of Wildwood Road and Mount Lebanon Road. The conveyance has a width of 2.0 feet and a depth of 1.0 foot. This channel is represented by a dashed blue line on the Maryville USGS topographic quarter quad. This stream currently flows through a straightened channel, which is likely the result of the surrounding land-use activities. At the time of survey no water was present within the channel, nor any remnants of aquatic life. However, a field survey conducted on December 17, 2009 by the WPC, observed water in the stream channel and identified several aquatic species from the orders Trichoptera, Ephemeroptera, Odonata, Diptera, and Gastropoda. The dominant vegetation in the buffer around STR-5 consisted of blackberry, Chinese privet, Canada goldenrod (*Solidago Canadensis*), and Japanese honeysuckle (*Lonicera japonica*). The soil within the channel was mostly clay with a high chroma indicating non-hydric soils. Approximately 300 linear feet of STR-5 would be permanently impacted by the proposed project. The impact would result from the placement of a culvert under the proposed roadway.

STR-6, Peppermint Branch, is a warm-water perennial tributary to the Little River. It is located approximately 0.5 miles northwest of the intersection of Sevierville Road and Nina Delozier Road. This medium-quality stream was 7.0 feet wide with 8.0 - foot tall moderately stable banks

with minor scouring and sloughing. At the time of the survey the water surface width was 7.0 feet across, and the depth was 0.5 foot. The substrate consisted of sand, silt, cobble, and gravel. Canopy cover over STR-6 was approximately 30 percent. There was a riparian buffer of 50 feet present on the left bank of STR-6. The riparian buffer on the right bank had been completely eliminated. Dominant vegetative species included American basswood, American elm, green ash, Chinese privet, fescue, water oak, and red maple. Approximately 247 linear feet of STR-6 would be permanently impacted by the proposed project. The impact would result from the placement of a culvert under the proposed roadway.

STR-7 is a warm-water perennial tributary to the Little River. It is located approximately 0.5 miles northwest of the intersection of Sevierville Road and Nina Delozier Road. STR-7 was not previously documented on the Maryville USGS topographic quarter quad. It was created by the water that drains out of WTL-5. This medium-quality stream was 1.5 foot wide with 3.0 - foot tall stable and gently sloping banks. At the time of the survey the water surface width was 1.5 feet across, and the depth was 0.5 foot. The substrate consisted of sand and silt. Canopy cover over STR-7 was mostly eliminated. The riparian buffer on the left and right bank of STR-7 was mostly eliminated. Dominant vegetative species included fescue, bahiagrass, and swamp smartweed (*Polygonum hydropiperoides*). Approximately 330 linear feet of STR-7 would be permanently impacted by the proposed project. The impact would result from the placement of a culvert under the proposed roadway.

STR-8 is an intermittent tributary to the Little River. It is located approximately 0.5 miles northeast of the intersection of Davis Ford Road and Nina Delozier Road. The stream channel has a width of 11.0 feet and a depth of 12.0 feet. This channel is represented by a solid blue line on the Maryville USGS topographic quarter quad indicating STR-8 is a perennial stream. However, past and present land-use activities, upstream of this location, have likely altered the area hydrology, resulting in less frequent flows in the stream channel. Therefore, STR-8 is likely an intermittent stream channel, at this location of the stream, as no water was observed or any remnants of aquatic life during the field surveys. However, a field survey conducted on December 17, 2009 by the WPC, observed water in the stream channel and identified aquatic species from the orders Trichoptera, Ephemeroptera, Odonata, Gastropoda, Isopoda, Diptera, and Oligochaeta. The dominant vegetation in the buffer around STR-8 consisted of Chinese

privet, flowering dogwood, cat greenbrier (*Smilax glauca*), Japanese honeysuckle, American beech, fescue, blackberry, and trumpet creeper. The soil within the channel was mostly clay with a high chroma indicating non-hydric soils. Approximately 287 linear feet of STR-8 would be permanently impacted by the proposed project. The impact would result from the placement of a culvert under the proposed roadway.

STR-9, Gravelly Creek, is a warm-water perennial tributary to the Little River. It is located approximately 0.14 miles south of Centennial Church. This medium-quality stream was 33.0 feet wide with 2.0 - foot tall stable and gently sloping banks. At the time of the survey the water surface width was 11.0 feet across, and the depth was 0.5 foot. STR-9 had a stream flow of 1.0 foot per second. The substrate consisted of sand, gravel, and silt. Canopy cover over STR-9 was approximately 70 percent. There was a riparian buffer of 25 feet present on both the left and right banks of STR-9. Dominant vegetative species included American beech, sweetgum, and red maple. Approximately 311 linear feet of STR-9 would be permanently impacted by the proposed project. The impact would result from the placement of a culvert under the proposed roadway.

STR-10, Flag Branch, is a warm-water perennial tributary to the Little River. It is located approximately 0.27 miles south of Centennial Church. This medium-quality stream was 8.0 feet wide with 5.0 - foot tall moderately stable banks. STR-10 had stream flow that was mostly riffle and run. The stream channel substrate consisted of sand, silt, and small gravel. Canopy cover over STR-10 was approximately 20 percent. There was a riparian buffer present of 25 feet on both the left and right banks of STR-10. Dominant vegetative species included American beech, sweetgum, and red maple. STR-10 is located outside of the proposed project. Sediment run-off is the only potential impact to STR-10 by the proposed project.

WWC-1 is a wet weather conveyance and tributary to the Little River. It is located approximately 0.3 miles northeast of the intersection of Old Knoxville Highway and Jackson Drive. The conveyance has a width of 2.0 feet and a depth of 1.0 foot. This channel is represented by a solid blue line on the Maryville USGS topographic quarter quad. Although the channel is represented as a stream, recent land practices have destroyed all features that would designate the channel as jurisdictional. At the time of survey no water was present within the channel. The channel was covered by fescue. The soil within the channel was mostly clay with

a high chroma indicating non-hydric soils. The munsell color for the soil was 7.5 YR 4/6. Approximately 415 linear feet of WWC-1 would be permanently impacted by the proposed project. The impact would result from the placement of a culvert under the proposed roadway.

WWC-2 is a wet weather conveyance and tributary to the Little River. It is located approximately 0.6 miles northwest of the intersection of Sevierville Road and Nina Delozier Road. The conveyance has a width of 4.0 feet and a depth of 2.0 foot. This conveyance was created due to recent land practices and disturbances in the area. At the time of survey no water was present within the channel, nor any remnants of aquatic life. The dominant vegetation in the buffer around WWC-2 consisted of flowering dogwood, common ivy, American elm, Chinese privet, American beech, common greenbrier, Japanese honeysuckle, blackjack oak (*Quercus marilandrica*), chestnut oak, American holly (*Ilex opaca*), poison ivy, red maple, trumpet creeper (*Campsis radicans*), and sweetgum. The soil within the channel was mostly clay with a high chroma indicating non-hydric soils. WWC-2 is located outside of the proposed project. Sediment run-off is the only potential impact to WWC-2 by the proposed project.

PND-1 is a 1.3 acre freshwater man-made impoundment of STR-4. PND-1 was designated as a blue polygon on the Maryville USGS topographic quad. Water depth was undeterminable. Water quality was good, and water color had a slight green tint. Dominant vegetation around PND-1 included American beech, Chinese privet, red maple, American winterberry, Christmas fern, and fescue. PND-1 is located outside of the proposed project limits, and would not be impacted by the proposed roadway.

PND-2 is a 0.4 acre isolated man-made depression. PND-2 was designated as a blue polygon on the Maryville USGS topographic quad. Water depth was undeterminable. Water quality was good, and water color had a slight green tint. Dominant vegetation around PND-2 included giant goldenrod, and American pokeweed. PND-2 is located outside of the proposed project limits, and would not be impacted by the proposed roadway. Approximately 0.4 acres would be permanently impacted by the proposed project. The impact would result from the placement of fill material.

Alternative D

STR-1 is an unnamed warm-water intermittent tributary to the Little River. It is located approximately 0.2 miles west of the intersection of Mount Lebanon Road and Sam Houston School Road. This medium-quality stream was 4.0 feet wide with moderately stable 3.0 - foot tall banks with minor scouring and sloughing. The average wetted width and depth are 1.0 feet and 0.1 foot, respectively. STR-1 had negligible flow. The substrate consisted of sand, silt, gravel, and cobble. Canopy cover over STR-1 was approximately 40 percent. There was a riparian buffer of 25 feet present on both the left and right banks of STR-1. Dominant vegetative species included Chinese privet, poison ivy, box elder (*Acer negundo*), muscadine (*Vitis rotundifolia*), American elm, blackberry, and fescue. Approximately 108 linear feet of STR-1 would be permanently impacted by the proposed project. The impact would result from the placement of a culvert under the proposed roadway.

STR-2 is an unnamed warm-water perennial tributary to the Little River. It is located approximately 160.0 feet southwest of the intersection of Mount Lebanon Road and Sam Houston School Road. This medium-quality stream was 8.0 feet wide with moderately stable 4.0 - foot tall banks with minor scouring and sloughing. The average wetted width and depth are 4.0 feet and 0.3 foot, respectively. STR-2 had negligible flow. The substrate consisted of sand, silt, gravel, and cobble. Canopy cover over STR-2 was approximately 40 percent. There was a riparian buffer of 25 feet present on both the left and right banks of STR-2. Dominant vegetative species included box elder, poison ivy, cardinal flower (*Lobelia cardinalis*), Chinese privet, Japanese honeysuckle, strawberry bush, and trumpet creeper. Approximately 186 linear feet of STR-2 would be permanently impacted by the proposed project. The impact would result from the placement of a culvert under the proposed roadway.

STR-3 is an unnamed warm-water intermittent tributary to the Little River. It is located approximately 0.7 miles north of the intersection of DeArmond Road and Sam Houston School Road. This medium-quality stream was 1.5 feet wide with 2.0 - foot tall straight and incised banks. No water was present within the channel at the time of the survey. The substrate consisted of sand, gravel, and bedrock. Canopy cover over STR-3 was approximately 80 percent. A riparian buffer of 45 feet was present on both the left and right banks of STR-3. Dominant vegetative species included box elder, Japanese honeysuckle, Chinese privet, red

maple, black tupelo, Virginia creeper, blackjack oak, tulip tree (*Liriodendron tulipifera*), muscadine, and multiflora rose (*Rosa multiflora*). STR-3 is located outside of the proposed project limits, and would not be impacted by the proposed project.

STR-4 is an unnamed warm-water intermittent tributary to the Little River. It is located approximately 0.14 miles southeast of the intersection of Wildwood Road and Peppermint Road. This medium-quality stream was 3.5 feet wide with moderately stable 3.0 - foot tall banks with minor scouring and sloughing. No water was present within the channel at the time of the survey. The substrate consisted of sand and silt. Canopy cover over STR-4 was approximately 10 percent. The riparian buffer on both the left and right banks of STR-4 had been eliminated. Dominant vegetative species surrounding STR-4 includes Chinese privet, blackberry, and common greenbrier. Approximately 136 linear feet of STR-4 would be permanently impacted by the proposed project. The impact would result from the placement of a culvert under the proposed roadway.

STR-5, Peppermint Branch, is a warm-water perennial tributary to the Little River. It is located approximately 0.54 miles southeast of the intersection of Wildwood Road and Peppermint Road. This medium-quality stream was 2.5 feet wide with moderately stable 3.0 - foot tall banks with minor scouring and sloughing. The average wetted width and depth are 1.0 feet and 0.4 foot, respectively. Flow velocity for STR-5 was 0.5 foot per second. The substrate consisted of sand, gravel, and cobble. Canopy cover over STR-5 was approximately 10 percent. The riparian buffer on both the left and right banks of STR-5 had been eliminated. Dominant vegetative species included fescue, giant goldenrod, and blackberry. Approximately 168 linear feet of STR-5 would be permanently impacted by the proposed project. The impact would result from the placement of a culvert under the proposed roadway.

STR 6 is an intermittent tributary to the Little River. It is located approximately 0.55 miles slightly east of the intersection of Nina Delozier Road and Sevierville Road. The stream has a width of 11.0 feet and a depth of 12.0 feet. This channel is represented by a solid blue line on the Maryville USGS topographic quarter quad indicating STR-6 is a perennial stream. However, past and present land-use activities, upstream of this location, have likely altered the area hydrology, resulting in less frequent flows in the stream channel. Therefore, STR-6 is likely an intermittent stream channel, at this location of the stream, as no water was observed or any remnants of aquatic life during the field surveys. At the time of the survey no water was present within the channel, nor any remnants of aquatic life. However, a field survey conducted on December 17, 2009 by the WPC, observed water in the stream channel and identified aquatic species from the orders Trichoptera, Ephemeroptera, Odonata, Gastropoda, Isopoda, Diptera, and Oligochaeta. The dominant vegetation in the buffer around STR-6 consisted of Chinese privet, flowering dogwood, and trumpet creeper. The soil within the channel was mostly clay with a high chroma indicating non-hydric soils. Approximately 133 linear feet of STR-6 would be permanently impacted by the proposed project. The impact would result from the placement of a culvert under the proposed roadway.

STR-7, Crooked Creek, is a warm-water perennial tributary to the Little River. It is located approximately 0.66 miles northwest of the intersection of Lamar Alexander Road and Brookfield Road. This medium-quality stream was 15.0 feet wide with moderately stable 3.0 - foot tall banks with minor scouring and sloughing. The average wetted width and depth are 11.0 feet and 0.5 feet, respectively. Flow velocity for STR-7 was 2.0 feet per second. The substrate consisted of sand, gravel, and silt. Canopy cover over STR-7 was approximately 70 percent. A 200.0 foot riparian buffer was present on the left bank, and a 25.0 foot riparian buffer was present on the right bank. Dominant vegetative species included fescue, giant goldenrod, and blackberry. STR-7 is located outside of the proposed project limits, and would not be impacted by the proposed project.

STR-8, Gravelly Creek, is a warm-water perennial tributary to the Little River. It is located approximately 0.6 miles northwest of the intersection of Lamar Alexander Road and Brookfield Road. This medium-quality stream was 15.0 feet wide with moderately stable 2.0 - foot tall banks with incised scouring and sloughing. The average wetted width and depth are 11.0 feet

and 0.5 foot, respectively. Flow velocity for STR-8 was 1.0 foot per second. The substrate consisted of sand, silt, and gravel. Canopy cover over STR-8 was approximately 70 percent. A 100.0 foot riparian buffer was present on the right bank, and a 25.0 foot riparian buffer was present on the left bank. Dominant vegetative species included American beech, sweetgum, and red maple. Approximately 152 linear feet of STR-8 would be permanently impacted by the proposed project. The impact would result from the placement of a culvert under the proposed roadway.

WWC-1 is a wet weather conveyance and tributary to the Little River. It is located approximately 0.65 miles west of the intersection of Mount Lebanon Road and Sam Houston School Road. The conveyance has a width of 1.0 foot and a depth of 4.0 foot. This conveyance was created due to recent land practices and disturbances in the area. At the time of survey no water was present within the channel, nor any remnants of aquatic life. The dominant vegetation in the buffer around WWC-1 consisted of Chinese privet, blackberry, box elder, and common greenbrier. The soil within the channel was mostly clay with a high chroma indicating non-hydric soils. Approximately 167 linear feet of WWC-1 would be permanently impacted by the proposed project. The impact would result from the placement of a culvert under the proposed roadway.

WWC-2 is a wet weather conveyance and tributary to the Little River. It is located approximately 0.6 miles slightly north of the intersection of DeArmond Road and Sam Houston School Road. The conveyance has a width of 1.0 foot and a depth of 0.5 foot. This conveyance was created due to recent land practices and disturbances in the area. At the time of survey no water was present within the channel, nor any remnants of aquatic life. The dominant vegetation in the buffer around WWC-2 consisted of Chinese privet, blackberry, multiflora rose, common greenbrier, and tulip tree. The soil within the channel was mostly clay with a high chroma indicating non-hydric soils. Approximately 1,100 linear feet of WWC-2 would be permanently impacted by the proposed project. The impact would result from the placement of a culvert under the proposed roadway.

WWC-3 is a wet weather conveyance and tributary to the Little River. It is located approximately 188 feet slightly north of the intersection of DeArmond Road and Sam Houston School Road. The conveyance has a width of 3.0 feet and a depth of 2.0 feet. This conveyance was created due to recent land practices and disturbances in the area. At the time of survey no water was present within the channel, nor any remnants of aquatic life. The dominant vegetation in the buffer around WWC-3 consisted of Chinese privet, Japanese honeysuckle, red maple, box elder, blackgum, blackjack oak, common greenbrier, and tulip tree. The soil within the channel was mostly clay with a high chroma indicating non-hydric soils. Approximately 157 linear feet of WWC-3 would be permanently impacted by the proposed project. The impact would result from the placement of a culvert under the proposed roadway.

WWC-4 is a wet weather conveyance and tributary to the Little River. It is located approximately 0.64 miles southeast of the intersection of Wildwood Road and Peppermint Road. The conveyance has a width of 4.0 feet and a depth of 3.0 feet. This conveyance was created due to recent land practices and disturbances in the area. At the time of survey no water was present within the channel, nor any remnants of aquatic life. The dominant vegetation in the buffer around WWC-4 consisted of Chinese privet, red maple, blackgum, and tulip tree. The soil within the channel was mostly clay with a high chroma indicating non-hydric soils. WWC-4 is located outside of the proposed project limits, and would not be impacted by the proposed project.

PND-1 is a 2.0 acre freshwater man-made impoundment of STR-3. PND-1 was designated as a blue polygon on the Maryville USGS topographic quad. Water depth was undeterminable. Water quality was good, and water color had a slight green tint. Fish and Benthos were present at time of survey. Dominant vegetation around PND-1 included mostly fescue.

PND-2 is a 0.2 acre isolated man-made depression. PND-2 was designated as a blue polygon on the Kingsville Springs USGS topographic quad. Water depth was undeterminable. Water quality was good, and water color had a slight green tint. Benthos were present at time of survey. Dominant vegetation around PND-2 included mostly fescue.

Table 5.1 – Summary of Streams within Alternative A

Stream	Project Segment	Location	Potential Impacts		Legal Designation (confirmed/unconfirmed)	Stream Description
			Type of Impact	Size of Impact		
STR-1 Unnamed tributary to Little River	Alt. A	Alt. A - approximately 0.4 miles north of Eagleton Village	Potential culvert placement within channel	340 linear feet	Intermittent Stream/ Unconfirmed	The channel is 2.5 feet across and 1-2 feet deep. Water surface width is 2.0 feet, and water depth is 1.0 foot. Banks were 2.0 feet tall and moderately stable w/ minor scouring and sloughing. The substrate is sand and silt. No signs of aquatic life were present at the time of survey. There was no canopy cover at this section of the stream.
STR-2 Unnamed tributary to Little River	Alt. A	Alt. A - approximately 0.4 miles north of Eagleton Village	Potential culvert placement within channel	147 linear feet	Intermittent Stream/ Unconfirmed	The channel is 2.5 feet across and 1-2 feet deep. Water surface width is 2.0 feet, and water depth is 1.0 foot. Stream banks were 4.0 feet tall, eroded, and sloughing. The substrate is primarily organic debris with areas of exposed sand. No signs of aquatic life were present at the time of survey. The stream has full canopy coverage; species include <i>Fagus grandifolia</i> , <i>Pinus taeda</i> , <i>Platanus occidentalis</i> , <i>Celtis occidentalis</i> , and <i>Cornus florida</i> .
STR-3 Unnamed tributary to Little River	Alt. A	Alt. A - approximately 0.57 miles slightly southwest of the intersection of Sam Houston School Road and Mt. Lebanon Road	Potential culvert placement within channel and channel relocation	640 linear feet	Perennial Stream/ Confirmed	The channel is 6.0 feet across and 1.5 feet deep. Water surface width is 3.0 feet, and water depth is 0.2 feet. Banks were 5.0 feet tall and moderately stable w/ minor scouring and sloughing. The substrate is sand, silt, gravel, cobble, and bedrock. No signs of aquatic life were present at the time of survey. The stream has scattered canopy coverage; species include <i>Fagus grandifolia</i> , <i>Ligustrum sinense</i> , <i>Cornus florida</i> , <i>Rubus</i> sp., <i>Quercus alba</i> , <i>Fraxinus americana</i> , <i>Tilia americana</i> , and <i>Smilax rotundifolia</i> .
STR-4 Unnamed tributary to Little River	Alt. A	Alt. A - approximately 0.26 miles slightly northwest of the intersection of Melody Road and Mt. Lebanon Road	Potential impact from sediment run-off from proposed project	0.0 linear feet	Perennial Stream/ Confirmed	The channel is 3.0 feet across and 0.5 foot deep. Water surface width is 0.1 foot, and water depth is 0.1 foot. Banks are 1.0 to 2.0 feet tall and moderately stable and gently sloping. The substrate is sand, silt, gravel, cobble, and bedrock. No signs of aquatic life were present at the time of survey. The stream has full canopy coverage; species include <i>Fagus grandifolia</i> , <i>Ligustrum sinense</i> , <i>Cornus florida</i> , <i>Rubus</i> sp., <i>Quercus alba</i> , <i>Fraxinus americana</i> , <i>Tilia americana</i> , and <i>Smilax rotundifolia</i> .
STR-5 Unnamed tributary to Little River	Alt. A	Alt. A - approximately 0.26 miles slightly northwest of the intersection of Wildwood Road and Mt. Lebanon Road	Potential culvert or bridge placement over channel	300 linear feet	Intermittent Stream/ Unconfirmed	The channel is 2.0 feet across and 1.0 foot deep. No water was present in the channel at the time of survey. Stream banks were 3.0 feet tall, incised but stable. The substrate is primarily clay. No signs of aquatic life were present at the time of survey. The stream has scattered canopy coverage; species include <i>Rubus</i> sp., <i>Ligustrum sinense</i> , <i>Solidago canadensis</i> , and <i>Lonicera japonica</i> .
STR-6 Peppermint Branch	Alt. A	Alt. A - approximately 0.7 miles northwest of the intersection of Peppermint Road and Sevierville Road	Potential culvert placement within channel	336 linear feet	Intermittent Stream/ Confirmed	The channel is 6.0 feet across and 0.5 foot deep. No water was in channel at time of survey. Banks are 2.0 – 4.0 feet tall and somewhat unstable w/ minor scouring and sloughing. The substrate is sand, silt, and gravel. No signs of aquatic life were present at the time of survey. The stream has full canopy coverage; species include <i>Nyssa sylvatica</i> , <i>Cornus florida</i> , <i>Ulmus americana</i> , and <i>Platanus occidentalis</i> .
STR-7 Unnamed tributary to Little River	Alt. A	Alt. A - approximately 0.3 miles northwest of the intersection of Davis Ford Road and Nina Delozier Road	Potential culvert placement within channel	335 linear feet	Intermittent Stream/ Unconfirmed	The channel is 8.0 feet across and 0.5 foot deep. No water was present in the channel at the time of survey. Banks are 2.0 to 3.0 feet tall and moderately stable with minor scouring and sloughing. The substrate is sand and silt. No signs of aquatic life were present at the time of survey. The stream has full canopy coverage; species include <i>Nyssa Quercus alba</i> , <i>Ligustrum sinense</i> , <i>Acer rubrum</i> , <i>Liquidambar styraciflua</i> , <i>Rubus</i> sp., <i>Toxicodendron radicans</i> , <i>Ulmus americana</i> , and <i>Ulmus rubra</i> .

Table 5.1 (cont.) – Summary of Streams within Alternative A

Stream	Project Segment	Location	Potential Impacts		Legal Designation (confirmed/ unconfirmed)	Stream Description
			Type of Impact	Size of Impact		
STR-8 Gravelly Creek	Alt. A	Alt. A – approximately 0.47 miles north of Morning Star Church	Potential culvert placement within channel and channel relocation	640 linear feet	Perennial Stream/Confirmed	The channel is 12.0 feet across and 1.5 feet deep. Water surface width is 10.0 feet, and water depth is 0.5 foot. Stream banks were 1.0-3.0 feet tall, stable and gently sloping. The substrate is sand, silt, gravel, cobble, and bedrock. Fish species were observed. The stream has scattered canopy coverage, species include <i>Ulmus americana</i> , <i>Quercus nigra</i> , <i>Solidago sp.</i> , <i>Ligustrum sinense</i> , <i>Acer rubrum</i> , <i>Nyssa sylvatica</i> , <i>Toxicodendron radicans</i> , <i>Juniperus virginiana</i> , and <i>Cercis Canadensis</i> .
STR-9 Flag Branch	Alt. A	Alt. A – approximately 0.23 miles north of Morning Star Church	Potential culvert or bridge placement over /within channel	480 linear feet	Perennial Stream/Confirmed	The channel is 15.0 feet across and 1.5 feet deep. Water surface width is 10.0 feet, and water depth is 0.5 foot. Stream banks were 3.0 – 8.0 feet tall and moderately stable. The substrate is sand, silt, gravel, cobble, and bedrock. Fish and macroinvertebrate species were observed. The stream has full canopy coverage; species include <i>Euonymus americanus</i> , <i>Ulmus rubra</i> , <i>Toxicodendron radicans</i> , <i>Quercus prinus</i> , <i>Juniperus virginiana</i> , <i>Quercus nigra</i> , and <i>Fraxinus pennsylvanica</i> .

Table 5.2 – Summary of Wet Weather Conveyances within Alternative A

Wet Weather Conveyance	Project Segment	Location	Potential Impacts		Legal Designation (confirmed/unconfirmed)	Wet Weather Conveyance Description
			Type of Impact	Size of Impact		
WWC-1 Unnamed tributary to Little River	Alt. A	Alt. A - approximately 0.3 miles northeast of the intersection of Old Knoxville Highway, and Jackson Drive	Potential culvert placement within channel	415 linear feet	Wet Weather Conveyance/ Unconfirmed	Channel is 2.0 feet across and 1.0 foot deep. No water was present in the channel at the time of survey. Banks were 1.0 foot tall and gently sloping. The channel is covered by fescue. Soil is a clay with a munsell color of 7.5 YR 4/6. There was no canopy cover at this section of the WWC-1.
WWC-2 Unnamed tributary to Little River	Alt. A	Alt. A - approximately 0.3 miles south of the intersection of Davis Ford Road and Nina Delozier Road	Potential culvert placement within channel	426 linear feet	Wet Weather Conveyance/ Unconfirmed	Channel is 3.0 feet across and 1.0 foot deep. No water was present in the channel at the time of survey. Banks were 1.0 foot tall and gently sloping. There was no canopy cover at this section of the WWC-2.
WWC-3 Unnamed tributary to Little River	Alt. A	Alt. A - approximately 0.57 miles southeast of the intersection of Davis Ford Road and Nina Delozier Road	Potential culvert placement within channel	0.0 linear feet	Wet Weather Conveyance/ Unconfirmed	Channel is 20.0 feet across and 1.0 foot deep. No water was present in the channel at the time of survey. Banks are 2.0 – 3.0 feet tall and gently sloping. The channel is covered with herbaceous vegetation. There was no canopy cover at this section of the WWC-3.

Table 5.3 – Summary of Waterbodies within Alternative A

Waterbody	Project Segment	Location	Potential Impacts		Legal Designation (confirmed/unconfirmed)	Waterbody Description
			Type of Impact	Size of Impact		
PND-1	Alt. A	Alt. A - approximately 0.26 miles slightly northwest of the intersection of Melody Road and Mt. Lebanon Road	No Impact; the resource is located outside of proposed right-of-way.	0.0 acres	Freshwater Pond connected to STR-4/ Confirmed	PND-1 is a 1.3 acre freshwater man-made impoundment of STR-4. PND-1 was designated as a blue polygon on the Maryville USGS topographic quad. Water depth was undeterminable. Water quality was good, and water color had a slight green tint. Dominant vegetation around PND-1 included <i>Fagus grandifolia</i> , <i>Ligustrum sinense</i> , <i>Acer rubrum</i> , <i>Ilex verticillata</i> , <i>Polystichum anistichoides</i> , and <i>Festuca</i> sp.
PND-2	Alt. A	Alt. A - approximately 0.3 miles northwest of the intersection of Wildwood Road and Mt. Lebanon Road	Fill	0.4 acre	Isolated Freshwater Pond/ Unconfirmed	PND-2 is a 0.4 acre isolated man-made depression. PND-2 was designated as a blue polygon on the Maryville USGS topographic quad. Water depth was undeterminable. Water quality was good, and water color had a slight green tint. Dominant vegetation around PND-1 included <i>Solidago gigantea</i> , and <i>Phytolacca Americana</i> .

Table 5.4 – Summary of Streams within Alternative C

Stream	Project Segment	Location	Potential Impacts		Legal Designation (confirmed/unconfirmed)	Stream Description
			Type of Impact	Size of Impact		
STR-1 Unnamed tributary to Little River	Alt. C	Alt. C - approximately 0.4 miles north of Eagleton Village	Potential culvert placement within channel	340 linear feet	Intermittent Stream/ Unconfirmed	The channel is 2.5 feet across and 1-2 feet deep. Water surface width is 2.0 feet, and water depth is 1.0 foot. Banks were 2.0 feet tall and moderately stable w/ minor scouring and sloughing. The substrate is sand and silt. No signs of aquatic life were present at the time of survey. There was no canopy cover at this section of the stream.
STR-2 Unnamed tributary to Little River	Alt. C	Alt. C - approximately 0.4 miles north of Eagleton Village	Potential culvert placement within channel	147 linear feet	Intermittent Stream/ Unconfirmed	The channel is 2.5 feet across and 1-2 feet deep. Water surface width is 2.0 feet, and water depth is 1.0 foot. Stream banks were 4.0 feet tall, eroded, and sloughing. The substrate is primarily organic debris with areas of exposed sand. No signs of aquatic life were present at the time of survey. The stream has full canopy coverage; species include <i>Fagus grandifolia</i> , <i>Pinus taeda</i> , <i>Platanus occidentalis</i> , <i>Celtis occidentalis</i> , and <i>Cornus florida</i> .
STR-3 Unnamed tributary to Little River	Alt. C	Alt. C - approximately 0.57 miles slightly southwest of the intersection of Sam Houston School Road and Mt. Lebanon Road	Potential culvert placement within channel and channel relocation	640 linear feet	Perennial Stream/ Confirmed	The channel is 6.0 feet across and 1.5 feet deep. Water surface width is 3.0 feet, and water depth is 0.2 foot. Banks were 5.0 feet tall and moderately stable w/ minor scouring and sloughing. The substrate is sand, silt, gravel, cobble, and bedrock. No signs of aquatic life were present at the time of survey. The stream has scattered canopy coverage; species include <i>Fagus grandifolia</i> , <i>Ligustrum sinense</i> , <i>Cornus florida</i> , <i>Rubus</i> sp., <i>Quercus alba</i> , <i>Fraxinus americana</i> , <i>Tilia americana</i> , and <i>Smilax rotundifolia</i> .
STR-4 Unnamed tributary to Little River	Alt. C	Alt. C - approximately 0.26 miles slightly northwest of the intersection of Melody Road and Mt. Lebanon Road	Potential impact from sediment runoff from proposed project	0.0 linear feet	Perennial Stream/ Confirmed	The channel is 3.0 feet across and 0.5 foot deep. Water surface width is 0.1 feet, and water depth is 0.1 foot. Banks are 1.0 to 2.0 feet tall and moderately stable and gently sloping. The substrate is sand, silt, gravel, cobble, and bedrock. No signs of aquatic life were present at the time of survey. The stream has full canopy coverage; species include <i>Fagus grandifolia</i> , <i>Ligustrum sinense</i> , <i>Cornus florida</i> , <i>Rubus</i> sp., <i>Quercus alba</i> , <i>Fraxinus americana</i> , <i>Tilia americana</i> , and <i>Smilax rotundifolia</i> .
STR-5 Unnamed tributary to Little River	Alt. A	Alt. A - approximately 0.26 miles slightly northwest of the intersection of Wildwood Road and Mt. Lebanon Road	Potential culvert or bridge placement over channel	300 linear feet	Intermittent Stream/ Unconfirmed	The channel is 2.0 feet across and 1.0 foot deep. No water was present in the channel at the time of survey. Stream banks were 3.0 feet tall, incised but stable. The substrate is primarily clay. No signs of aquatic life were present at the time of survey. The stream has scattered canopy coverage; species include <i>Rubus</i> sp., <i>Ligustrum sinense</i> , <i>Solidago canadensis</i> , and <i>Lonicera japonica</i> .
STR-6 Peppermint Branch	Alt. C	Alt. A - approximately 0.5 miles northwest of the intersection of Sevierville Road and Nina DeLozier Road	Potential culvert placement within channel	247 linear feet	Perennial Stream/Confirmed	The channel is 7.0 feet across and 0.5 foot deep. No water present in the channel at time of survey. Banks are 8.0 feet tall and moderately stable with minor scouring and sloughing. The substrate is sand cobble, and gravel. No signs of aquatic life were present at the time of survey. The stream has full canopy coverage; species include <i>Nyssa sylvatica</i> , <i>Cornus florida</i> , <i>Ulmus americana</i> , and <i>Platanus occidentalis</i> .

Table 5.4 (cont.) – Summary of Streams within Alternative C

Stream	Project Segment	Location	Potential Impacts		Legal Designation (confirmed/unconfirmed)	Stream Description
			Type of Impact	Size of Impact		
STR-7 Unnamed tributary to Little River	Alt. C	Alt. C - approximately 0.5 miles northwest of the intersection of Sevierville Road and Nina DeLozier Road	Potential culvert or bridge placement over channel	330 linear feet	Perennial Stream/ Unconfirmed	The channel is 1.5 feet across and 0.5 foot deep. Water surface width is 1.5 feet, and water depth is 0.3 foot. Stream banks were 1.0 - 3.0 feet tall, stable and gently sloping. The substrate is sand, silt, gravel, cobble, and bedrock. No signs of aquatic life were present at the time of survey. Canopy cover was mostly eliminated for this portion of the stream. Riparian vegetation included <i>Festuca</i> sp. and <i>Polygonum hydropiperoides</i> , and <i>Paspalum</i> sp.
STR-8 Unnamed tributary to Little River	Alt. C	Alt. C - approximately 0.5 miles northeast of the intersection of Davis Ford Road and Nina DeLozier Road	Potential culvert or bridge placement over channel	287 linear feet	Intermittent Stream/ Unconfirmed	The channel is 11.0.0 feet across and 0.2 foot deep. Banks are 12.0 feet tall and moderately stable with minor scouring and sloughing. No water present in the channel at time of survey. The substrate is sand and. No signs of aquatic life were present at the time of survey. The stream has scattered canopy; species include <i>Ligustrum sinense</i> , <i>Cornus florida</i> , <i>Smilax glauca</i> , <i>Lonicera japonica</i> , <i>Fagus grandifolia</i> , <i>Festuca</i> sp., <i>Rubus</i> sp., and <i>Campsis radicans</i> .
STR-9 Gravelly Creek	Alt. C	Alt. C - approximately 0.14 miles south of Centennial Church	Potential culvert or bridge placement over channel	311 linear feet	Perennial Stream/ Confirmed	The channel is 33.0 feet across and 1.0 foot deep. Banks are 2.0 feet tall and moderately stable with incised scouring and sloughing. The substrate is sand, gravel, and silt. No signs of aquatic life were present at the time of survey. The stream has scattered canopy coverage; species include <i>Fagus grandifolia</i> , <i>Liquidambar styraciflua</i> , and <i>Acer rubrum</i> .
STR-10 Flag Branch	Alt. C	Alt. C - approximately 0.27 miles south of Centennial Church	Potential culvert or bridge placement over channel	0.0 linear feet	Perennial Stream/ Confirmed	The channel is 11.0 feet across and 0.5 foot deep. No water present in the channel at time of survey. Banks are 1.0 foot tall and moderately stable with minor scouring and sloughing. The substrate is sand, gravel, and silt. No signs of aquatic life were present at the time of survey. The stream has scattered canopy coverage; species include <i>Fagus grandifolia</i> , <i>Liquidambar styraciflua</i> , and <i>Acer rubrum</i> .

Table 5.5 – Summary of Wet Weather Conveyances within Alternative C

Wet Weather Conveyance	Project Segment	Location	Potential Impacts		Legal Designation (confirmed/unconfirmed)	Wet Weather Conveyance Description
			Type of Impact	Size of Impact		
WWC-1 Unnamed tributary to Little River	Alt. C	Alt. C - approximately 0.3 miles northeast of the intersection of Old Knoxville Highway, and Jackson Drive	Potential culvert placement within channel	415 linear feet	Wet Weather Conveyance/ Unconfirmed	Channel is 2.0 feet across and 1.0 foot deep. No water was present in the channel at the time of survey. Banks were 1.0 foot tall and gently sloping. The channel is covered by fescue. Soil is clay with a munsell color of 7.5 YR 4/6. There was no canopy cover at this section of the WWC 1.
WWC-2 Unnamed tributary to Little River	Alt. C	Alt. C - approximately 0.6 miles northwest of the intersection of Sevierville Road and Nina DeLozier Road	Fill or Potential culvert placement within channel	0.0 linear feet	Wet Weather Conveyance/ Unconfirmed	The channel is 2.0 feet across and 0.2 foot deep. No water present in the channel at time of survey. Banks are 2.0 – 4.0 feet tall and somewhat unstable w/ minor scouring and sloughing. The substrate is sand, silt, and clay. No signs of aquatic life were present at the time of survey. The stream has scattered canopy; species include <i>Cornus florida</i> , <i>Hedera helix</i> , <i>Ulmus americana</i> , <i>Ligustrum sinense</i> , <i>Fagus grandifolia</i> , <i>Smilax rotundifolia</i> , <i>Lonicera japonica</i> , <i>Quercus marilandica</i> , <i>Quercus prinus</i> , <i>Ilex opaca</i> , <i>Toxicodendron radicans</i> , <i>Acer rubrum</i> , <i>Campsis radicans</i> , and <i>Liquidambar styraciflua</i> .

Table 5.6 – Summary of Waterbodies within Alternative C

Waterbody	Project Segment	Location	Potential Impacts		Legal Designation (confirmed/unconfirmed)	Waterbody Description
			Type of Impact	Size of Impact		
PND-1	Alt. C	Alt. C - approximately 0.26 miles slightly northwest of the intersection of Melody Road and Mt. Lebanon Road	No Impact; The resource is located outside of proposed right-of-way.	0.0 acres	Freshwater Pond connected to STR-4/ Confirmed	PND-1 is a 1.3 acre freshwater man-made impoundment of STR-4. PND-1 was designated as a blue polygon on the Maryville USGS topographic quad. Water depth was undeterminable. Water quality was good, and water color had a slight green tint. Dominant vegetation around PND-1 included <i>Fagus grandifolia</i> , <i>Ligustrum sinense</i> , <i>Acer rubrum</i> , <i>Ilex verticullata</i> , <i>Polystichum anistichoides</i> , and <i>Festuca</i> sp.
PND-2	Alt. C	Alt. C - approximately 0.3 miles northwest of the intersection of Wildwood Road and Mt. Lebanon Road	Drain and Fill	0.4 acre	Isolated Freshwater Pond/ Unconfirmed	PND-2 is a 0.4 acre isolated man-made depression. PND-2 was designated as a blue polygon on the Maryville USGS topographic quad. Water depth was undeterminable. Water quality was good, and water color had a slight green tint. Dominant vegetation around PND-1 included <i>Solidago gigantea</i> , and <i>Phytolacca Americana</i> .

Table 5.7 – Summary of Streams within Alternative D

Stream	Project Segment	Location	Potential Impacts		Legal Designation (confirmed/unconfirmed)	Stream Description
			Type of Impact	Size of Impact		
STR-1 Unnamed tributary to Little River	Alt. D	Alt. D - approximately 0.2 miles west of the intersection of Mt. Lebanon Road and Sam Houston School Road	Potential culvert placement within channel	108 linear feet	Intermittent Stream/ Unconfirmed	The channel is 1.0 to 4.0 feet across and feet deep. Water surface width is 1.0 foot, and water depth is 0.1 foot. Banks were 2.0 to 3.0 feet tall and moderately stable w/ minor scouring and sloughing. The substrate is sand and silt. No signs of aquatic life were present at the time of survey. The stream has full canopy coverage; species include <i>Ligustrum sinense</i> , <i>Toxicodendron radicans</i> , <i>Acer negundo</i> , and <i>Ulmus americana</i> .
STR-2 Unnamed tributary to Little River	Alt. D	Alt. D - approximately 160 feet southwest of the intersection of Mt. Lebanon Road and Sam Houston School Road	Potential culvert placement within channel	186 linear feet	Perennial Stream/ Confirmed	The channel is 4.0 to 8.0 feet across and 4.0 feet deep. Water surface width is 4.0 feet, and water depth is 0.3 foot. Banks were 2.0 to 4.0 feet tall and moderately stable w/ minor scouring and sloughing. The substrate is sand, gravel, and cobble. No signs of aquatic life were present at the time of survey. The stream has full canopy coverage; species include <i>Ligustrum sinense</i> , <i>Toxicodendron radicans</i> , <i>Acer negundo</i> , and <i>Tilia americana</i> .
STR-3 Unnamed tributary to Little River	Alt. D	Alt. D - approximately 0.7 miles slightly north of the intersection of DeArmond Road and Sam Houston School Road	No Impacts or Potential impact from sediment run-off from proposed project	0.0 linear feet	Intermittent Stream/ Unconfirmed	The channel is 0.5 to 1.5 feet across and 0.2 foot deep. No water was present at the time of survey. Banks were 1.0 – 2.0- feet tall as well as incised and straightened. The substrate is sand, gravel, and silt. No signs of aquatic life were present at the time of survey. The stream has scattered canopy coverage; species include <i>Ligustrum sinense</i> , <i>Lonicera japonica</i> , <i>Acer rubrum</i> , <i>Acer negundo</i> , <i>Nyssa sylvatica</i> , <i>Quercus marilandrica</i> , <i>Liriodendron tulipifera</i> , and <i>Smilax rotundifolia</i> .
STR-4 Unnamed tributary to Little River	Alt. D	Alt. D - approximately 0.14 miles southeast of the intersection of Wildwood Road and Peppermint Road	Potential culvert placement within channel	136 linear feet	Intermittent Stream/ Unconfirmed	The channel is 2.0 to 3.5 feet across and 0.3 to 2.0 feet deep. Water surface width is 1.0 foot, and water depth is 0.3 foot. Banks were 2.0 to 3.0 feet tall and moderately stable w/ minor scouring and sloughing. The substrate is sand and silt. No signs of aquatic life were present at the time of survey. The stream has scattered canopy coverage; species include <i>Ligustrum sinense</i> , <i>Rubus</i> sp., and <i>Smilax rotundifolia</i> .
STR-5 Peppermint Branch	Alt. D	Alt. D - approximately 0.54 miles southeast of the intersection of Wildwood Road and Peppermint Road	Potential culvert or bridge placement over channel	168 linear feet	Perennial Stream/ Confirmed	The channel is 1.0 to 2.5 feet across and 0.3 to 2.0 feet deep. Water surface width is 1.0 foot, and water depth is 0.4 foot. Banks were 2.0 to 3.0 feet tall and moderately stable w/ minor scouring and sloughing. The substrate is sand, gravel, and cobble. No signs of aquatic life were present at the time of survey. The canopy coverage has been eliminated. Riparian species included <i>Festuca</i> sp., <i>Solidago gigantea</i> , and <i>Ligustrum sinense</i> .

Stream	Project Segment	Location	Potential Impacts		Legal Designation (confirmed/unconfirmed)	Stream Description
			Type of Impact	Size of Impact		
STR-6 Unnamed tributary to Little River	Alt. D	Alt. D - approximately 0.55 miles east of the intersection of Sevierville Road and Nina Delozier Road	Potential culvert or bridge placement over channel	133 linear feet	Intermittent Stream/ Unconfirmed	The channel is 11.0.0 feet across and 0.2 foot deep. No water was present at the time of survey. Banks are 12.0 feet tall and moderately stable with minor scouring and sloughing. No water in channel at time of survey. The substrate is sand and. No signs of aquatic life were present at the time of survey. The stream has full canopy coverage; species include <i>Ligustrum sinense</i> , <i>Cornus florida</i> , and <i>Campsis radicans</i> .
STR-7 Crooked Creek	Alt. D	Alt. D - approximately 0.66 miles northwest of the intersection of Lamar Alexander Road and Brookfield Road	No Impact; The resource is located outside of proposed right-of-way	0.0 linear feet	Perennial Stream/ Confirmed	The channel is 11.0 to 15.0 feet across and 0.5 to 2.0 feet deep. Water surface width is 11.0 feet, and water depth is 0.5 foot. Banks were 3.0 to 4.0 feet and moderately stable w/ minor scouring and sloughing. The substrate is sand, gravel, and silt. No signs of aquatic life were present at the time of survey. Banks were 2.0 to 3.0 feet tall and moderately stable w/ minor scouring and sloughing. The substrate is sand and silt. The stream has scattered canopy coverage; species include <i>Fagus grandifolia</i> , <i>Liquidambar styraciflua</i> , and <i>Acer rubrum</i> .
STR-8 Gravelly Creek	Alt. D	Alt. D - approximately 0.6 miles northwest of the intersection of Lamar Alexander Road and Brookfield Road	Potential culvert placement within channel	152 linear feet	Perennial Stream/ Confirmed	The channel is 15.0 feet across and 2.0 feet deep. Water surface width is 11.0 feet, and water depth is 0.5 foot. Banks are 2.0 feet tall and moderately stable with incised scouring and sloughing. The substrate is sand, gravel, and silt. No signs of aquatic life were present at the time of survey. The stream has scattered canopy coverage; species include <i>Fagus grandifolia</i> , <i>Liquidambar styraciflua</i> , and <i>Acer rubrum</i> .

Table 5.8 – Summary of Wet Weather Conveyances within Alternative D

Wet Weather Conveyance	Project Segment	Location	Potential Impacts		Legal Designation (confirmed/unconfirmed)	Wet Weather Conveyance Description
			Type of Impact	Size of Impact		
WWC-1 Unnamed tributary to Little River	Alt. D	Alt. D - approximately 0.65 miles east of the intersection of Mt. Lebanon Road and Sam Houston School Road	Potential culvert placement within channel	167 linear feet	Wet Weather Conveyance/ Unconfirmed	The channel is 0.5 to 1.0 foot across and 4.0 feet deep. No water was present at the time of survey. Banks were 0.5 foot tall and moderately stable w/ undercutting and sloping. The substrate is silt and clay. No signs of aquatic life were present at the time of survey. The stream has scattered canopy coverage; species include <i>Ligustrum sinense</i> , <i>Rubus</i> sp., <i>Acer negundo</i> , and <i>Smilax rotundifolia</i> .
WWC-2 Unnamed tributary to Little River	Alt. D	Alt. D - approximately 0.6 miles slightly north of the intersection of DeArmond Road and Sam Houston School Road	Fill	1,100 linear feet	Wet Weather Conveyance/ Unconfirmed	The channel is 0.5 to 1.0 foot across and 4.0 feet deep. No water was present at the time of survey. Banks were 0.5 foot tall and moderately stable w/ undercutting and sloping. The substrate is sand, gravel, and cobble. No signs of aquatic life were present at the time of survey. The stream has scattered canopy coverage; species include <i>Ligustrum sinense</i> , <i>Rubus</i> sp., <i>Rosa multiflora</i> , <i>Liriodendron tulipifera</i> , and <i>Rhus copallinum</i> .
WWC-3 Unnamed tributary to Little River	Alt. D	Alt. D - approximately 188 feet slightly north of the intersection of DeArmond Road and Sam Houston School Road	Potential culvert placement within channel	157 linear feet	Wet Weather Conveyance/ Unconfirmed	The channel is 2.0 to 3.0 feet across and 0.3 foot deep. No water was present at the time of survey. Banks were 1.0 – 2.0- feet tall and moderately stable with sloughing and scouring. The substrate is sand and silt. No signs of aquatic life were present at the time of survey. The stream has scattered canopy coverage; species include <i>Ligustrum sinense</i> , <i>Lonicera japonica</i> , <i>Acer rubrum</i> , <i>Acer negundo</i> , <i>Nyssa sylvatica</i> , <i>Quercus marilandrica</i> , <i>Liriodendron tulipifera</i> , and <i>Smilax rotundifolia</i> .
WWC-4 Unnamed tributary to Little River	Alt. D	Alt. D - approximately 0.64 miles southeast of the intersection of Wildwood Road and Peppermint Road	No Impact; The resource is located outside of proposed right-of-way	0.0 linear feet	Wet Weather Conveyance/ Unconfirmed	The channel is 3.0 to 4.0 feet across and 2.0 feet deep. No water was present at the time of survey. Banks were 3.0 feet tall and moderately stable and gently sloping. No signs of aquatic life were present at the time of survey. The substrate is sand, silt, and large cobble. No signs of aquatic life were present at the time of survey. The stream has scattered canopy coverage; species include <i>Ligustrum sinense</i> , <i>Acer rubrum</i> , <i>Nyssa sylvatica</i> , and <i>Liriodendron tulipifera</i> .

Table 5.9 – Summary of Waterbodies within Alternative D

Waterbody	Project Segment	Location	Potential Impacts		Legal Designation (confirmed/unconfirmed)	Waterbody Description
			Type of Impact	Size of Impact		
PND-1	Alt. D	Alt. D - approximately 0.65 miles west of the intersection of Mt. Lebanon Road and Sam Houston School Road	No Impact; The resource is located outside of proposed right-of-way.	0.0 acres	Freshwater Pond connected to STR-3/ Confirmed	PND-1 is a 2.0 acre freshwater man-made impoundment of STR-3. PND-1 was designated as a blue polygon on the Maryville USGS topographic quad. Water depth was undeterminable. Water quality was good, and water color had a slight green tint. Fish and Benthos were present at time of survey. Dominant vegetation around PND-1 included <i>Festuca</i> sp.
PND-2	Alt. D	Alt. D - approximately 0.3 miles northwest of the intersection of Lamar Alexander Road and Brookfield Road	Fill	0.1 acre	Isolated Freshwater Pond/ Confirmed	PND-2 is a 0.2 acre isolated man-made depression. PND-2 was designated as a blue polygon on the Kingsville Springs USGS topographic quad. Water depth was undeterminable. Water quality was good, and water color had a slight green tint. Benthos were present at time of survey dominant vegetation around PND-1 included <i>Festuca</i> sp.

5.1.1 Direct Impacts

The proposed Alternative A, C, and D corridors would have similar direct impacts to the non-wetland waters of the U.S. identified within the proposed corridors that include the placement of culverts within stream channels, extension of existing culverts, channel relocation, and the potential introduction of silt and sediment into stream channels from construction activities. Waterbodies crossed by the proposed alternative corridors would likely be filled. Alternative A would potentially affect two open waterbodies, three wet weather conveyances, and nine stream sites. Alternative C would potentially affect two open waterbodies, two wet weather conveyances, and ten stream sites. Alternative D would potentially affect two open waterbodies, four wet weather conveyances, and eight stream sites. Potential impacts to stream channels and wet weather conveyances not crossed by the proposed project but associated with channels crossed by the proposed project may experience increased levels of silt and sediment during project construction. Therefore, erosion control measures would be implemented to reduce the potential introduction of silt and sediment to streams located beyond the proposed project rights-of-way.

At this time in the design phase, construction limits and culvert and bridge locations have not yet been determined. Therefore, the exact impact type (e.g. culvert placement, bridge crossing, channel relocation, etc.) and the amount of impact at the individual non-wetland water of the U.S. sites cannot yet be determined. Because the exact impact type and amount is not yet known, the information in Tables 5.1 through 5.9 represents the anticipated worst-case impact (linear feet/acre of non-wetland water within proposed right-of-way limits), with the assumption that these impacts would be reduced, where possible, during further project design. As presented in Tables 5.1 through 5.3, Alternative A would potentially impact approximately 1,760 linear feet of perennial stream channel and 1,458 linear feet of intermittent stream channel, 841 linear feet of wet weather conveyance channel, and 0.4 acres of open waterbodies (i.e. pond). As presented in Tables 5.4 through 5.6, Alternative C would potentially impact approximately 1,528 linear feet of perennial stream channel, 1,074 linear feet of intermittent stream channel, 415 linear feet of wet conveyance channel, and 0.4 acres of open waterbodies. As presented in Tables 5.7 through 5.9, Alternative D would potentially impact approximately 506 linear feet of perennial stream channel,

377 linear feet of intermittent stream channel, 1,424 linear feet of wet conveyance channel, and 0.1 acre of open waterbodies.

Potential direct impacts to fish and other aquatic organisms from project construction could be minimized by conducting work in and around perennial streams outside the spawning season of species common to the proposed project area (i.e. during the months of September through January). Long-term impacts to aquatic organisms could occur through the loss of natural streambed by culvert construction, bank clearing, the placement of rip-rap, and the removal of trees lining the channel.

Particular care would be taken at the perennial stream crossings. Construction of culverts could be staged during the drier portions of the year, late summer and fall, when stream flows are reduced. If bridges are constructed, they could be designed to span the entire stream channel, where possible. The fording of streams by construction equipment at bridge locations could be prohibited.

5.1.2 Indirect Impacts

The proposed alternatives are likely to facilitate new development and/or accelerate the development that is already occurring in the proposed project area. The surrounding land use is primarily agricultural with scattered residential homes and commercial businesses occurring along the existing roadway networks that traverse the proposed alternative corridors. Other dominant land-uses are undeveloped forested land and old fields. The review of historic aerial photography indicates that land use has been in continuous transition over the years with the most significant changes occurring in the 1980's to present day. The primary shift is the conversion of agricultural fields to large single-family residential developments. The conversion rate of agricultural/undeveloped land to residential, commercial, and/or industrial is likely to increase once the proposed project is completed. Therefore, non-wetland waters of the U.S. are likely to experience some indirect impacts from the proposed project. Impacts are likely to occur in the form of increased silt and sediment discharge into stream channels from construction activities and the crossing and filling of non-wetland waters of the U.S. with culverts and bridges from additional road construction and development. The additional impervious surface areas from development would also cause indirect impacts to non-wetland

waters of the U.S. as storm water run-off would increase. The larger volume of storm water would mean greater amounts of sediment and pollutants being deposited into non-wetland waters of the U.S., and thereby, potentially reducing the overall water quality and functions of these resources within the Fort Loudoun Lake watershed.

However, several federal, state, and local regulations would off-set some of the anticipated indirect impacts associated with the proposed project. Section 404 of the Clean Water Act, a federal regulation, is administered and enforced by the USACE and requires entities seeking to impact jurisdictional waters of the U.S. to obtain various permits prior to impacting these resources. These permits require the use of minimization measures and obtaining some form of mitigation for impacting jurisdictional waters of the U.S. Mitigation is often achieved by purchasing mitigation credits from a mitigation bank that serves the same watershed or adjacent watershed. An entity can also achieve mitigation by the restoration of jurisdictional waters of the U.S. or through the preservation of jurisdictional waters of the U.S. within the same watershed.

Additional measures to reduce potential indirect impacts to non-wetland waters of the U.S. would be the implementation of TDOT's Standard Specifications for Road and Bridge Construction. These standards include the implementation of Best Management Practices (BMPs) during construction of the proposed project. BMPs often include early revegetation of disturbed areas, wherever possible, to hold soil movement to a minimum and prohibiting the dumping of chemicals, fuels, lubricants, bitumens, raw sewage, or other harmful wastes into or alongside of streams or impoundments, or into natural or manmade channels leading thereto. Typically, contract provisions also require the use of temporary erosion control measures as shown on the construction plans or as deemed necessary during construction. These temporary measures may include the use of berms, dikes, dams, sediment basins, fiber mats, netting, gravel, mulches, grasses, slope drains, and other erosion control devices or methods, as applicable.

Indirect impacts to non-wetland waters of the U.S. are inevitable; however, the protective measures outlined in the federal, state, and local regulations would minimize any indirect impacts to water quality and non-wetland waters of the U.S. resulting from the proposed project.

5.1.3 Cumulative Impacts

The non-wetland waters of the U.S. that occur within the proposed alternative corridors traverse a landscape that has been impacted largely by agriculture and more recently residential and commercial development. Therefore, many of the non-wetland waters of the U.S. encountered by the proposed alternative corridors have been impacted and/or altered from their “natural” condition. The most notable impacts observed as result of past and current land uses were channel straightening, relocation, riparian buffer elimination/degradation, and heavy amounts of silt and sediment within the stream channels. As previously noted the proposed project would likely facilitate new development and accelerate the existing development trends within the proposed project area. Therefore, it is probable that new development and road construction would contribute to the overall increase in impacts to non-wetland waters of the U.S. within the Fort Loudoun Lake watershed. Expected impacts would be new culverts and the extension of existing culverts, increased silt and sediment introduction, and the increase of impervious surfaces. Over time, such impacts would play a role in the overall degradation of water quality and aquatic habitat within the region. Furthermore, the placement of stream segments within a culvert is considered to be a permanent impact by the TDEC.

Direct impacts to non-wetland waters of the U.S. within the proposed project area are in some respect unavoidable. However, cumulative impacts to non-wetland waters of the U.S. would be minimized given the numerous federal, state, and local regulations that are in place and would off-set the overall cumulative impacts to waters of U.S. within the region. These impacts would be off-set by the required compensatory mitigation that would take place within or adjacent to the Fort Loudoun Lake watershed. Impacts to water quality would be prevented and minimized by the requirements set forth in TDOT’s Standard Specifications for Road and Bridge Construction. Furthermore, public and private entities seeking to develop within or adjacent to non-wetland waters of the U.S. are required to obtain federal, state, and local permits and install and maintain erosion control measures. Given the required permits and the protective measures that must be adhered to, the proposed project and other recent, ongoing, or planned developments would not significantly contribute to cumulative impacts to non-wetland waters of the U.S. within the proposed project area.

5.1.4 Non-Wetland Waters of the U.S. Mitigation

Stream channels requiring relocation and/or channelization would be replaced on-site to the extent possible, using techniques that would replace existing stream characteristics such as length, width, gradient, and tree canopy. Stream or water body 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, would either be mitigated off-site by improving a degraded system or by making a comparable payment to an in-lieu-fee program which would perform such off-site mitigation under the direction of state and federal regulatory and resource agencies.

5.2 Wetlands

All areas that displayed evidence and/or presence of the three parameters (hydrophytic vegetation, hydric soils, and wetland hydrology) outlined in the *USACE Wetlands Delineation Manual* (USACE 1987) were identified and delineated during the field surveys. The delineations included those wetlands identified on the NWI maps as well as those wetlands identified during field surveys but not indicated on NWI mapping. Isolated wetlands were also included in the delineations and would be included in additional discussions and reports until TDEC and the USACE have confirmed or refuted the jurisdictional applicability of these wetlands.

The wetlands encountered within and adjacent to the Alternative A and C corridors were primarily associated with intermittent and perennial stream corridors that traverse pastureland or abandoned livestock watering ponds. The location of these wetlands has allowed for frequent disturbances from livestock and other anthropogenic activities that have severely degraded and reduced the size of the wetland habitats. Past and current agricultural activities and land uses have also contributed to the reduction and/or loss of important functions provided by wetlands that include floodwater abatement, pollutant filtration, maintenance of stream and pond base flow, and, wildlife habitat.

5.2.1 Affected Environment

During the field surveys, two wetland community types (scrub-shrub and emergent), common in disturbed landscapes, were observed within the proposed alternative corridors. The scrub-shrub wetland reflects the disturbance history by the composition of the wetland vegetation that

consisted of various tree and woody and herbaceous plant species. Some of the tree and shrub species include black willow (*Salix nigra*), elderberry (*Sambucus canadensis*), Chinese privet, and brook-side alder (*Alnus serrulata*). Woody and herbaceous plant species include Japanese honeysuckle, smallspike false nettle (*Boehmeria cylindrica*), cardinal flower (*Lobelia cardinalis*), Virginia water horehound (*Lycopus virginicus*), sawtooth blackberry (*Rubus argutus*), soft rush (*Juncus effusus*), and various smartweeds (*Polygonum spp.*). The wetland hydrology observed (i.e., temporarily flooded to seasonally flooded/saturated) is a result of seasonally high water tables within floodplains and stream terraces, groundwater base flow within stream channels, and over-bank discharge. Soils are typically gleyed or prominently mottled. This wetland community does provide some important functions, however minor, that include floodwater abatement, pollutant filtration, and maintenance of stream base flow.

The emergent wetland community also reflects a disturbance history as much of this wetland type is located along abandoned livestock watering ponds and within old drainage ditches. An emergent wetland community was also observed adjacent to some of the intermittent and perennial stream channels. The wetland hydrology observed is a result of storm water retention within the abandon ponds, over-bank discharge, and groundwater base flow. Soils are gleyed to prominently mottled. Herbaceous plants are the dominant vegetation that includes cardinal flower, orange jewelweed (*Impatiens capensis*), sedges (*Carex sp.*), soft rush, common cat-tail, common boneset (*Eupatorium perfoliatum*), and beggarticks (*Bidens sp.*). Functions provided by this wetland include floodwater abatement and pollutant filtration.

Tables 5.10 through 5.11 further describes wetland characteristics, functions, potential impacts, and location of each wetland identified within the proposed Alternative A and C corridors. In addition, the field data sheets provided in Appendix C describes vegetation, soil composition, and hydrological features for each wetland that would be encountered by Alternatives A and C.

Alternative A

WTL-1 is a seasonally saturated scrub-shrub wetland. WTL-1 is isolated, and created by water run-off due to human induced topography chain. This wetland was located approximately 0.2 miles northeast of the intersection of Old Knoxville Highway and Jackson Drive. WTL-1 primary wetland function is temporary surface water run-off storage. Dominant vegetation

included dotted smartweed, swamp, soft rush, beggarticks, broad-leaved dock (*Rumex obtusifolius*), black willow (*Salix nigra*), ironweed, and giant goldenrod. Hydrologic indicators included water marks and saturated soils with a low chroma. Approximately 0.1 acre of WTL-1 would be permanently impacted by the proposed project. The impact would result from the placement of fill into WTL-1.

WTL-2 is a seasonally saturated emergent wetland located adjacent to STR-1 and STR-2. This wetland was located approximately 0.4 miles north of Eagleton Village. WTL-2 primary wetland functions are temporary surface water run-off storage, some water filtration, and possible flood attenuation. Dominant vegetation included wool grass (*Scirpus cyperinus*), common cat-tail, sneezeweed (*Helenium autumnale*), marshpepper knotweed (*Polygonum hydropiper*), beggarticks, Allegheny monkeyflower (*Mimulus ringens*), ironweed, giant goldenrod, dotted smartweed, and sawtooth blackberry. Hydrologic indicators included water stained leaves, water marks and saturated soils with a low chroma. Approximately 0.2 acre of WTL-2 would be permanently impacted by the proposed project. The impact would result from the placement of fill into WTL-2.

WTL-3 is a seasonally saturated emergent wetland located adjacent to STR-3. This wetland was located approximately 0.57 miles slightly southwest of the intersection of Sam Houston School Road and Mount Lebanon Road. WTL-3 primary wetland functions are water filtration, and possible flood attenuation. Dominant vegetation included wool grass, common cat-tail, whitegrass (*Leersia virginica*), marshpepper knotweed, soft rush, smallspike false nettle (*Boehmeria cylindrica*), Asiatic dayflower (*Commelina communis*), and ironweed. Hydrologic indicators included inundation, water marks and saturated soils with a low chroma. Approximately 0.6 acre of WTL-3 would be permanently impacted by the proposed project. The impact would result from the placement of fill into WTL-3.

WTL-4 is a seasonally saturated scrub-shrub wetland located adjacent to STR-4. This wetland was located approximately 0.26 miles slightly northwest of the intersection of Melody Road and Mount Lebanon Road. WTL-4 primary wetland functions are water filtration and possible flood attenuation. Dominant vegetation included black willow, common cat-tail, smallspike false nettle, marshpepper knotweed, beggarticks, Rosette grass (*Dicanthelium* sp.), Saint John's-wort (*Hypericum* sp.), Japanese honeysuckle, and Virginia water horehound. Hydrologic indicators

included water stained leaves, water marks, inundation, drainage patterns, and saturated soils with a low chroma. WTL-4 is located outside of the proposed project limits, and would not be impacted by the proposed project.

WTL-5 is a seasonally saturated emergent wetland located adjacent to STR-6. This wetland was located approximately 0.41 miles south of the intersection of Nina Delozier Road and Davis Ford Road. WTL-5 primary wetland functions are temporary surface water run-off storage, some water filtration, and possible flood attenuation. Dominant vegetation included cardinal flower, orange jewelweed, sneezeweed, marshpepper knotweed, common boneset, Allegheny monkeyflower, ironweed, dotted smartweed, and Virginia water horehound. Hydologic indicators included inundation, water marks, drainage patterns, and saturated soils with a low chroma. Approximately 0.1 acre of WTL-5 would be permanently impacted by the proposed project. The impact would result from the placement of fill into WTL-5.

WTL-6 is a seasonally saturated scrub-shrub wetland. WTL-6 is isolated and created by water run-off due to human induced topography chain. This wetland was located approximately 0.34 miles south of Morning Star Church. WTL-6 primary wetland function is water collection from surrounding sloping topography. Dominant vegetation included black willow, eastern daisy fleabane (*Erigeron annuus*), common cat-tail, common boneset, curly dock (*Rumex crispus*), soft rush, Allegheny monkeyflower, great water dock (*Rumex orbiculatus*), dotted smartweed, and whitegrass. Hydologic indicators included water marks, drainage patterns and saturated soils with a low chroma. WTL-6 is located outside of the proposed project limits, and would not be impacted by the proposed project.

Alternative C

WTL-1 is a seasonally saturated scrub-shrub wetland. WTL-1 is isolated and created by water run-off due to human induced topography chain. This wetland was located approximately 0.2 approximately miles northeast of the intersection of Old Knoxville Highway and Jackson Drive. WTL-1 primary wetland function is temporary surface water run-off storage. Dominant vegetation included dotted smartweed, swamp smartweed, soft rush, beggarticks, broad-leaved dock, black willow, ironweed, and giant goldenrod. Hydrologic indicators included water marks and saturated soils with a low chroma. Approximately 0.1 acre of WTL-1 would be permanently

impacted by the proposed project. The impact would result from the placement of fill into WTL-1.

WTL-2 is a seasonally saturated emergent wetland located adjacent to STR-1 and STR-2. This wetland was located approximately 0.4 miles north of Eagleton Village. WTL-2 primary wetland functions are temporary surface water run-off storage, some water filtration, and possible flood attenuation. Dominant vegetation included wool grass, common cat-tail, sneezeweed, marshpepper knotweed, beggarticks, Allegheny monkeyflower, ironweed, giant goldenrod, dotted smartweed, and sawtooth blackberry. Hydologic indicators included water stained leaves, water marks and saturated soils with a low chroma. Approximately 0.2 acre of WTL-2 would be permanently impacted by the proposed project. The impact would result from the placement of fill into WTL-2.

WTL-3 is a seasonally saturated emergent wetland located adjacent to STR-3. This wetland was located approximately 0.57 miles slightly southwest of the intersection of Sam Houston School Road and Mount Lebanon Road. WTL-3 primary wetland functions are water filtration and possible flood attenuation. Dominant vegetation included wool grass, common cat-tail, whitegrass, marshpepper knotweed, soft rush, smallspike false nettle, Asiatic dayflower, and ironweed. Hydologic indicators included inundation, water marks and saturated soils with a low chroma. Approximately 0.6 acre of WTL-3 would be permanently impacted by the proposed project. The impact would result from the placement of fill into WTL-3.

WTL-4 is a seasonally saturated scrub-shrub wetland located adjacent to STR-4. This wetland was located approximately 0.26 miles slightly northwest of the intersection of Melody Road and Mount Lebanon Road. WTL-4 primary wetland functions are water filtration and possible flood attenuation. Dominant vegetation included black willow, common cat-tail, smallspike false nettle, marshpepper knotweed, beggarticks, rosette grass, Saint John's wort, Japanese honeysuckle, and Virginia water horehound. Hydologic indicators included water stained leaves, water marks, inundation, drainage patterns, and saturated soils with a low chroma. WTL-4 is located outside of the proposed project limits, and would not be impacted by the proposed project.

WTL-5 is a seasonally saturated emergent wetland located adjacent to STR-6. This wetland was located approximately 0.44 miles north of the intersection of Nina Delozier Road and Sevierville

Road. WTL-5 primary wetland functions are water filtration, and possible flood attenuation. Dominant vegetation included climbing hempvine (*Mikania scandens*), Elliot's goldenrod (*Solidago elliotii*), American hornbeam (*Carpinus caroliniana*), marshpepper knotweed, dotted smartweed, and smooth sawgrass (*Cladium mariscoides*). Hydologic indicators included water marks, inundation, drainage patterns, and saturated soils with a low chroma. WTL-5 is located outside of the proposed project limits, and would not be impacted by the proposed project.

Table 5.10 – Summary of Wetlands within Alternative A

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 Palustrine Scrub/ Shrub, isolated	Alt. A - approximately 0.2 approximately miles northeast of the intersection of Old Knoxville Highway, and Jackson Drive	Fill	Temporary surface water run-off storage	0.1	0.1	Small wetland area created by water run-off due to human induced topography chain. <i>Salix nigra</i> is the most abundant tree species. Dominant herbaceous vegetation includes <i>Polygonum</i> sp., <i>Juncus effusus</i> , and <i>Vernonia</i> sp.
WTL-2 Palustrine Emergent, contiguous	Alt. A - approximately 0.4 miles north of Eagleton Village	Fill	Temporary surface water run-off storage; some water filtration, possible flood attenuation	0.2	0.2	Small wetland area dominated by herbaceous species such as <i>Scirpus cyperinus</i> , <i>Typha latifolia</i> , <i>Polygonum hydropiper</i> , <i>Bidens</i> sp., <i>Vernonia</i> sp., and <i>Rubus argutus</i> .
WTL-3 Palustrine Emergent, contiguous	Alt. A - approximately 0.57 miles slightly southwest of the intersection of Sam Houston School Road and Mt. Lebanon Road	Fill	Some water filtration, possible flood attenuation	0.6	0.6	Small wetland area associated with STR-1 and STR-2. WTL-3 was dominated by herbaceous species such as <i>Scirpus cyperinus</i> , <i>Typha latifolia</i> , <i>Polygonum hydropiper</i> , <i>Bidens</i> sp., <i>Vernonia</i> sp., and <i>Rubus argutus</i> .
WTL-4 Palustrine Scrub/ Shrub, contiguous	Alt. A - approximately 0.26 miles slightly norththwest of the intersection of Melody Road and Mt. Lebanon Road	No Impact; The resource is located outside of proposed right-of-way.	Some water filtration, possible flood attenuation	0.0	0.0	Small wetland area associated with STR-4 and PND-1. <i>Salix nigra</i> is the most abundant tree species. Dominant herbaceous vegetation includes <i>Polygonum</i> spp., <i>Typha latifolia</i> , <i>Lycopus virginicus</i> , <i>Solidago gigantean</i> , and <i>Vernonia</i> sp.
WTL-5 Palustrine/ Emergent, contiguous	Alt. A - approximately 0.41 miles south of the intersection of Nina Delozier Road and Davis Ford Road	Fill	Some water filtration, possible flood attenuation	0.1	0.1	Small wetland area associated with STR-8. WTL-5 was dominated by herbaceous species such as <i>Lobelia cardinalis</i> , <i>Helenium autumnale</i> , <i>Polygonum punctatum</i> , <i>Eupatorium perfoliatum</i> , and <i>Impatiens capsensis</i> .
WTL-6 Palustrine Scrub/ Shrub, isolated	Alt. A - approximately 0.34 miles south of Morning Star Church	No Impact; The resource is located outside of proposed right-of-way.	Water collection from surrounding sloping topography	0.0	0.0	Small wetland created by drainage. Lack of maintenance has allowed wetland vegetation to dominate. <i>Salix nigra</i> is the most abundant tree species. Dominant herbaceous vegetation includes <i>Eupatorium perfoliatum</i> , <i>Juncus effusus</i> , <i>Leersia virginica</i> , and <i>Typha latifolia</i> .

Table 5.11 – Summary of Wetlands within Alternative C

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 Palustrine Scrub/ Shrub, isolated	Alt. C - approximately 0.2 miles northeast of the intersection of Old Knoxville Highway, and Jackson Drive	Fill	Temporary surface water run-off storage	0.1	0.1	Small wetland area created by water run-off due to human induced topography chain. <i>Salix nigra</i> is the most abundant tree species. Dominant herbaceous vegetation includes <i>Polygonum</i> sp., <i>Juncus effusus</i> , and <i>Vernonia</i> sp.
WTL-2 Palustrine/ Emergent, contiguous	Alt. C - approximately 0.4 miles north of Eagleton Village	Fill	Temporary surface water run-off storage; some water filtration, possible flood attenuation	0.2	0.2	Small wetland area dominated by herbaceous species such as <i>Scirpus cyperinus</i> , <i>Typha latifolia</i> , <i>Polygonum hydropiper</i> , <i>Bidens</i> sp., <i>Vernonia</i> sp., and <i>Rubus argutus</i> .
WTL-3 Palustrine Emergent, contiguous	Alt. C - approximately 0.57 miles slightly southwest of the intersection of Sam Houston School Road and Mt. Lebanon Road	Fill	Some water filtration, possible flood attenuation	0.6	0.6	Small wetland area associated with STR-1 and STR-2. WTL-3 was dominated by herbaceous species such as <i>Scirpus cyperinus</i> , <i>Typha latifolia</i> , <i>Polygonum hydropiper</i> , <i>Bidens</i> sp., <i>Vernonia</i> sp., and <i>Rubus argutus</i> .
WTL-4 Palustrine Scrub/ Shrub, contiguous	Alt. C - approximately 0.26 miles slightly norththwest of the intersection of Melody Road and Mt. Lebanon Road	No Impact; The resource is located outside of proposed right-of-way.	Some water filtration, possible flood attenuation	0.0	0.0	Small wetland area associated with STR-4 and PND-1. <i>Salix nigra</i> is the most abundant tree species. Dominant herbaceous vegetation includes <i>Polygonum</i> spp., <i>Typha latifolia</i> , <i>Lycopus virginicus</i> , <i>Solidago gigantean</i> , and <i>Vernonia</i> sp.
WTL-5 Palustrine/ Emergent, contiguous	Alt. C approximately 0.44 miles north of the intersection of Nina Delozier Road and Sevierville Road	No Impact; The resource is located outside of proposed right-of-way.	Some water filtration, possible flood attenuation	0.0	0.0	Small wetland area associated with STR-7 and STR-8. WTL-5 was dominated by herbaceous species such as <i>Mikania scandens</i> , <i>Polygonum hydropiper</i> , <i>Polygonum punctatum</i> , <i>Carpinus caroliniana</i> , and <i>Cladium mariscoides</i> .

5.2.2 Direct Impacts

Six wetland sites were identified within the Alternative A corridor and five wetland sites were identified with the Alternative C corridor. There were no wetland sites identified within the Alternative D corridor. Four of the six wetland sites within the Alternative A corridor would be impacted, while three of the five wetland sites within the Alternative C corridor would be impacted. The total wetland acres impacted by Alternatives A and C are similar at 1.0 acre and 0.9 acre, respectively. It is anticipated that these wetland acres would be filled as a result of the proposed Alternative A and C corridors. These wetland impacts are shown in Table 5.10 through 5.11. Efforts would be made, however, during further project design, to avoid or minimize impacts to as many of these sites as possible.

5.2.3 Indirect Impacts

The proposed alternatives are likely to facilitate new development and/or accelerate the development that is already occurring in the proposed project area. The primary change would be the conversion of agricultural fields/pastureland to single-family residential developments. In addition, commercial development is likely to continue along the existing roadway networks within the proposed alternative corridors. The transition of the area from a rural setting to a more urbanized setting is likely to have some indirect impacts to wetlands within the proposed alternative corridors as undeveloped land is converted into developed land. Typically, as undeveloped land is required for development, wetlands are often filled and/or encroached upon to accommodate this development. However, a review of the National Wetland Inventory (NWI) maps indicate that the majority of the wetland habitats are primarily located along the Little River corridor with only small wetland seeps or man-made open waterbodies occurring within the area that would likely be developed. It is probable that the past land uses have altered the local hydrology and caused the reduction in wetland communities. Therefore, indirect impacts to wetlands from the proposed project would be minimal given the lack of existing wetland acres within the proposed project area.

In addition, federal, state, and local regulations, such as Section 404 of the Clean Water Act, would off-set some of the anticipated indirect impacts associated with the proposed project. Section 404 of the Clean Water Act, a federal regulation, is administered and enforced by the

USACE and would require entities seeking to impact jurisdictional waters of the U.S. to obtain various permits prior to impacting these resources. These permits require the use of minimization measures and obtaining some form of mitigation for impacting jurisdictional waters of the U.S. Mitigation is often achieved by purchasing mitigation credits from a mitigation bank that serves the same watershed or adjacent watersheds. An entity can also achieve mitigation by the creation and/or restoration of jurisdictional waters of the U.S. or through the preservation of jurisdictional waters of the U.S. within the same watershed.

The same protective measures implemented to protect non-wetland waters of the U.S. would also be implemented to protect wetlands. Some indirect impacts to wetlands are probable; however, the protective measures outlined in the federal, state, and local regulations would minimize any indirect impacts to wetlands resulting from the proposed project. Efforts to further minimize these effects would be made during the project design phase.

5.2.4 Cumulative Impacts

Prior to 1972, there was no legislation regulating the filling of waters of the U.S. Therefore, the nation experienced a massive reduction in wetland acres due to filling and draining of these natural resources. One of the most significant contributors to wetland loss was from the agricultural industry, as wetland areas were considered useless, and therefore, wetlands were drained, filled, and converted into a “useful” resource. The important role wetlands have in providing flood abatement areas, wildlife habitat, and improving water quality was finally recognized in 1972 by the amendment of the Clean Water Act. This amendment included Section 404, which established a law regulating the discharge of dredge and/or fill material into waters of the U.S. Since the 1972 amendment, several policies regarding Section 404 of the Clean Water Act have been established, including the “no-net loss” policy that was initiated in 1989. The goal of this policy is to conserve wetlands wherever possible, and that acres of wetlands converted to other uses must be off-set through restoration and creation of other wetlands, maintaining or increasing the total wetland resource base.

Like most of the eastern United States, the proposed project area has also experienced significant land use changes over the years, which has reduced and degraded wetland communities within the region. As previously noted, agriculture is the primary land use within the proposed

alternative corridors and has virtually eliminated large contiguous wetland communities that may have existed prior to the settlement of the area. Current development trends indicate that the area would continue to experience changes in land use as the cities of Maryville and Alcoa expand to accommodate growth. Therefore, the existing wetland acres within the proposed project area are likely to be impacted by development facilitated by the proposed project and the development that currently exists, as well as developments that are underway and anticipated.

At this time it is difficult to predict the overall impact that the development facilitated by the proposed project and other developments may have on existing wetland communities. However, cumulative impacts to wetlands would be minimized given the numerous federal, state, and local regulations that are in place and would off-set the overall cumulative impacts to wetlands within the region. These impacts would be off-set by the required compensatory mitigation that would take place within or adjacent to the Fort Loudoun Lake watershed. The current NWI maps indicate that approximately 27.8 acres of wetland habitat occurs along the Little River corridor (adjacent to the proposed project area), which could be used as compensatory mitigation in the form of preservation, enhancement, restoration, or expansion of existing wetlands (i.e. creation). Therefore, given the required permits and the protective measures that must be adhered to, the proposed project and the anticipated development would not significantly contribute to cumulative impacts to the loss of wetlands within the proposed project area.

5.2.5 Avoidance and Minimization of Wetland Impacts

Alternatives A, C, and D have been developed to have the least amount of impacts to not only the natural environment, but also the physical environment such as surrounding cities and neighborhoods, building structures, and community parks. Consequently, shifts in the proposed alternative alignments to further minimize impacts to wetlands also consider the potential impacts to the physical environments, and therefore, a particular alternative may be selected that has the potential to impact a greater amount of wetland acres versus another alternative. Alternatives A and C would impact approximately 1.0 and 0.9 wetland acres, respectively; however, this was based on a worst-case scenario and may be less once final design plans have been developed. At this time, it is difficult to predict potential impacts to wetlands if an alignment shift is deemed necessary to accommodate issues such as road design safety standards

and/or avoidance of historic building structures, neighborhoods, and/or community facilities. However, it is likely that wetland impacts would be similar or fewer based on the lack of existing wetland communities within the proposed project area. As the project design phase progresses, additional avoidance and minimization measures would be evaluated to reduce the projected impacts to wetlands, where possible. Any shifts to the alternative alignments would also consider such measures. Measures would also be developed and considered to minimize impacts to wetlands that are outside of the proposed project right-of-way.

5.2.6 Wetland 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 (USACE). The minimum replacement ratio for wetlands is 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, would 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.

6.0 Floodplains

A survey of the proposed alternative corridors for floodplains, as required by the provisions of Executive Order 11988, has identified transverse crossings of the 100-year floodplain associated with tributaries of the Little River. Floodplains provide important ecological values that include surface water and storm water storage, bank stabilization, filtration of sediment, shading for stream channels, and food and shelter for wildlife.

6.1 Direct Impacts

The proposed alternatives would impact 100-year floodplains at various stream crossings throughout the proposed corridors (Table 6.1 – Floodplain Acres Impacted per Alternative). The amount of floodplain acres that may be impacted at the various floodplain crossings where calculated by measuring the amount of floodplains that occur within the proposed Alternative A,

C, and D corridors (Figure 4: Alternatives A, C, & D Floodplains). As presented in Table 6.1, 6.85 acres, 8.95 acres, and 8.1 acres of the 100-year floodplain could be impacted by the proposed Alternative A, C, and D corridors, respectively. However, avoidance and minimization measures are being evaluated and would be implemented during the design and construction of the proposed project to reduce the direct impacts to the 100-year floodplain. Avoidance and minimization measures include crossing the floodplain at or near a perpendicular angle, with an appropriately sized bridge/culvert, and or placing a parallel highway alignment out of the floodplain or as far away from the stream as possible.

Table 6.1 – Floodplain Acres Impacted per Alternative

Resource Name	Class	Designated ID per Alternative			Alternative A (acres)	Alternative C (acres)	Alternative D (acres)
		A	C	D			
STR -1	STR	N/A	N/A	1	0	0	0.9
STR -2	STR	N/A	N/A	2	0	0	1.4
Peppermint Branch	STR	6	6	5	0.75	1.2	0.5
Crooked Creek	STR	N/A	N/A	7	0	0	0
Unnamed trib. to Little River	STR	N/A	8	6	0	0.7	0.3
Gravelly Creek	STR	8	9	8	1.8	0	0
Flag Branch	STR	9	10	N/A	4.3	7.05	0
Crooked Creek/Flag Branch*	STR	N/A			0	0	5.0
Total Floodplain Impacts					6.85	8.95	8.1

Note: * = Alternative D intersects the floodplains of Crooked Creek and Flag Branch where the floodplains of these streams converge.

6.2 Indirect Impacts

The proposed alternatives include the addition of paved travel lanes that would increase the amount of impervious surface area within the area of influence. This increase in impervious surface area could indirectly impact floodplains and flood prone areas. The most notable effect

would be the amount of storm water run-off and the increased velocity of the storm water run-off. To minimize these indirect effects to floodplains and flood prone areas, the proposed alternatives would be designed to control the increase and velocity of storm water run-off. The design measures may include urban curb and gutters, minimization of storm water discharge locations, storm water run-off directed into the median, grassed ditches, and no direct storm water discharge into stream channels.

Additionally, the proposed project is likely to facilitate new development and/or accelerate the existing development within the area that would also contribute to the increase in impervious surface area. However, impacts from the induced development would be minimized by federal, state, and local laws that have been established to control development within floodplain and flood prone areas.

The proposed project would increase impervious surface area by the additional paved travel lanes and by the expected development that would likely occur in the area. This could have reasonable and foreseeable indirect effects on floodplains. However, the roadway design measures and future development being subject to federal, state, and local floodplain regulations that prohibit or limit development in floodplains would minimize the potential indirect effects.

6.3 Cumulative Impacts

The proposed project would likely contribute to the overall impacts to floodplains that have occurred and are occurring within the area. The impacts would result from additional roadway crossings and the increased development that is likely to occur. However, some of the projected impacts would be off-set by the roadway design and by the federal, state, and local regulations that limit development within floodplain areas.

7.0 Water Quality

Water quality can be impacted by various sources such as surrounding land uses, point and non-point pollution sources, and the amount of impervious surfaces within an area. The impacts to water quality from transportation projects are often associated the land disturbances from construction activities and the addition of impervious surfaces. The land disturbing activities can contribute to the discharge of excessive amounts of sediment into surface waters (i.e.,

streams, wetlands, open waters); while the increase in impervious surfaces allows for the discharge of increased amounts of pollutants (e.g., oils, chemicals, polluted storm water, etc.) into the surface waters.

Currently, several factors are contributing to the degradation of water quality within the proposed alternative corridors including grazing livestock, agriculture, and increasing development. These activities and land uses have all contributed to increased amounts of sediments, pollutants, and increases in surface water temperature. Section 303(d) of the Clean Water Act mandates each State to identify waters within its boundaries that do not meet water quality standards. There are currently three streams that occur within the proposed alternative corridors that are on the Tennessee 2008 303(d) list (Table 7.1 – Listed 303(d) Streams within Alternative Corridors).

Table 7.1 – Listed 303(d) Streams within Alternative Corridors

Resource	Class	Designated ID per Alternative			Support Designated Use (Y/N)	Cause	Source
		A	C	D			
Peppermint Branch	STR	6	6	5	No	Loss of biological integrity due to siltation	Discharges from MS4 area. Pasture Grazing
Crooked Creek	STR	N/A	N/A	7	No	Loss of biological integrity due to siltation and Escherichia coli	Pasture Grazing/ Unrestricted cattle access
Flag Branch	STR	9	10	N/A	No	Habitat loss due to alteration in stream-side or littoral vegetative cover. Loss of biological integrity due to siltation.	Pasture Grazing. Discharges from MS4 area

7.1.1 Direct and Indirect Impacts

The potential direct and indirect impacts on water quality from the proposed alternatives include water quality degradation from roadway-induced development. Construction of roads, buildings, and parking lots reduces the ability of land to absorb and filter rainwater, resulting in a higher potential for contaminated runoff to directly enter streams and other surface waters. New residential and other development would also result in additional discharges from sewer treatment facilities into surface water bodies. The contributing factors to water quality degradation include sediment runoff from precipitation events during construction, and the increased amounts of pollutants that could be introduced into the waters of the U.S. as a result of the increased amount of impervious surfaces.

7.1.2 Cumulative Impacts

The cumulative impacts on water quality resulting from the indirect effects of the proposed alternatives, in combination with future land development and transportation projects, would have the potential to cause the additional degradation of water quality. Storm water runoff from new developments could contain oil, grease, pesticides, and other chemicals, which could be carried to waterbodies. Poor water pollution abatement control measures during and after construction of developments could increase erosion, sedimentation, and total suspended solids. New residential and other development would also result in additional discharges from sewer treatment facilities into water bodies. However, some of the projected impacts would be off-set by the roadway design and by the federal, state, and local regulations that require erosion and sediment control plans, the implementation of BMPs, and various water quality permits that require water quality monitoring.

7.2 Exceptional Tennessee Waters

Tennessee water quality standards require the incorporation of the antidegradation policy into regulatory decisions (Chapter 1200-4-3-.06). The WPC has been delegated the responsibility of identifying exceptional Tennessee Waters (previously known as Tier 2) and Outstanding National Resource Waters (Tier 3). In exceptional waters, degradation cannot be authorized unless (1) there is no reasonable alternative to the proposed activity that would render it non-degrading and (2) the activity is in the economic or social interest of the public. In Outstanding National Resource Waters, no new discharges, expansions of existing discharges, or mixing zones will be permitted unless such activity will not result in measurable degradation of the water quality.

The proposed project lies within the Fort Loudoun Lake watershed and is comprised of approximately 911 stream miles, some of which are designated Exceptional Tennessee Waters. One of these designated Exceptional Tennessee Waters includes the Little River, which is in close proximity to the proposed project. The Little River has been designated as an Exceptional Tennessee Water because a portion of the river flows through the Great Smoky Mountains National Park and also supports federal and state threatened and endangered species that includes the fine-rayed pigtoe (*Fusconaia cuneolus*), Virginia spiraea (*Spiraea virginiana*), snail

darther (*Percina tanasi*), longhead darther (*Percina macrocephala*), and the ashy darther (*Etheostoma cinereum*).

The watershed (Fort Loudoun) that the Little River occurs in can be characterized by forested slopes, high gradient, cool, clear streams, and rugged terrain. Some of the lower stream reaches occur on limestone. In addition, some of the watershed's streams flow through the Blue Ridge Mountains, and have a distinct fauna, some containing brook trout, the only salmonid native to Tennessee. The overall use support of the water quality conditions for waterbodies within the watershed are characterized as follows: 1 percent Threatened, 12 percent Does Not Support Designated Use, 12 percent Partially Support Designated Use, 39 percent Fully Support Designated Use, 35 percent were Not Assessed, and 39 percent Fully Supports Designated Use.

7.2.1 Direct and Indirect Impacts

The potential direct and indirect impacts to this Exceptional Tennessee Water, Little River, are similar to the direct and indirect impacts the proposed project could have on the overall water quality conditions. These impacts include water quality degradation from roadway-induced development. Construction of roads, buildings, and parking lots reduces the ability of land to absorb and filter rainwater, resulting in a higher potential for contaminated runoff to directly enter the Little River and other surface waters. New residential and other development would also result in additional discharges from sewer treatment facilities into surface water bodies. The contributing factors to water quality degradation include sediment runoff from precipitation events during construction, and the increased amounts of pollutants that could be introduced into the waters of the U.S. as a result of the increased amount of impervious surfaces.

In addition, the factors identified as potential causes of water quality degradation can also have negative impacts on the federal and state threatened and endangered species listed as occurring within the Little River. Many of the listed threatened and endangered species require clean and clear water to survive and have specific habitat requirements for spawning and reproduction. Some of the required habitats include clean swept gravel shoals, gravel and bedrock substrate with boulders, and various degrees of stream flow velocities. The listed water quality degradation factors can suffocate the listed species, bury potential habitat and food from sediment accumulation, alter stream flow velocities, and in some cases alter stream morphology.

7.2.2 Cumulative Impacts

The cumulative impacts on water quality resulting from the indirect effects of the proposed alternatives, in combination with future land development and transportation projects, would have the potential to cause additional degradation to the water quality and negatively impact the listed threatened and endangered species. Storm water runoff from new developments could contain oil, grease, pesticides, and other chemicals, which could be carried to waterbodies. Poor water pollution abatement control measures during and after construction of developments could increase erosion, sedimentation, and total suspended solids. New residential and other development would also result in additional discharges from sewer treatment facilities into water bodies. However, some of the proposed projected impacts would be off-set by the roadway design and by the federal, state, and local regulations that require erosion and sediment control plans, the implementation of BMPs, and various water quality permits that require water quality monitoring. Furthermore, the proposed project would be designed and constructed in accordance with the Endangered Species Act (ESA) of 1973, as amended, 16 U.S.C. 1531 et seq., which states “*that each Federal agency shall, in consultation with the Secretary (Secretary of the Interior/Secretary of Commerce), insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species resulting in the destruction or adverse modification of designated critical habitat.*”

8.0 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 the TDEC, the United States Fish and Wildlife Service (USFWS) and books and/or databases of cave records, and the 2001 Biological Assessment prepared for the proposed project. A May 8, 2006 TDEC Division of Natural Heritage database review identified five federally listed species known to occur within one-mile of the proposed project. In addition, the TDEC Division of Natural Heritage database documented state rare species, species of concern, and federally threatened and endangered species within a four-mile radius of the proposed project (Appendix D). The threatened and endangered species that potentially occur in Blount County are listed in Table 8.1 – Protected Species Potentially Occurring in Blount County. The following paragraphs describe the preferred habitats and

known distribution of the federal and state threatened and endangered species identified in the one mile and four mile databases.

Table 8.1 - Protected Species Potentially Occurring in Blount County

Common Name	Scientific Binomial	Regulatory Status	Preferred Habitat	Project Right-of-Way
Fish Species				
Snail Darter	<i>Percina tanasi</i>	Federal Threatened	Large free-flowing rivers with extensive areas of clean-swept gravel shoals.	Habitat Not Present
Duskytail Darter	<i>Etheostoma percunurum</i>	Federal Endangered	Pools of larger streams with bedrock rubble substrate. These pools are typically one to three feet in depth and have gently flowing current and are for the most part silt-free.	Habitat Not Present
Ashy Darter	<i>Etheostoma cinereum</i>	State Threatened	Small to medium upland rivers, occurring locally in areas of bedrock gravel substrate with boulders, water willow, or other cover with minimal silt deposits.	Habitat Not Present
Longhead Darter	<i>Percina macrocephala</i>	State Threatened	Upland creeks and small to medium sized rivers with good water quality, pools three feet or so deep, and gentle currents that provide silt free bottoms composed of bedrock, boulder, and gravel substrates.	Habitat Not Present
Invertebrates				
Fine-rayed Pigtoe	<i>Fusconaia cuneolus</i>	Federal Endangered	A lotic, riffle-dwelling species that usually inhabits ford and shoal areas of rivers with moderate gradient.	Habitat Not Present

Amphibians				
Tennessee Cave Salamander	<i>Gyrinophilus palleucus</i>	State Threatened	Streams in caves that contain amphipods and other aquatic organisms that can serve as a food source.	Habitat Not Present
Mammals				
Indiana Bat	<i>Myotis sodalis</i>	Federal Endangered	<p>Winter months this species hibernates in limestone caves where temperatures average 3 – 6 ° C with relative humidities of 66 to 95 percent.</p> <p>Summer months males stay in the vicinity of the hibernacula with the location of their daytime whereabouts not known</p> <p>Females form maternity colonies that are typically located under the loose bark or in cavities of trees.</p>	Summer Habitat Present
Plants				
Appalachian Bugbane	<i>Actaea rubifolia</i>	State Threatened	Rich soil on river bluffs, north-facing hillsides and talus slopes, moist dolomite ledges in ravines, as well as rocky shady woods below limestone bluffs	Habitat Not Present

Snail Darter - Federally Threatened

The snail darter (*Percina tanasi*) is generally thought to have inhabited the main channel of the upper Tennessee River and lower reaches of its major tributaries (Starnes and Etnier 1980; Etnier and Starnes 1993). Mr. D.A. Etnier and Mr. R.A. Stiles discovered this species in the lower Little Tennessee River in 1973 (Etnier 1976). The preferred habitat of the snail darter as described by Starnes and Etnier (1980) consists of large free-flowing rivers with extensive areas of clean-swept gravel shoals. The TDEC Division of Natural Heritage has documented records of the snail darter in the Little River at Little River Mile (LRM) 8.5 (1983), LRM 9.4 (2000), LRM 15.9 (2000), and LRM 17.3 (2000). These are all downstream from the tributaries that would be crossed by the proposed alternatives.

Duskytail Darter – Federally Endangered

The preferred habitat of the duskytail darter (*Etheostoma percnurum*) is pools of larger streams with bedrock rubble substrate. These pools are typically one to three feet in depth and have gently flowing current and are for the most part silt-free (Etnier and Starnes 1993). Etnier and Starnes (1993) have documented occurrences of four populations of the duskytail darter in the Little River. These occurrences were documented at the US-411 bridge downstream to just below the SR 33 bridge; the lower several miles of Citico Creek in Monroe County, Tennessee, Copper Creek a tributary to the Clinch River in Scott County, Virginia, and in the Cumberland River Drainage from the Big South Fork near the mouth of Station Camp Creek in Scott County, Tennessee. The TDEC Division of Natural Heritage has documented records of the duskytail darter in the Little River at LRM 8.5 (1992), LRM 9.4 (2000), and LRM 17.3 (1992). These records are all downstream from tributaries that would be crossed by the proposed alternatives.

Fine-rayed Pigtoe – Federally Endangered

The fine-rayed pigtoe mussel (*Fusconaia cuneolus*) is described by Neves (1991:274) as a “lotic, riffle-dwelling species that usually inhabits ford and shoal areas of rivers with moderate gradient.” Hickman (1937) and Ortman (1925:330) collected this species in

sandy substrates. It is believed that this species is restricted to the Tennessee River drainage except for the Duck River (Bogan and Parmalee 1983). The fine-rayed pigtoe mussel has been extirpated throughout most of its former range, with the last remaining population in Tennessee occurring in the Clinch (Hancock County) and Powell (Hancock and Claiborne Counties) Rivers (Parmalee and Bogan 1998). The TDEC Division of Natural Heritage has documented occurrences of the fine-rayed pigtoe mussel in the Little River at LRM 9.7 (1981) and Pistol Creek (1914) approximately 0.5 mile upstream of its confluence with the Little River at LRM 8.1.

Ashy Darter – State Threatened

The ashy darter (*Etheostoma cinereum*) typically inhabits small to medium upland rivers, occurring locally in areas of bedrock gravel substrate with boulders, water willow, or other cover with minimal silt deposits (Etnier and Starnes 1993). The depths in these areas are generally 1.5 inches to 6.5 feet and have sluggish currents (Etnier and Starnes 1993). Distribution of the ashy darter in Tennessee drainage includes the Buffalo, Duck, Emory, and Little Rivers (Starnes and Etnier 1980). Etnier and Starnes (1983) indicated that the healthiest known population for this species is located in the Little River in Blount County, Tennessee. One of the most productive collection locations is downstream of the US 411 bridge (Etnier and Starnes 1993) at LRM 17.3. This site is approximately 1.6 miles downstream of where the proposed project would cross a small, unnamed tributary to the Little River. The TDEC Division of Natural Heritage database has documented occurrences of the ashy darter from the Little River at LRM 13.3 (1970), 14.2 (1968), 17.3 (1976), and 17.6 (1970). These locations are all downstream from the tributaries that would be crossed by the proposed alternatives.

Longhead Darter – State Threatened

The longhead darter (*Percina macrocephala*) prefers larger upland creeks and small to medium sized rivers with good water quality, pools three feet or so deep, and gentle currents that provide silt free bottoms composed of bedrock, boulder, and gravel substrates (Clay 1975; Starnes and Etnier 1980; Etnier and Starnes 1993). Starnes and Etnier (1993) indicate that in some years, this species is common in portions of the Little River in Blount County, Tennessee. The TDEC Division of Natural Heritage database

has documented occurrences of the longhead darter in the Little River at LRM 8.5 (1985), 14.2 (1993), and 16.0 (1974). These locations are all downstream of tributaries that would be crossed by the proposed alternatives.

Indiana Bat – Federally Endangered

The Indiana bat (*Myotis sodalis*) range includes the Midwest and the eastern United States from the western edge of the Ozark Region in Oklahoma to southern Wisconsin, east to Vermont, and as far south as northern Florida (USFWS 1991). The Indiana bat is known to utilize two distinct habitat types through the course of a given year. During the winter months this species hibernates in limestone caves where temperatures average 3 – 6 ° C with relative humidities of 66 to 95 percent (Barbour and Davis 1969). Hibernation generally takes place from October to April, depending on climactic conditions (Harvey and Pride 1986). After emerging from hibernation, the bats disperse. The males apparently spend the summer months in the vicinity of the hibernacula with the location of their daytime whereabouts not known (Hall 1962; LaVal et al. 1977). Females form maternity colonies that are typically located under the loose bark or in cavities of trees (Humphrey et al. 1977; Kennedy and Harvey 1980). These trees generally have a diameter at breast height of six (6) inches or greater (USFWS, pers. comm.). Humphreys et al. (1977) found that foraging habitat for this species was confined to air space 6 to 100 feet near foliage of riparian and floodplain trees. Cope et al. (1978) indicated that the Indiana bat would not fly over open country or open water when flying to a foraging area.

Tennessee Cave Salamander – State Threatened

The Tennessee cave salamander (*Gyrinophilus palleucus*) prefers streams in caves that contain amphipods and other aquatic organisms that can serve as a food source. Individuals may be found in rimstone pools, stream runs and pools, and pools isolated by receding water. Typically, the water tends to be clear and free of sediment and substrate includes rock, gravel, sand and mud (Godwin 1995). Sinkholes are an important habitat component, allowing detritus inflow (Caldwell and Copeland 1992). This species occasionally occurs in surface environments, but is most likely that these individuals have been washed out of caves (Bury et al. 1980). The range of the Tennessee cave

salamander includes central and south-central Tennessee, northern Alabama, and northwestern Georgia (Frost 2002, Beachy 2005). The largest population of this species known to occur in Tennessee is Cave Cove Cave (Caldwell and Copeland 1992). The TDEC Division of Natural Heritage has records of this species occurring approximately four miles from the proposed alternatives.

Appalachian Bugbane – State Threatened

The Appalachian bugbane (*Actaea rubifolia*) is typically found at or near the base of north-facing slopes on talus and rocky soils derived from dolomite (Ramsey 1993d). Occupied sites are typically cool, moist and occur within mixed mesophytic forests between 885 to 1,574 feet in elevation (Ramsey 1993d, Gleason and Cronquist 1991, Keener 1977). Occupied habitat in Tennessee includes rich soil on river bluffs, north-facing hillsides and talus slopes, moist dolomite ledges in ravines, as well as rocky shady woods below limestone bluffs (Pyne 1994, Tennessee Ecological Services Division 1992, Tennessee Valley Authority Regional Heritage Program 1992, Chester 1975, Small 1933). The TDEC Division of Natural Heritage has records of this species occurring approximately four miles from the proposed alternatives.

8.1 Summary of Habitat Findings

Prior to the 2008 field surveys, field surveys were conducted in 1997 and 2001 to prepare a Biological Assessment for the ashy darter, longhead darter, snail darter, duskytail darter, fine-rayed pigtoe, and Indiana bat. In the 2001 Biological Assessment (Appendix E), stream conditions were reported as small trickles to moderately sized flows with substrate consisting of mainly sand, gravel, and mud. Many of these streams lacked a sufficient riparian buffer, as they are located in open fields. Livestock were using these open fields for grazing and frequently crossing the stream channels. In addition, the area has limited foraging for the Indiana bat as most of the area is comprised of open fields or is residential with few stream corridors with large intact riparian buffers. No hibernaculum (winter habitat) was known to exist within five miles of the proposed project (Harvey and Pride 1986; Harvey 1992). However, summer habitat for the Indiana bat does exist within proposed project corridor.

Many of the same stream conditions reported in the 2001 Biological Assessment were observed during the 2008 field surveys. A number of the streams were dry, including Peppermint Branch, or had low flows at the time of the field surveys. It was noted that the historic and current land uses of the area have continued to have a significant impact on the area streams. The observed impacts included channel straightening, elimination of the riparian buffer, increase of silt and sediment, and the increase of pollutants from point and non-point sources. The impact on streams from grazing livestock was also noted and was most evident from the trampled stream banks. Therefore, based on the current stream conditions and no known records for the ashy darter, longhead darter, snail darter, duskytail darter, and fine-rayed pigtoe, no potentially suitable habitat for these species exist within the proposed project corridor. Furthermore, no potentially suitable hibernacula for the Indiana bat were observed during the 2008 field surveys. However, there remains the potential for summer habitat of the Indiana bat to occur within the proposed project.

In addition, a search for potentially suitable habitat for the Tennessee cave salamander was conducted during the 2008 field surveys. No cave habitat was identified during this survey. Furthermore, streams crossed by the proposed project are heavily silted and degraded and would not provide suitable habitat for species that may be flushed from their upstream cave habitat. Therefore, there is no potentially suitable habitat for the Tennessee cave salamander within the proposed alternative corridors.

A search for potentially suitable habitat for the Appalachian bugbane was also conducted during the 2008 field surveys. The majority of the proposed alternative corridors have been disturbed at one time or another and is currently agricultural fields, disturbed forest land, or developed. Therefore, the specific habitat requirements, the sensitivity of this species, and the current land uses within proposed alternative corridors has long since eliminated potentially suitable habitat for the Appalachian bugbane.

8.2 Direct and Indirect Impacts

No protected species records were shown within the likely direct impact zone of the project. Species records listed within a one mile radius are the duskytail darter, longhead darter, snail darter, and fine-rayed pigtoe mussel. No Indiana bat hibernaculum is known to occur within the proposed project corridor. All known Indiana bat hibernacula is five miles or further from the proposed project corridor, which are Bull Cave (9.2 miles), Kelly Ridge Cave (8.25 miles), and White Oak Blowhole Cave (11.5 miles). In addition, the Appalachian bugbane and Tennessee cave salamander were listed as potentially occurring within four miles of the proposed project corridor. However, no habitat or individual species were observed within the proposed project corridor; therefore, the proposed project would have “no effect” on the Tennessee cave salamander or the Appalachian bugbane.

Record reviews and background research was conducted for the 1997, 2001, and 2008 field surveys and for the completion of the 2001 Biological Assessment. The reviews and background research included TDEC and USFWS databases and contacting Dr. David Etnier, Mr. Steven Ahlstedt, USGS, and Dr. Lee Barclay, Field Supervisor USFWS (Appendix D). The TDEC and USFWS databases did not have any documented occurrences of any of the listed species in the streams and tributaries that would be crossed by the proposed project. Furthermore, Dr. David Etnier stated that he had collected the snail darter and duskytail darter from the Littler River, but not from any of the streams and tributaries, including Peppermint Branch, Gravelly Creek, and Flag Branch, that would be crossed by the proposed project. He further stated that the snail darter and duskytail darter would not likely be present in the smaller tributaries and streams as they prefer larger stream habitats. Mr. Ahlstedt stated that he is aware of the fine-rayed pigtoe being collected in the Little River, but is not aware of any collections from the tributaries that may be crossed by the proposed project. Mr. Ahlstedt also stated that the fine-rayed pigtoe prefers larger streams and would not likely be present in the smaller tributaries and streams crossed by the proposed project. In a letter dated January 12, 2000 (Appendix D), Dr. Barclay indicated that the Indiana bat is known to occur in the vicinity of the proposed project. He further stated that the Indiana bat uses trees with

loose bark and greater than six inches in diameter at breast height for maternity and roost sites. However, Dr. Barclay stated that if tree removal is done outside of the summer roosting time (October 15 to March 31) that the proposed project is not likely to adversely affect the Indiana bat.

The primary impact that the proposed project could have on the listed protected aquatic species is the potential to increase silt and sediment within the crossed stream channels. This introduction of silt and sediment to the Little River tributaries could migrate to the main channel of the Little River where there are known occurrences of the listed protected aquatic species. The primary impact that the proposed project could have on the Indiana bat is the removal of trees that potentially provide summer roosting habitat. However, the 2001 Biological Assessment concluded that if stringent BMPs, including erosion and siltation control measures, are implemented and tree removal is done between October 15 and March 31 that the proposed project is “not likely to adversely affect” the ashy darter, longhead darter, snail darter, duskytail darter, fine-rayed pigtoe mussel, and the Indiana bat. The USFWS concurred with the Biological Assessment for the determination of effects call for the Indiana bat in a letter dated February 5, 2002. The USFWS concurred with Biological Assessment for the determination of effects call for the duskytail darter, snail darter, and fine-rayed pigtoe mussel in a letter dated April 16, 2002. These concurrence letters are included in Appendix F.

8.3 Cumulative Impacts

Prior to the Endangered Species Act (ESA) of 1973, there was no legislation that gave federal protection to plant and animal species that were endanger of becoming extinct. Without this legislation, many plant and animal species with specific habitat requirements and/or are sensitive to various forms of disturbance became extinct or were significantly reduced in number. A major contributor to plant and animal extinction is due to loss of habitat, which is typically attributed to conversion of land use from its native state. Such land use conversions have taken place in this region of Tennessee with agriculture being the major land use type. However, current trends indicate a conversion of land use from agriculture to residential, commercial, and/or industrial as the region experiences an increase in population.

The proposed project is expected to facilitate development and would likely contribute to this trend of land use conversion. However, it is unlikely that the proposed project would have any cumulative effects on federal and state protected species. The proposed alternative corridors and area of influence is primarily agricultural and does not represent suitable habitat for any of the listed federal and state protected species. Furthermore, field surveys resulted in a finding of “no effect” for the Tennessee cave salamander and the Appalachian bugbane and the 2001 Biological Assessment resulted in a “not likely to adversely affect” determination call for the ashy darter, longhead darter, snail darter, duskytail darter, fine-rayed pigtoe, and Indiana bat. The determination of effects calls were based on lack of potentially suitable habitat, absence of individual federal or state protected species, and information provided by Dr. David Etnier, Mr. Steven Ahlstedt, USGS, and Dr. Lee Barclay, Field Supervisor USFWS. In addition, the federal, state, and local regulations would prevent any effects to federal and state protected species that could potentially result from the proposed project or development facilitated by the proposed project. Therefore, the proposed project would have no cumulative effects to federal or state protected species.

8.4 Conclusions

At this time, no state or federally listed protected species are known to be affected by the proposed project, other than potential sedimentation impacts to the duskytail darter, snail darter, and fine-rayed pigtoe mussel, which occur approximately one mile downstream of likely project construction, and potential habitat reduction for the Indiana bat. Impacts for these species have been coordinated with the appropriate agencies, and all requirements would be complied with.

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

9.0 Sinkholes

Prior to the September and October 2008 field surveys, a review of the appropriate USGS topography maps was performed to help determine potential sinkhole locations. In addition, a Preliminary Geologic Report was prepared by the TDOT Geotechnical Engineering Section (Appendix G), which provides geologic site conditions and gives recommendations that should be considered prior to construction of the proposed project. Based on the review of USGS topography maps, the findings of the Preliminary Geologic Report, and the 2008 field surveys, several sinkhole locations were identified within the proposed Alternative A, C, and D corridors (Figures 5A-5C – Sinkholes). During the 2008 field surveys, the sinkhole locations within the proposed Alternative A, C, and D corridors were investigated to determine if they were associated with watercourses (i.e., streams) and if they provided habitat for listed threatened and endangered species. None of the sinkholes were associated with watercourses or provided habitat for listed threatened and endangered species. The only field evidence that indicates a potential sinkhole location was the observance of depressed ground. No openings (indicating a potential cave) or flooding was observed during the September and October 2008 field surveys; however, flooding was noted at several of the sinkhole locations during the field surveys conducted to prepare the Preliminary Geologic Report.

9.1 Direct and Indirect Impacts

The proposed Alternative A, C, and D corridors traverse several sinkhole locations that are associated with “karst” topography, which is a term that refers to landforms and geologic features that have resulted from the dissolving of the carbonated bedrock underground, leaving large voids or open spaces beneath the ground surface. Therefore, the direct and indirect impacts to the sinkhole locations would be associated with the potential collapse of the ground surface where voids and/or open spaces are present. The potential collapse would likely result from vibrations associated with the construction of the proposed project and the increase of land development activity that would likely occur upon completion of the proposed project. In addition, sinkholes are often associated with underground streams and the introduction of pollutants to these underground streams could result from the proposed project and the associated land development.

The Preliminary Geologic Report did not report the observance of unstable ground that would pose a potential collapse of an encountered sinkhole from construction activities. However, as per the recommendation of the Preliminary Geologic Report, a subsurface program with auger drilling would likely be conducted prior to the construction of the proposed project to reduce/avoid potential impacts at the sinkhole locations.

9.2 Cumulative Impacts

The cumulative impacts on sinkholes resulting from the direct and indirect impacts of the proposed alternatives, in combination with future land development and transportation projects, would have the potential to cause impacts to sinkholes within the surrounding areas. Given the numerous sinkhole locations within the area, it is likely that sinkholes would be encountered by future road and land construction activities facilitated by the proposed project. The potential impacts could be related to the collapse of a sinkhole and/or introduction of pollutants to the associated underground streams. Additionally, sinkholes outside of the proposed alternative corridors, that were not investigated, may provide habitat for threatened and endangered species. Therefore, disturbances to these sinkholes from transportation projects and land development activity could impact habitat for the listed threatened and endangered species that utilize these environments.

To reduce/avoid potential impacts to sinkholes from future TDOT transportation projects, a field survey would be conducted on the proposed corridors and the results of those surveys would be documented in the associated reports. A subsurface program with auger drilling would also likely be conducted prior to the construction of the proposed project. The oversight of TDEC on land development activities would also help reduce/avoid impacts to sinkholes.

10.0 Required Permits

10.1 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 USACE permits and, where applicable, a Tennessee Valley Authority (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 would 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 would be complied with (TVA permit).

10.2 Wetland Permits

All wetland impacts require confirmation by, and coordination with, permitting agencies. All require either general or individual ARAP permits from the State of Tennessee. Almost all require either Nationwide or Individual permits from the USACE pursuant to Section 404 of the Clean Water Act. Other agencies such as the 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 USACE nationwide permits.

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

11.0 Summary of Findings

The proposed project is currently evaluating three alternatives that include two new location corridors (Alternatives A and C) and one alternative (Alternative D) that would primarily be an upgrade to existing roadway networks with some new location areas. Therefore, field surveys were conducted on all three proposed alternatives to determine the impacts that could occur to terrestrial and aquatic ecology, migratory birds and their habitat, floodplains, water quality, federal and state endangered and threatened species and their habitat, and sinkholes. A breakdown of impacts can be found in Table 11.1 - Summary of Proposed Impact Findings per Alternative.

Alternatives A and C would have the most substantial impacts to the terrestrial communities as they would traverse through undeveloped agricultural fields, pastureland, and forested communities. Impact breakdowns are included on the Table 11.1:

Table 11.1 – Summary of Proposed Impact Findings per Alternative			
Impact Type	Alternative A Impacts	Alternative C Impacts	Alternative D Impacts
Forested land	37 acres	33 acres	20 acres
Agricultural fields/ pastureland	132 acres	145 acres	79 acres
Commercial and industrial businesses	3 acres	9 acres	21 acres
Wetlands	1 acre	0.9 acre	0 acres
Perennial streams	1,760 linear feet	1,528 linear feet	506 linear feet
Intermittent streams	1,458 linear feet	1,074 linear feet	377 linear feet
Wet weather conveyances	841 linear feet	415 linear feet	1,424 linear feet
Open waterbodies (ponds)	0.4 acre	0.4 acres	0.1 acre
100-year Floodplains	6.85 acres	8.95 acres	8.1 acres

Alternative A may impact approximately 37 acres of forested land, 132 acres of agricultural fields/pastureland, and 3 acres of commercial and industrial businesses (Table 4.1). Alternative C may impact approximately 33 acres of forested land, 145 acres of agricultural/pastureland, and 9 acres of commercial and industrial businesses. Alternative D may impact approximately 20 acres of forested land, 79 acres of agricultural/pastureland, and 21 acres of commercial and industrial businesses. The potential impact to migratory bird species and their habitat would be minimal as potential foraging and nesting opportunities are limited due to past and current land uses of the area.

The aquatic environments that include wetlands and non-wetland waters of the U.S. would also experience significant impacts from Alternatives A and C. These impacts are likely to occur in the form of filling of wetlands, culvert placement and extension within stream channels, channel relocation and straightening, and increased levels of silt and sediment. The total wetland acres that may be impacted by Alternatives A and C are 1.0 acre and 0.9 acre, respectively. No wetlands occur within the Alternative D corridor. Non-wetland waters of the U.S. that may be impacted by the proposed alternative

corridors are as follows: Impacts created by the Alternative A corridor include approximately 3,218 linear feet of perennial and intermittent stream channel, 841 linear feet of wet weather conveyance channel, and 0.4 acre of open waterbodies (i.e. pond). Impacts created by the Alternative C corridor are approximately 2,602 linear feet of perennial and intermittent stream channel, 415 linear feet of wet conveyance channel, and 0.4 acre of open waterbodies. Impacts created by the Alternative D corridor are approximately 883 linear feet of perennial and intermittent stream channel, 1,424 linear feet of wet conveyance channel, and 0.1 acre of open waterbodies.

Impacts to floodplains may occur at locations where the proposed alternatives traverse the 100-year floodplain. The potential impact to the 100-year floodplain (Table 6.1) may result in approximately 6.85 acres, 8.95 acres, and 8.1 acres of floodplain impacts from the proposed Alternative A, C, and D corridors, respectively. However, avoidance and minimization measures are being evaluated and would be implemented during the design and construction of the proposed project to reduce the direct impacts to the 100-year floodplain. In addition, federal, state, and local regulations would minimize and prevent substantial impacts to floodplains.

Water quality may also be impacted as a result of the proposed alternatives. The construction of roads, buildings, and parking lots reduces the ability of land to absorb and filter rainwater, resulting in a higher potential for contaminated runoff to directly enter streams and other surface waters. New residential and other developments would also result in additional discharges from sewer treatment facilities into surface water bodies. The contributing factors to water quality degradation include sediment runoff from precipitation events during construction, and the increased amounts of pollutants that could be introduced into the waters of the U.S. as a result of the increased amount of impervious surfaces. However, some of the projected impacts would be off-set by the roadway design and by the federal, state, and local regulations that require erosion and sediment control plans, the implementation of BMPs, and various water quality permits that require water quality monitoring.

Field surveys and record reviews were also conducted for federal and state threatened and endangered species that include the duskytail darter, longhead darter, snail darter, fine-

rayed pigtoe mussel, Indiana bat, Tennessee cave salamander, and the Appalachian bugbane. A determination call of “not likely to adversely affect” was concluded for the duskytail darter, longhead darter, snail darter, fine-rayed pigtoe mussel, and Indiana bat. A “no effect” determination was concluded for the Tennessee cave salamander and Appalachian bugbane. These determinations were based on field surveys, background research, and information received from experts on the subject matter and federal and state agencies.

Numerous sinkholes were also identified within the proposed alternative corridors. The September and October 2008 field surveys did not identify any watercourses or threatened and endangered species habitat associated with the sinkhole locations. In addition, the Preliminary Geologic Report did not observe any unstable ground throughout the proposed alternative corridors. However, it is recommended that a subsurface program with auger drilling be conducted prior to the construction of the proposed project to evaluate the potential collapse of an encountered sinkhole.

Finally, several permits may be required for the anticipated impacts to jurisdictional waters of the U.S. that include individual or general Aquatic Resource Alteration Permits (ARAP) from the State of Tennessee; individual or Nationwide 404 USACE permits; and, where applicable, a Tennessee Valley Authority (TVA) 26a permit or letter of no objection. The necessary permits would be obtained once the exact impacts to jurisdictional waters of the U.S. can be determined.

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Appendix A

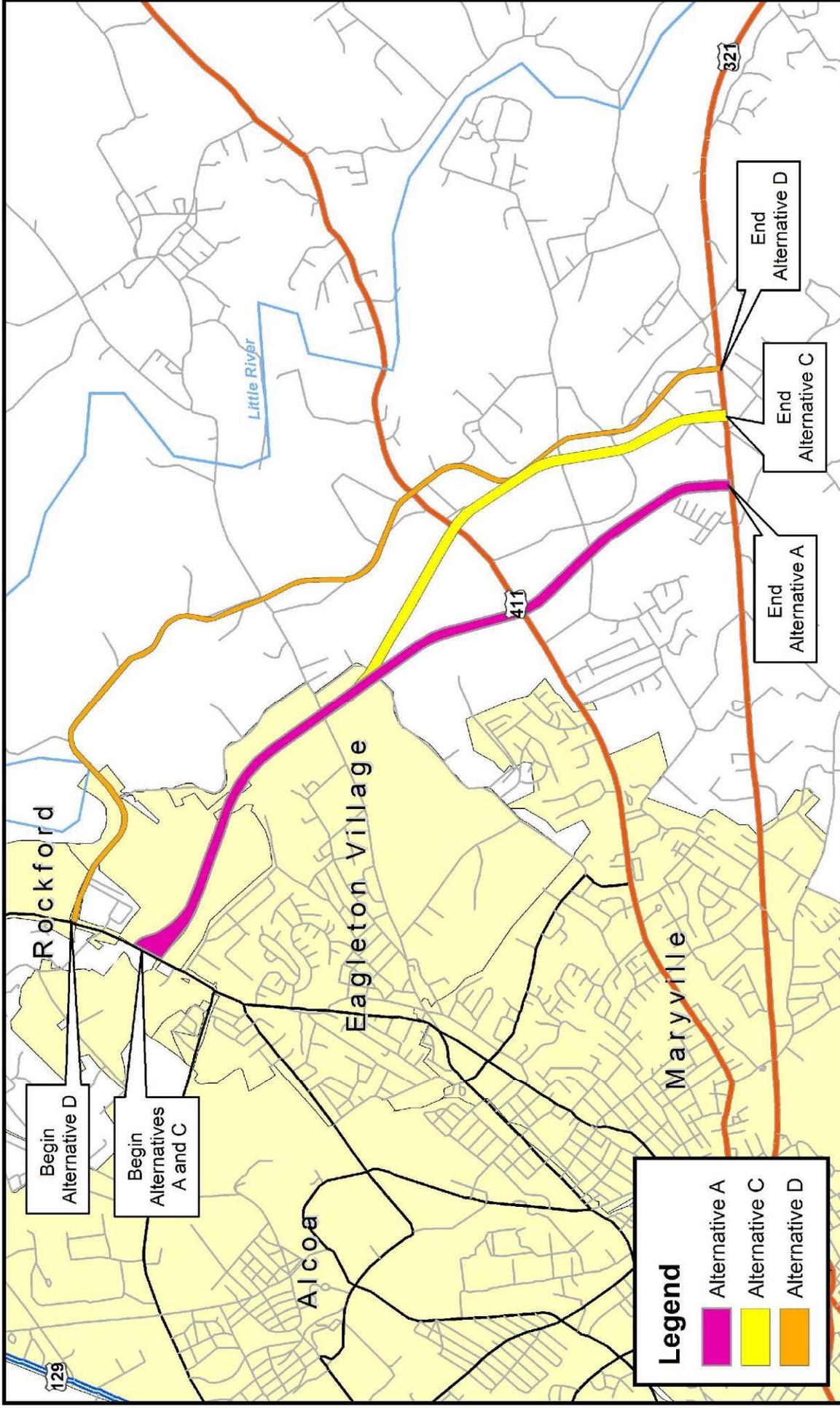
Figure 1

Figures 2A – 2H

Figures 3A – 3G

Figure 4

Figures 5A – 5C



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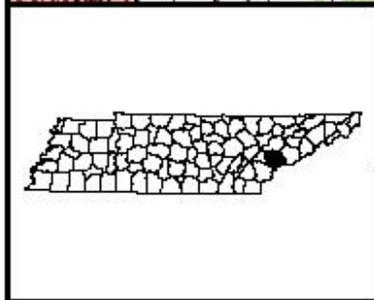
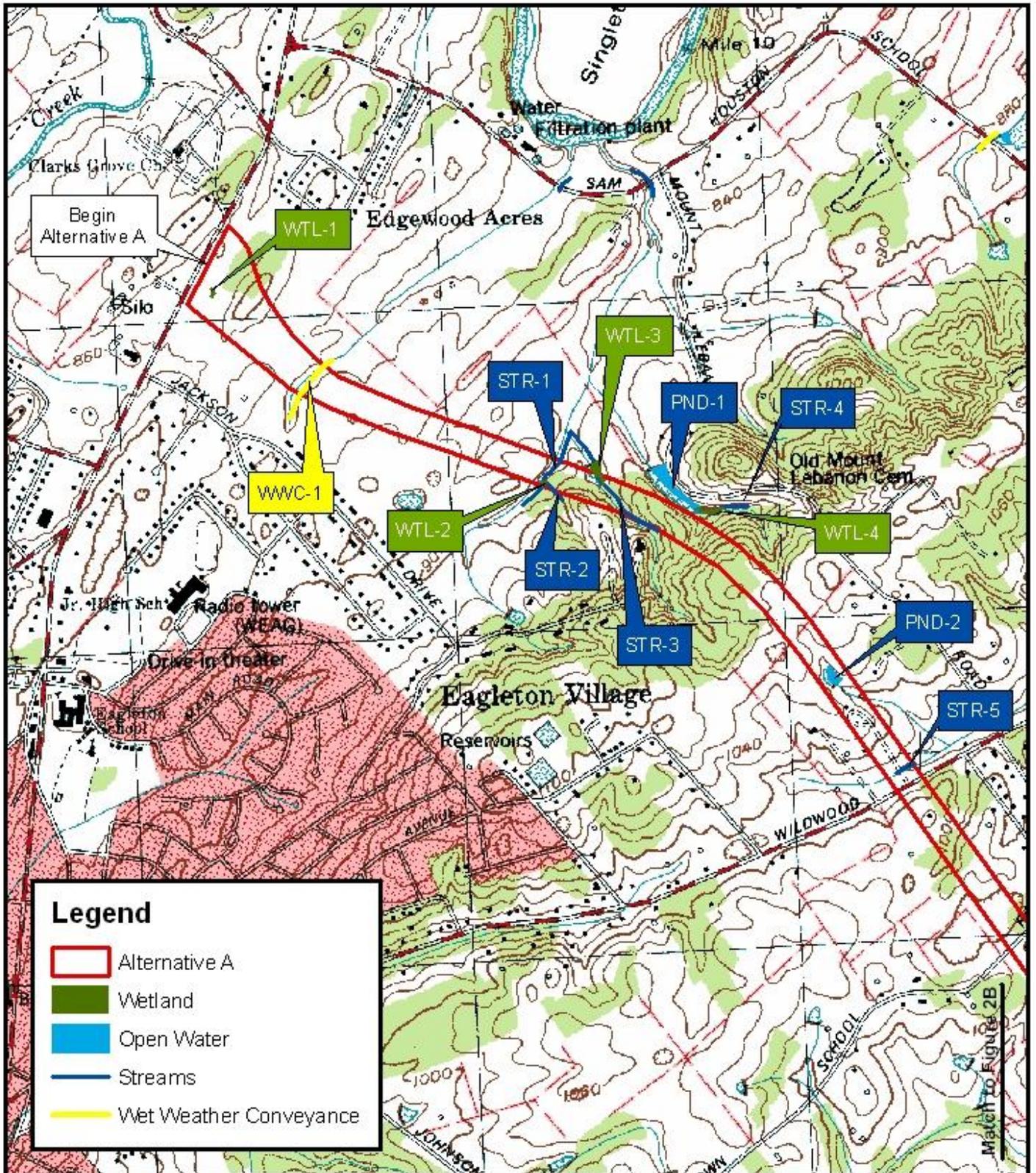
- Alternative A
- Alternative C
- Alternative D

Figure 1
Alternatives
A, C, & D
Project Location
Map

Pellissippi Parkway Extension
Blount County, TN
TDOT PIN 101423.00

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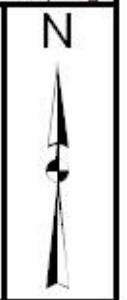
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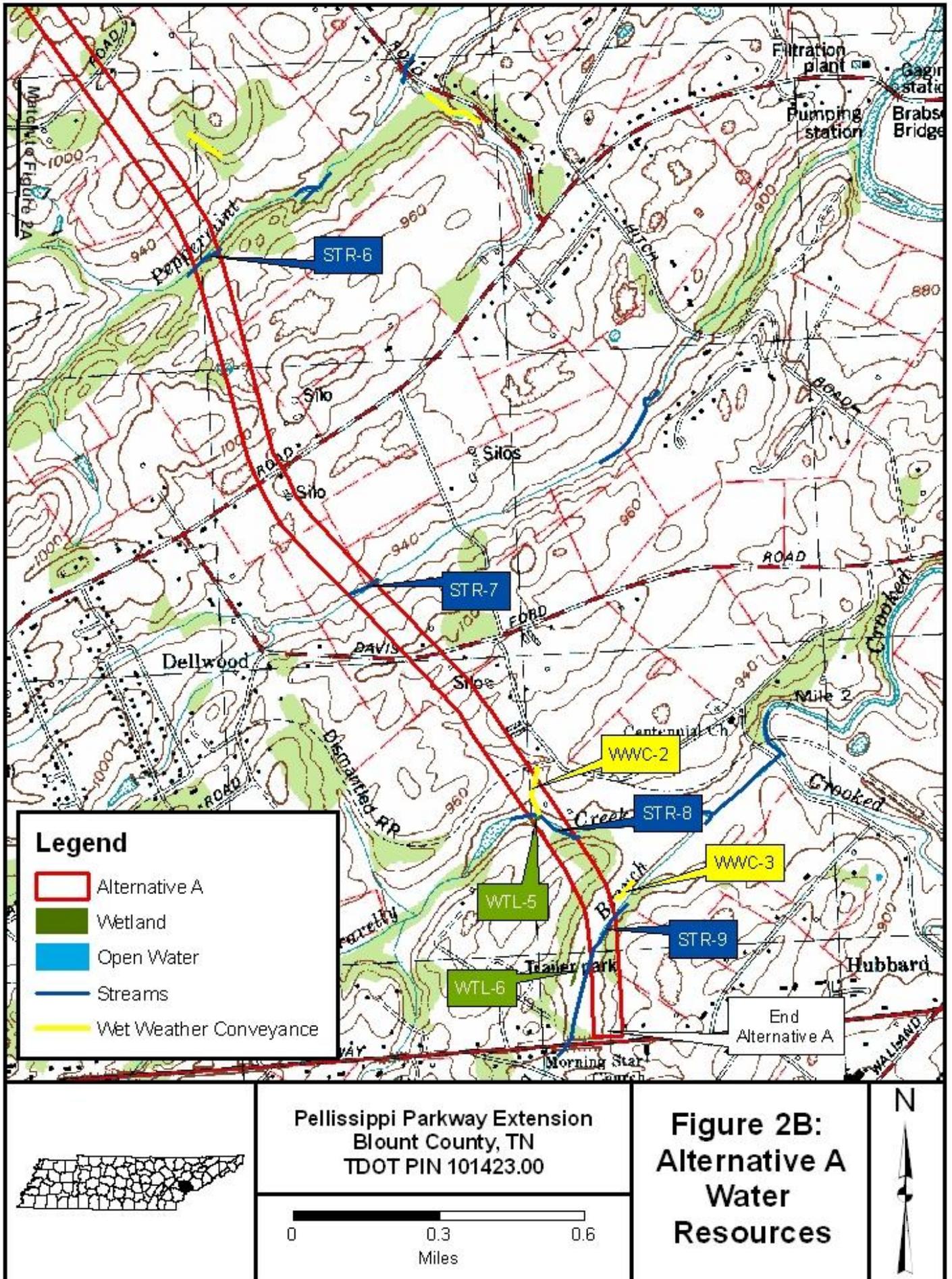


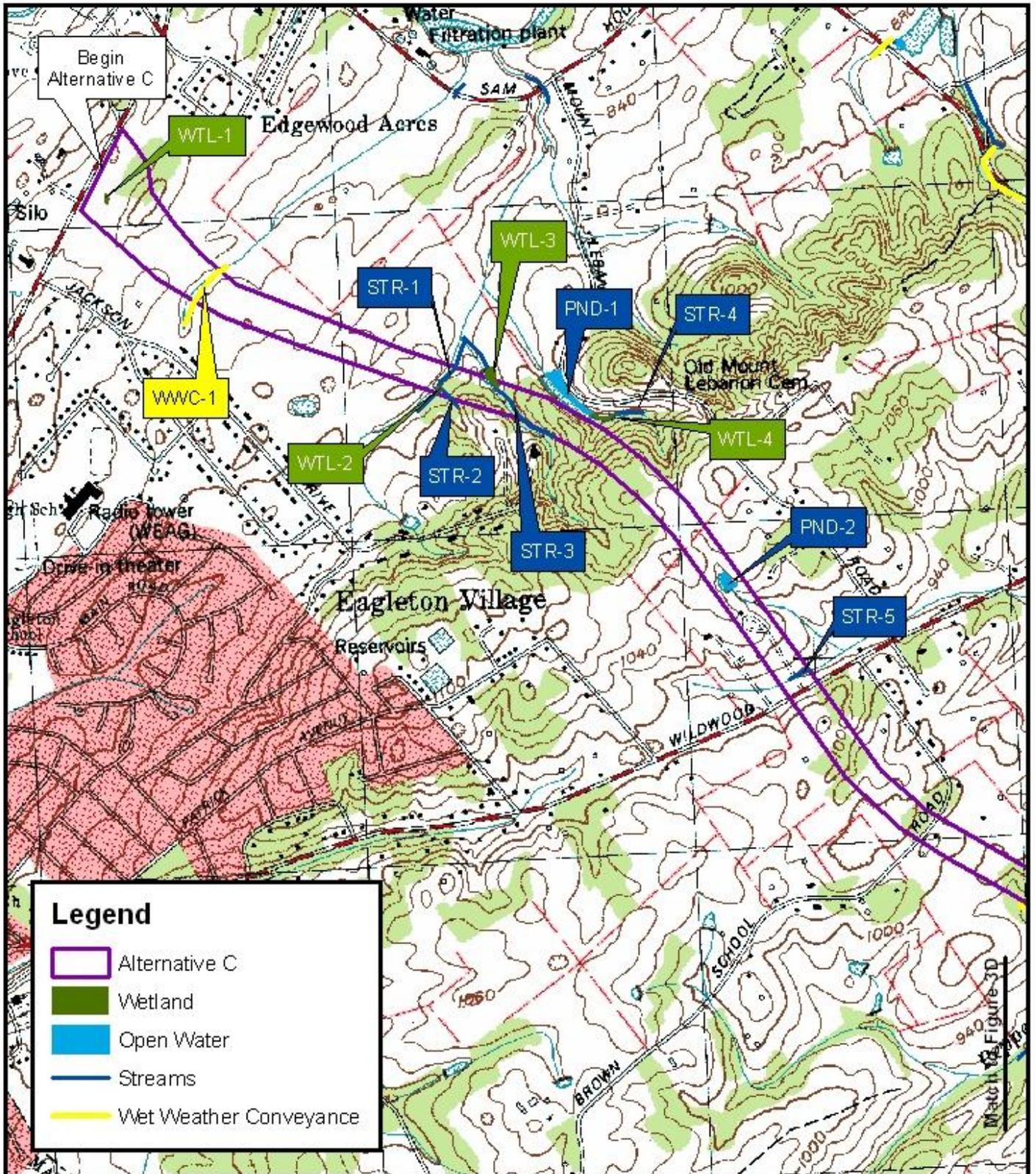
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**Figure 2A:
Alternative A
Water
Resources**

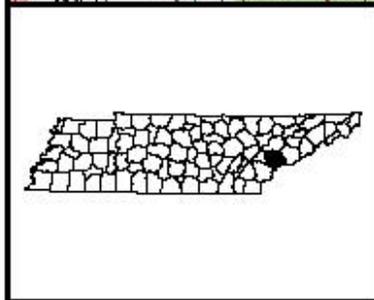






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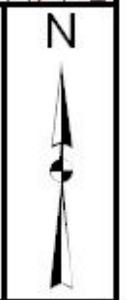
-  Alternative C
-  Wetland
-  Open Water
-  Streams
-  Wet Weather Conveyance

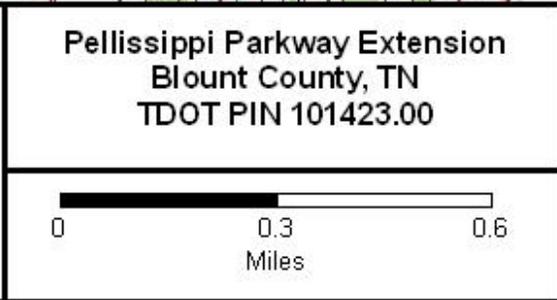
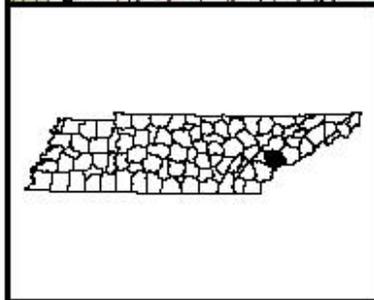
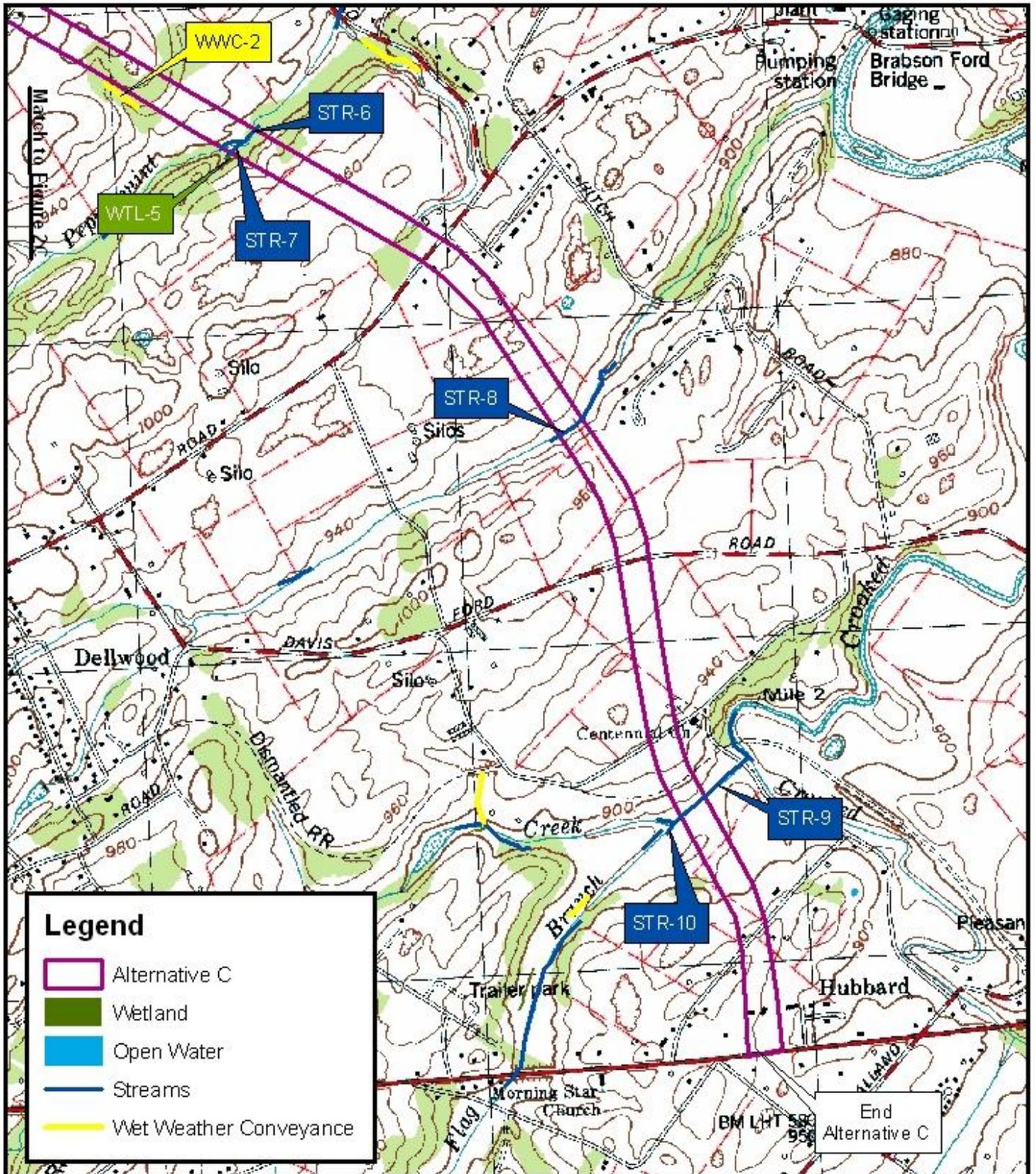


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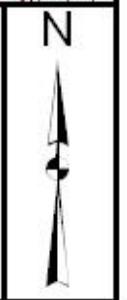
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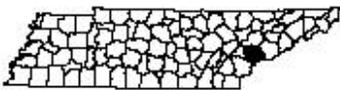
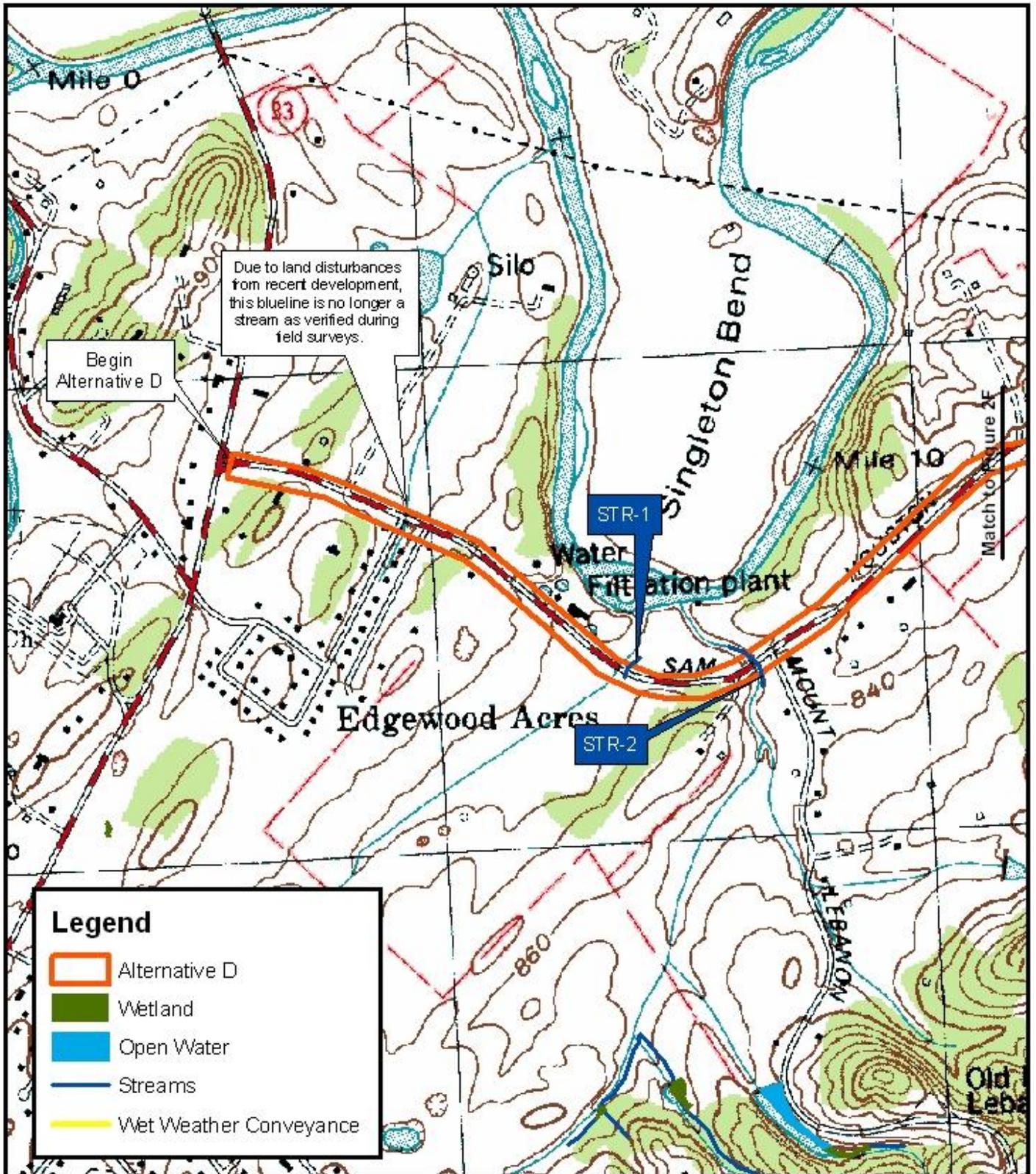
**Figure 2C:
Alternative C
Water
Resources**





**Figure 2D:
Alternative C
Water
Resources**





Pellissippi Parkway Extension
Blount County, TN
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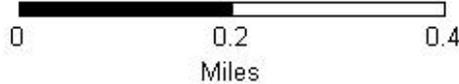
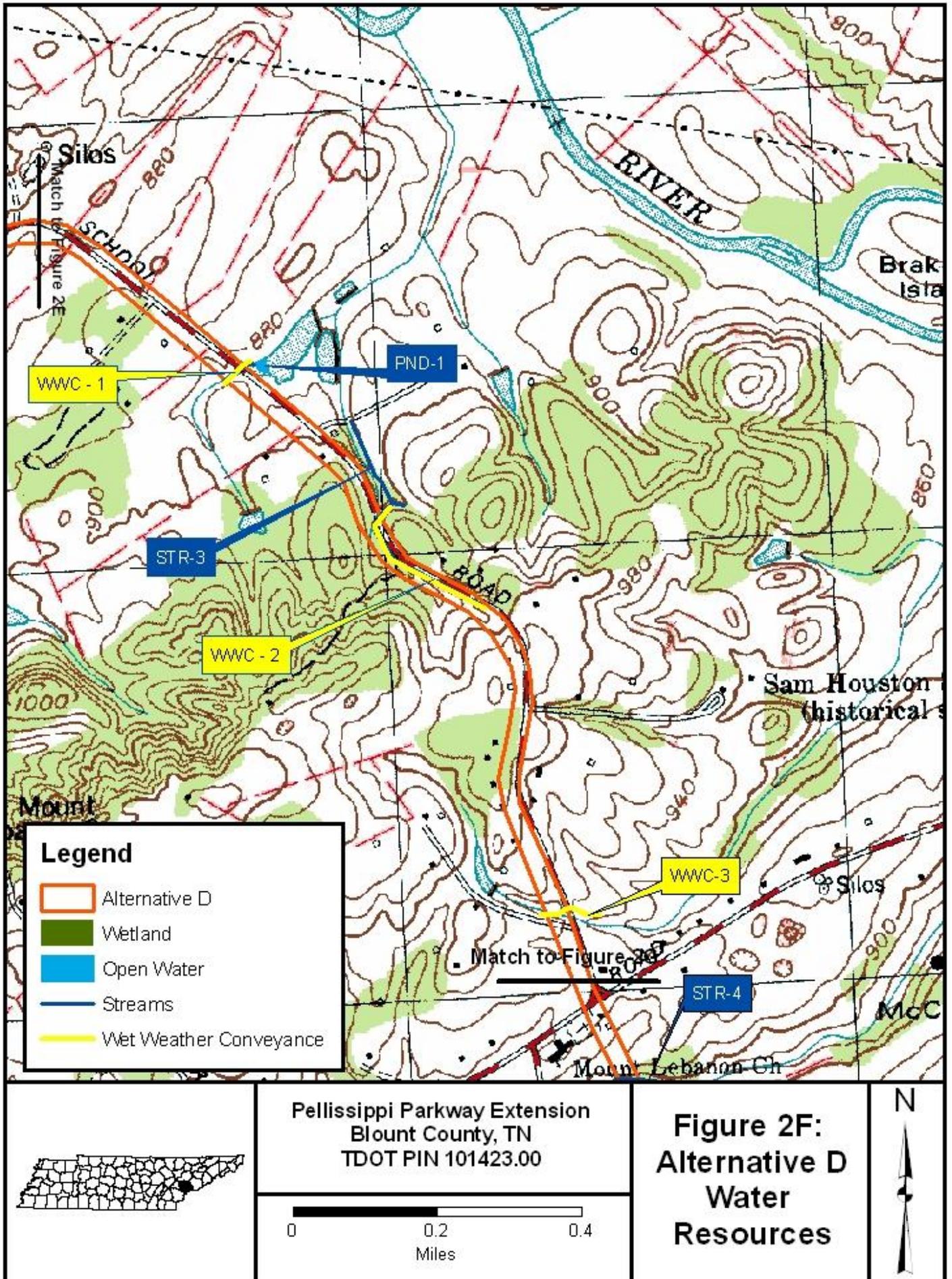
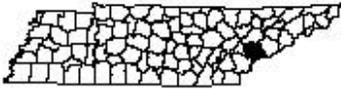
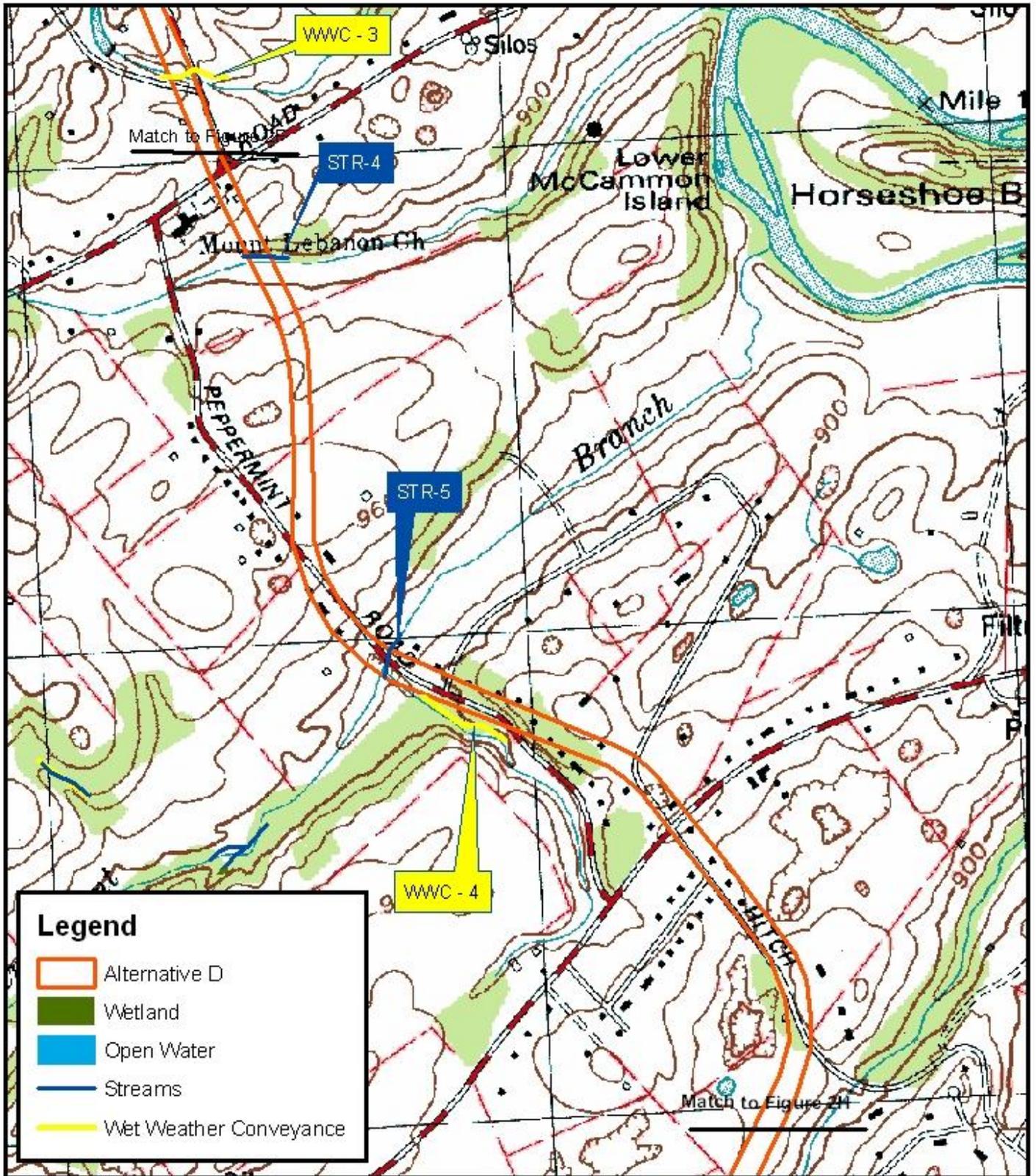


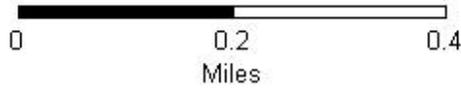
Figure 2E:
Alternative D
Water
Resources





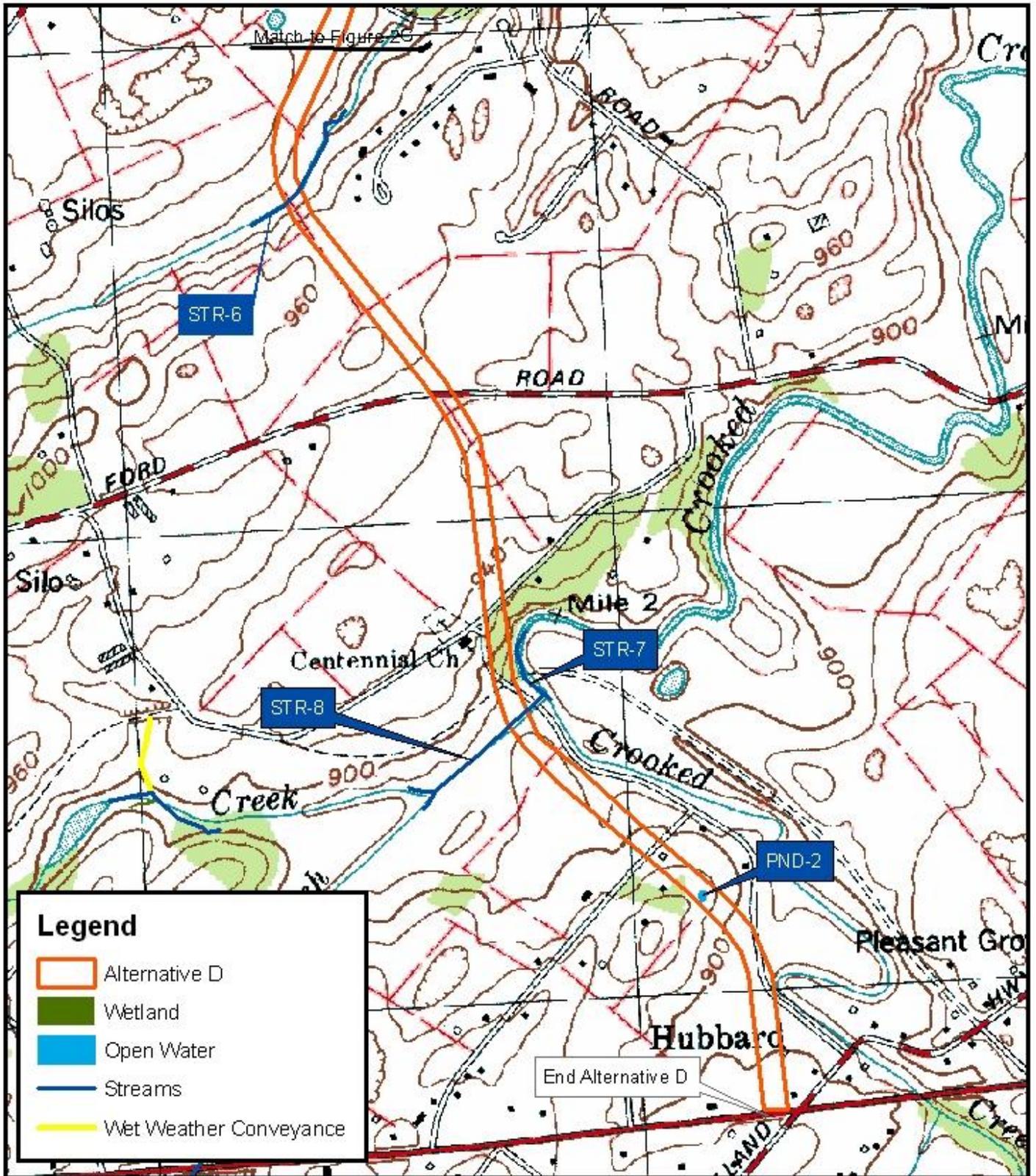


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**Figure 2G:
Alternative D
Water
Resources**





Pellissippi Parkway Extension
Blount County, TN
TDOT PIN 101423.00

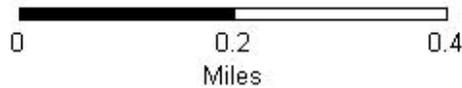
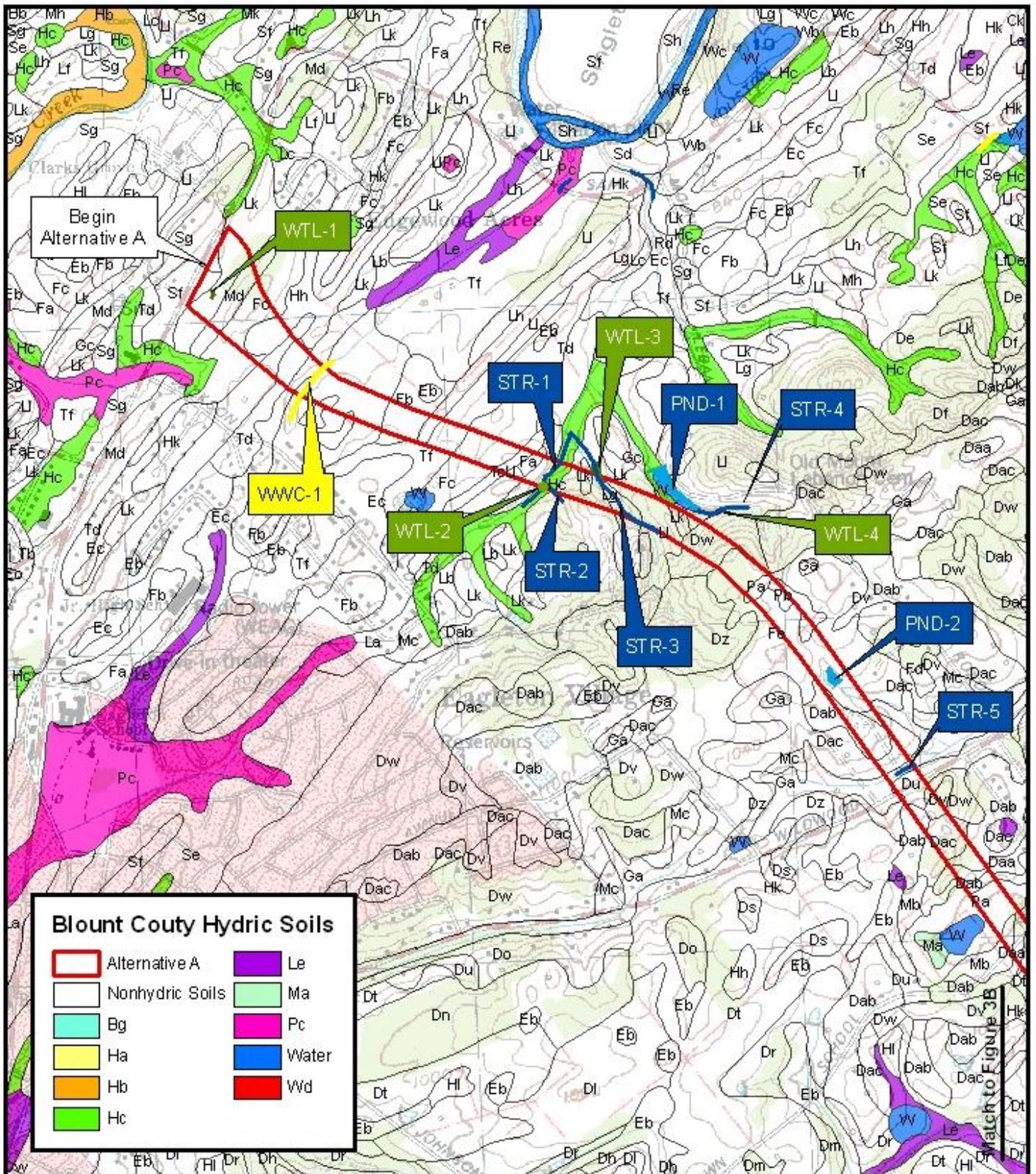


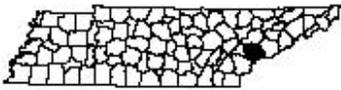
Figure 2H:
Alternative D
Water
Resources





Blount County Hydric Soils

	Alternative A		Le
	Nonhydric Soils		Ma
	Bg		Pc
	Ha		Water
	Hb		Wd
	Hc		



Pellissippi Parkway Extension
Blount County, TN
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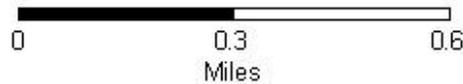
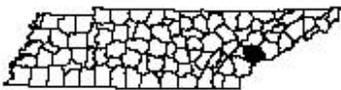
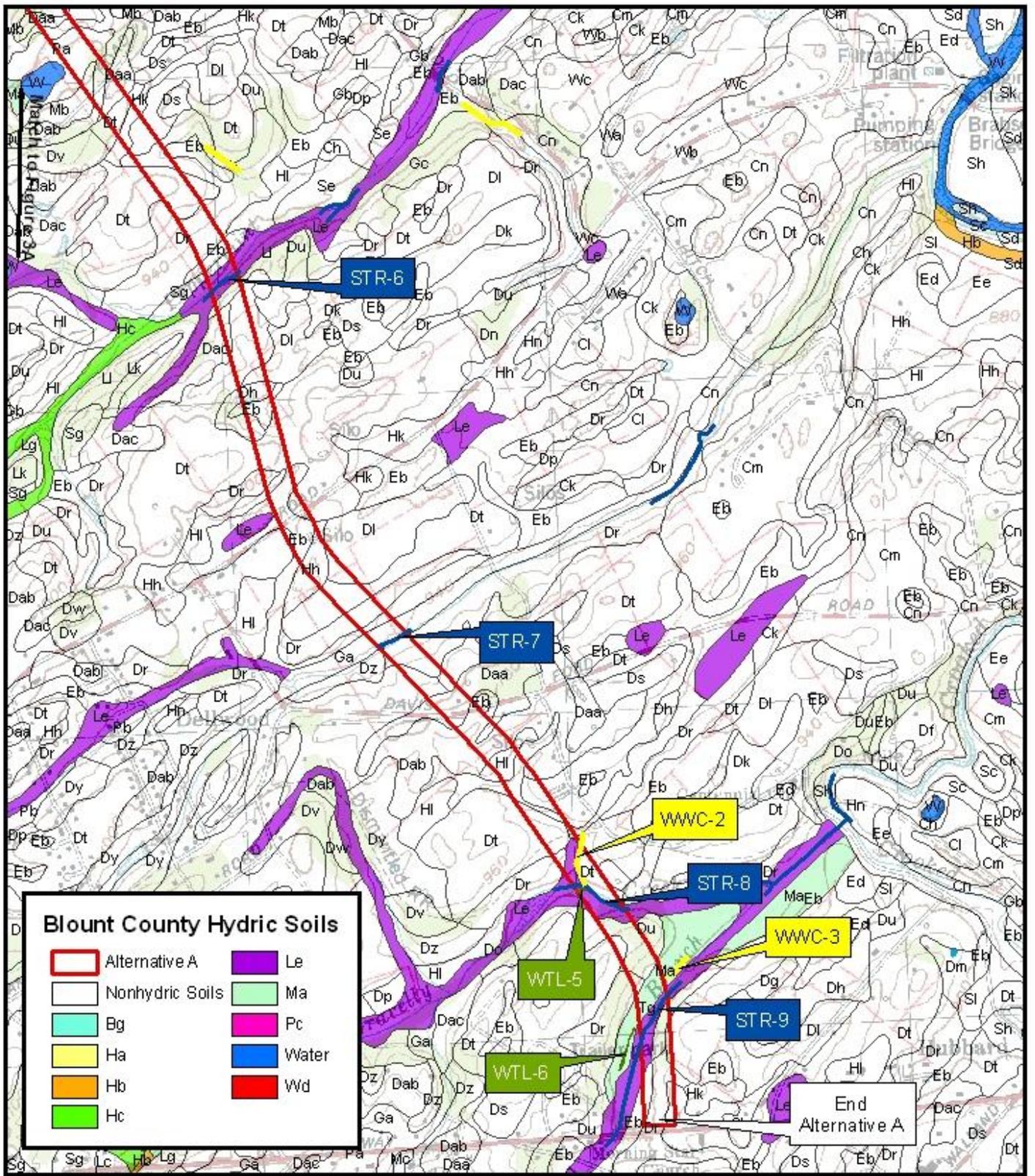


Figure 3A:
Alternative A
Hydric Soils
Map





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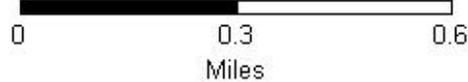
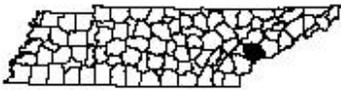
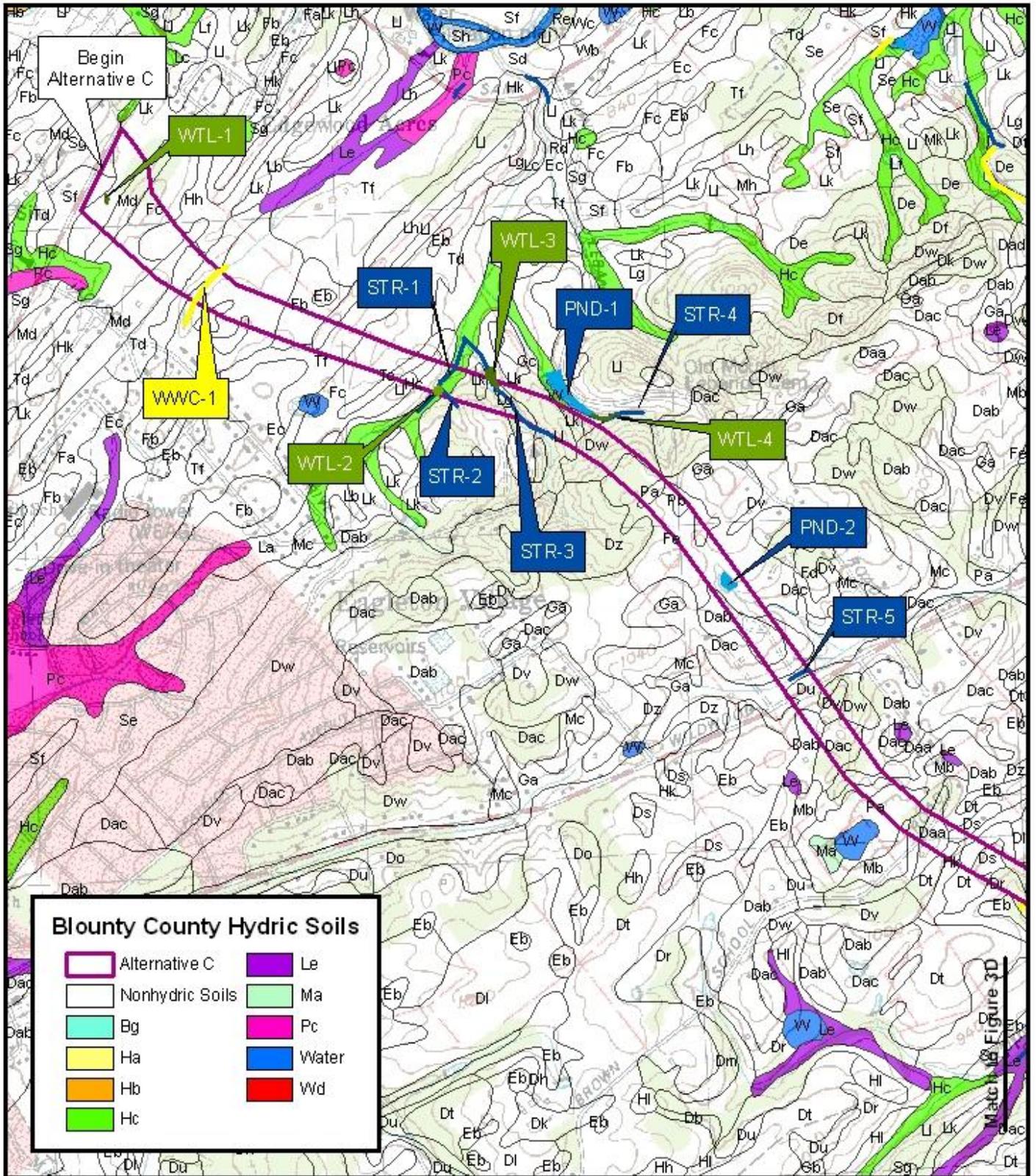
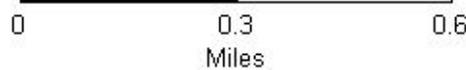


Figure 3B:
Alternative A
Hydric Soils
Map



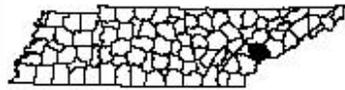
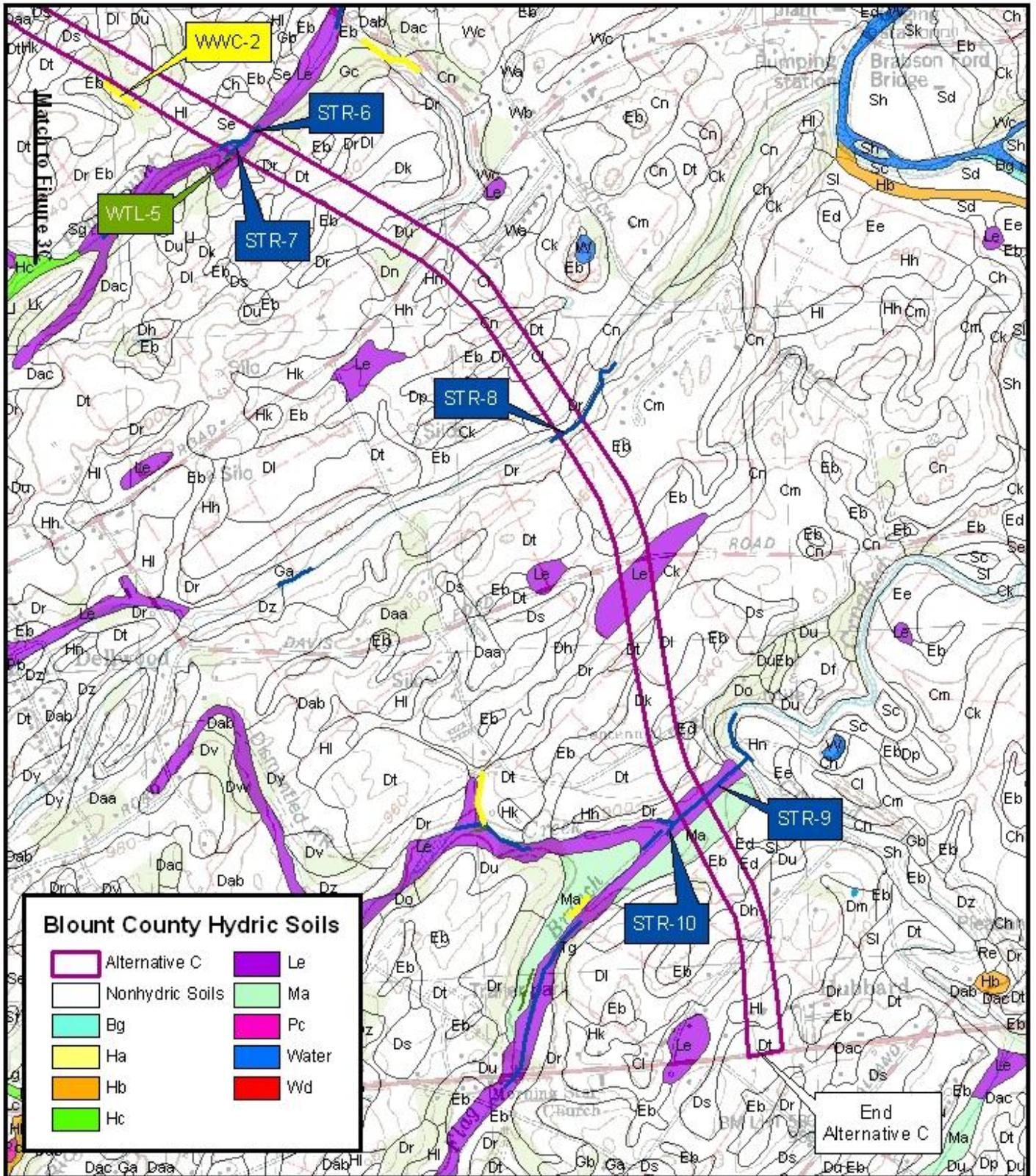


Pellissippi Parkway Extension
Blount County, TN
TDOT PIN 101423.00



**Figure 3C:
Alternative C
Hydric Soils
Map**





Pellissippi Parkway Extension
Blount County, TN
TDOT PIN 101423.00

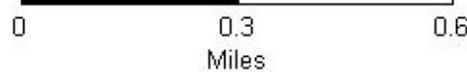
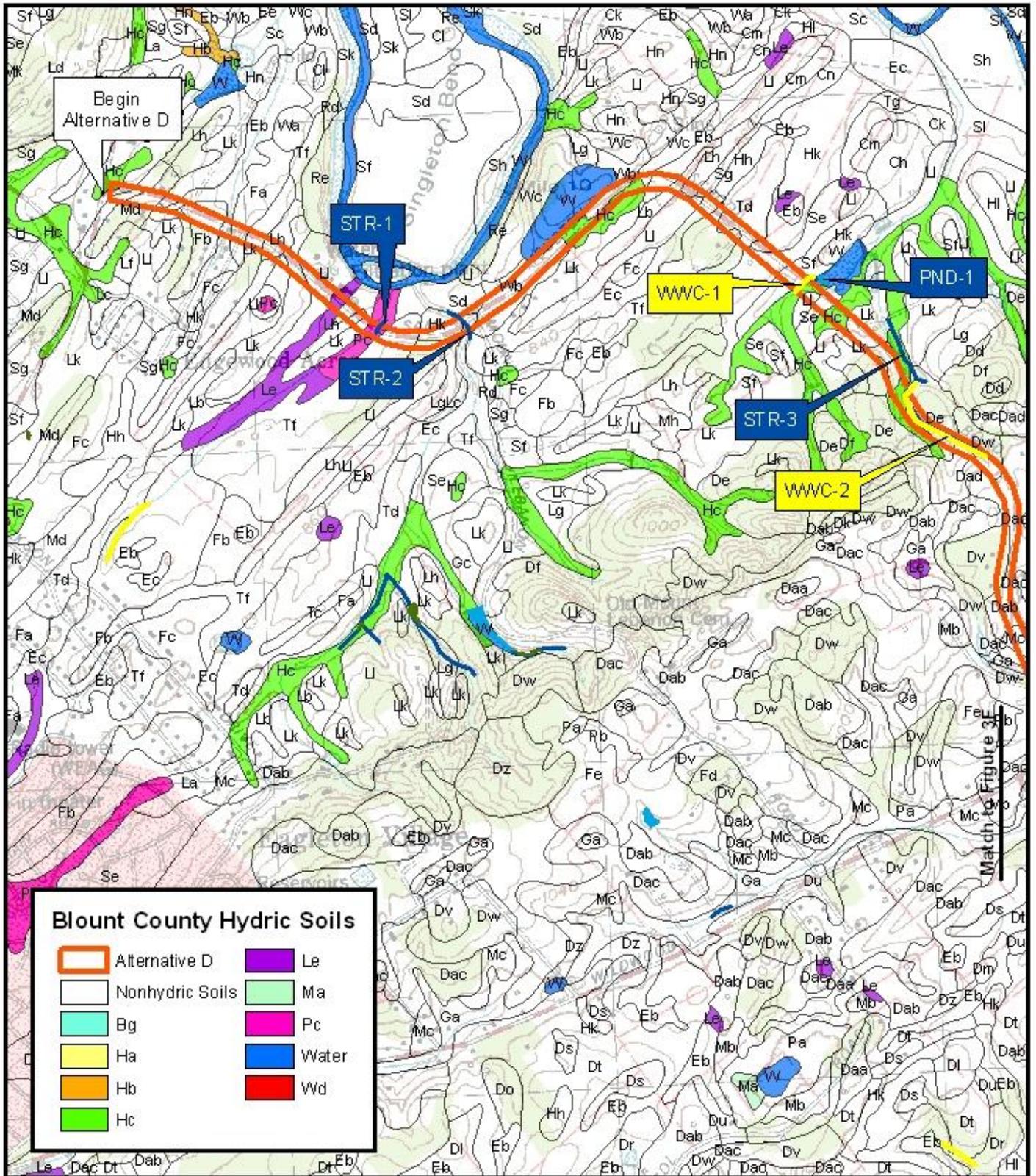


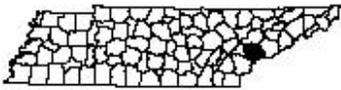
Figure 3D:
Alternative C
Hydric Soils
Map



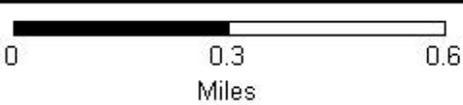


Blount County Hydric Soils

Alternative D	Le
Nonhydric Soils	Ma
Bg	Pc
Ha	Water
Hb	Wd
Hc	

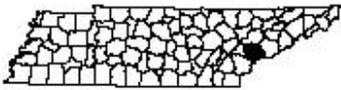
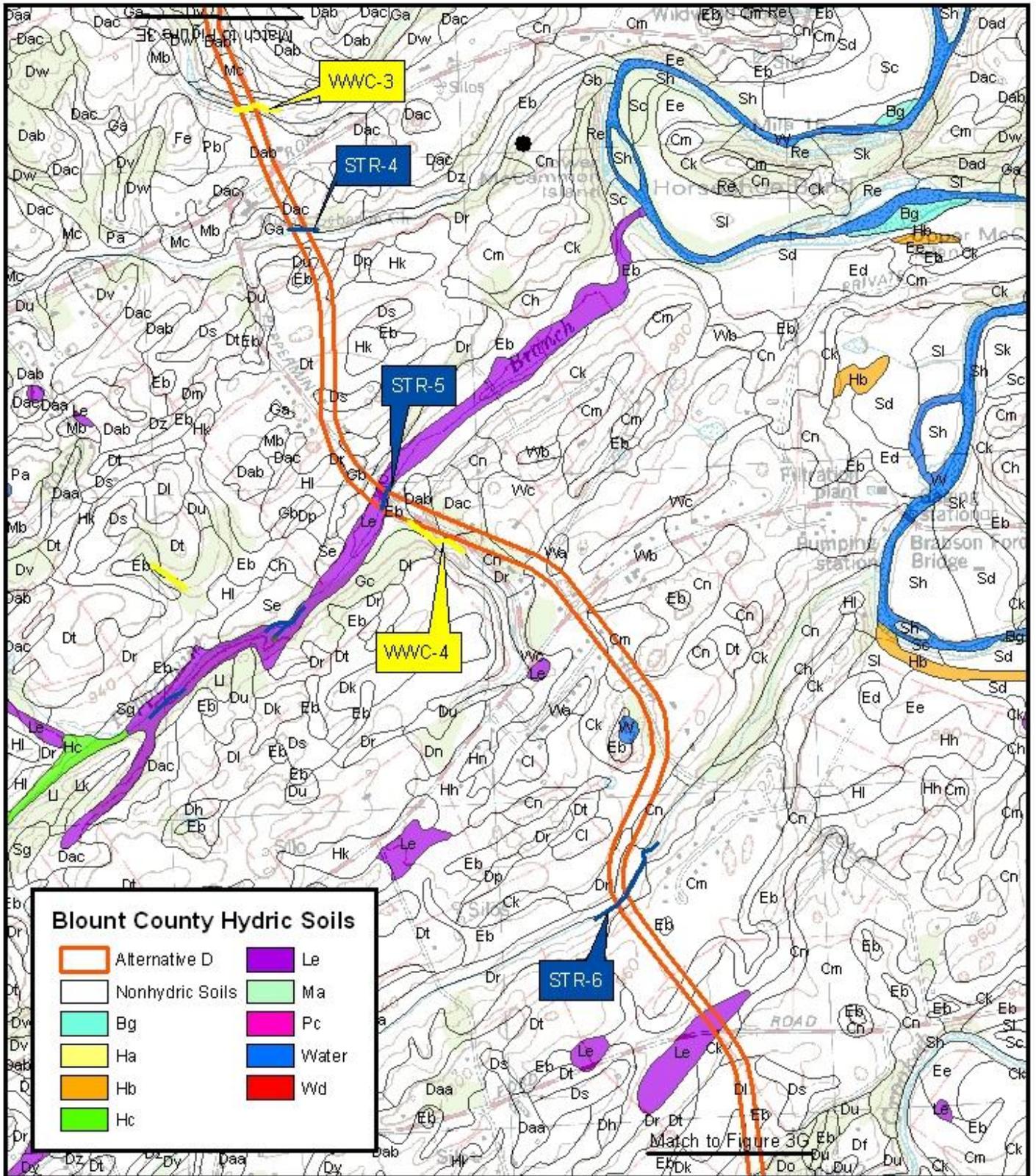


Pellissippi Parkway Extension
Blount County, TN
TDOT PIN 101423.00

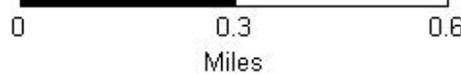


**Figure 3E:
Alternative D
Hydric Soils
Map**



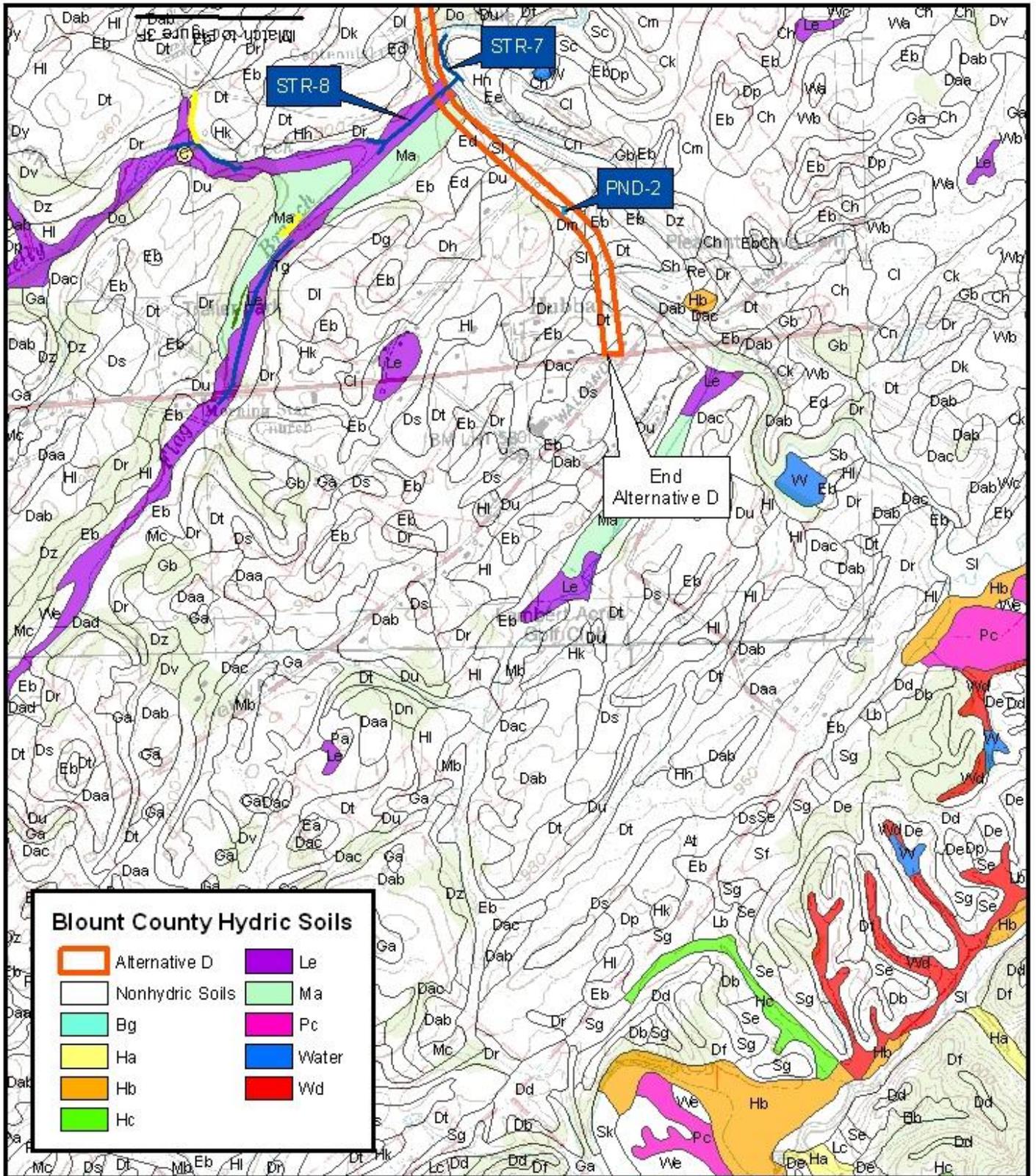


Pellissippi Parkway Extension
Blount County, TN
TDOT PIN 101423.00



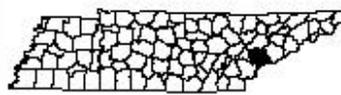
**Figure 3F:
Alternative D
Hydric Soils
Map**



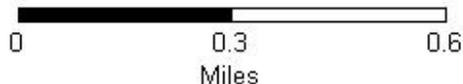


Blount County Hydric Soils

	Alternative D		Le
	Nonhydric Soils		Ma
	Bg		Pc
	Ha		Water
	Hb		Wd
	Hc		

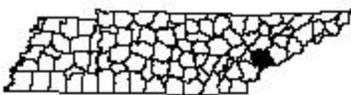
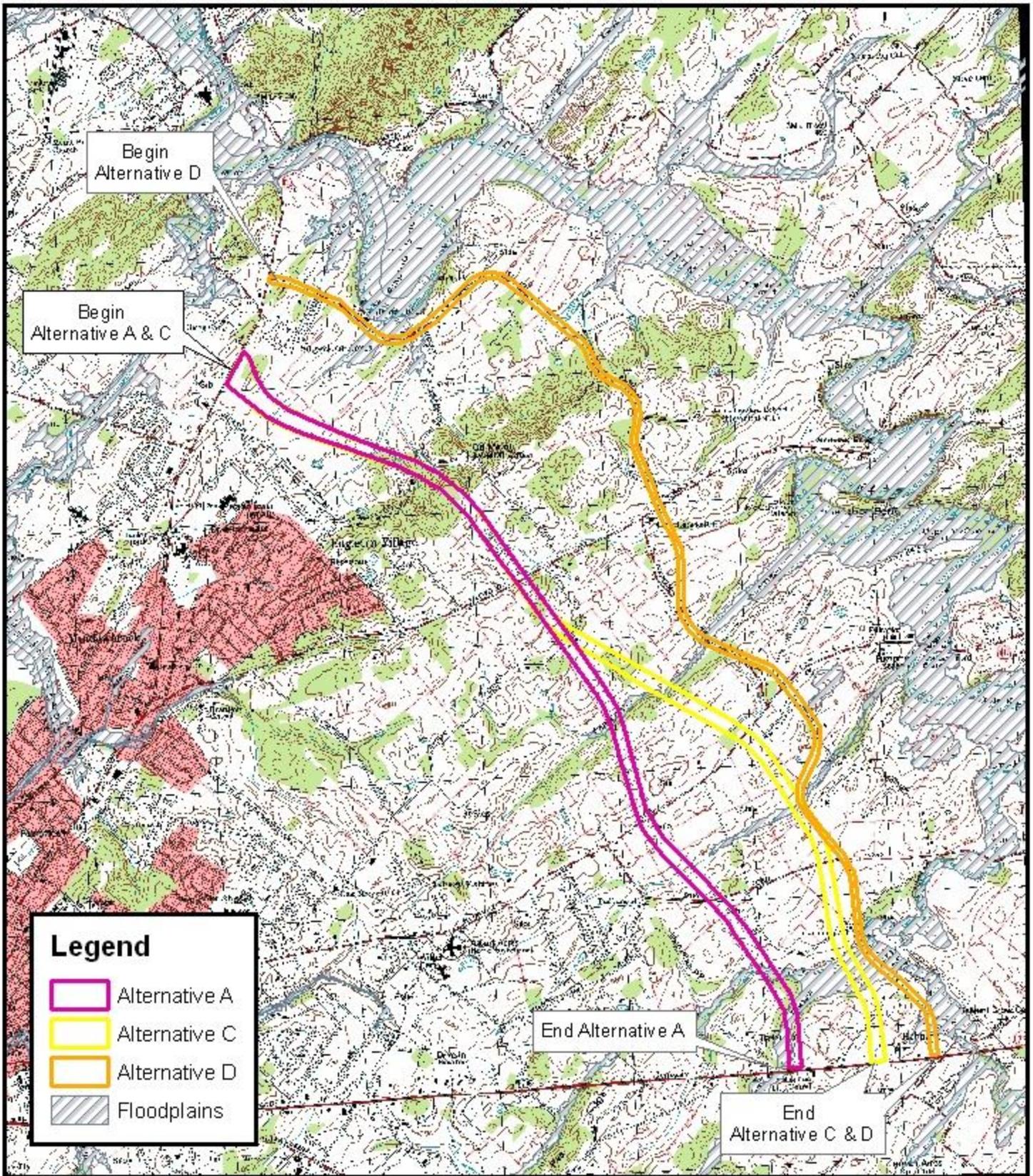


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Blount County, TN
TDOT PIN 101423.00

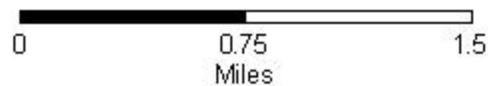


**Figure 3G:
Alternative D
Hydric Soils
Map**



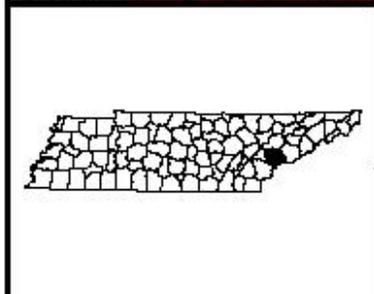
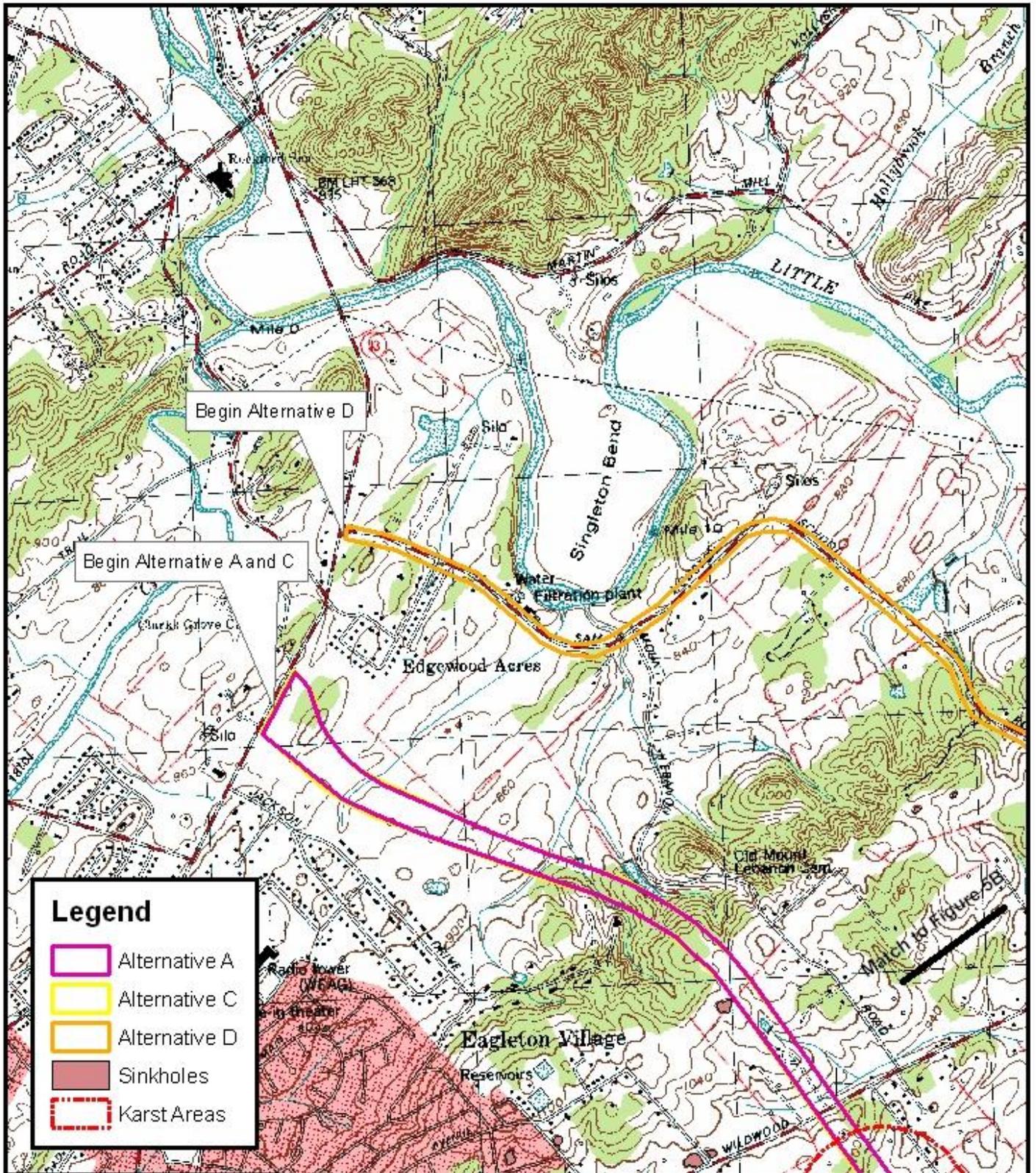


Pellissippi Parkway Extension
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**Figure 4:
Alternatives
A, C, & D
Floodplains**

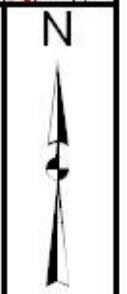


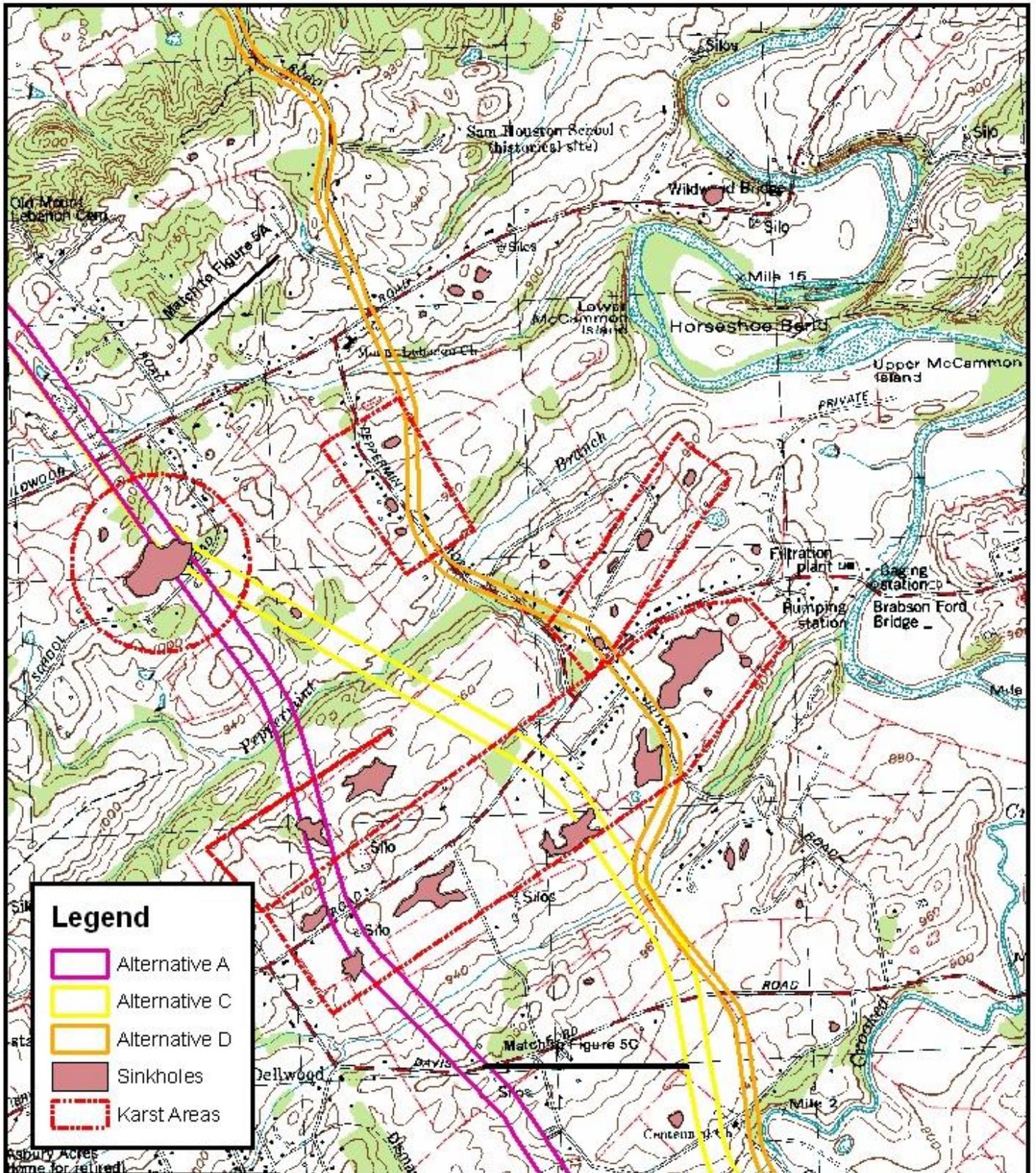


Pellissippi Parkway Extension
Blount County, TN
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0 0.4 0.8
Miles

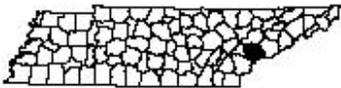
Figure 5A
Sinkholes
Alternatives
A, C, & D





Legend

-  Alternative A
-  Alternative C
-  Alternative D
-  Sinkholes
-  Karst Areas



Pellissippi Parkway Extension
Blount County, TN
TDOT PIN 101423.00

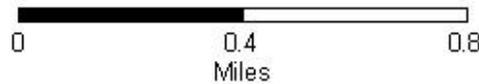


Figure 5B
Sinkholes
Alternatives
A, C, & D



Appendix B

Photographs

ALTERNATIVE A
Photographic Log



Photo 1: WTL-1 View Looking East



Photo 2: WWC-1 View Looking Southwest



Photo 3: WTL-2 View Looking Southwest



Photo 4: STR-1 View Looking Southwest



Photo 5: STR-2 View Looking South



Photo 6: STR-3 and WTL-3 View Looking Northwest



Photo 7: PND-1 View Looking North



Photo 8: STR-4 and WTL-4 Looking Northwest



Photo 9: PND-2 Looking Northwest



Photo 10: STR-5 Looking East



Photo 11: STR-6 (Peppermint Branch) View Looking Southwest



Photo 12: STR-7 Looking West



Photo 13: WWC-2 View Looking South



Photo 14: STR-8 (Gravelly Creek) View Looking Southeast



Photo 15: WTL-5 View Looking West



Photo 16: WWC-3 View Looking West



Photo 17: WTL-6 View Looking West



Photo 18: STR-9 (Flag Branch) View Looking Northeast

ALTERNATIVE C

Photographic Log



Photo 19: WTL-1 View Looking East



Photo 20: WWC-1 View Looking Southwest



Photo 21: WTL-2 View Looking Southwest



Photo 22: STR-1 View Looking Southwest



Photo 23: STR-2 View Looking South



Photo 24: STR-3 and WTL-3 View Looking Northwest



Photo 25: PND-1 View Looking North



Photo 26: STR-4 and WTL-4 View Looking Northwest



Photo 27: PND-2 View Looking Northwest



Photo 28: STR-5 View Looking South



Photo 29: WWC-2 View Looking Southeast



Photo 30: STR-6 (Peppermint Branch) View looking West



Photo 31: STR-7 View Looking Northeast



Photo 32: WTL-5 and STR-7 View Looking West



Photo 33: STR-8 View Looking Northeast



Photo 34: STR-9 (Gravelly Creek)View Looking Southwest



Photo 35: STR-10 (Flag Branch) View Looking Southwest

ALTERNATIVE D
Photographic Log



Photo 36: STR-1 View Looking Northeast



Photo 37: STR-2 View Looking South



Photo 38: WWC-1 View Looking Northeast



Photo 39: PND-1 View Looking East



Photo 40: STR-3 View Looking South



Photo 41: WWC-2 View Looking South



Photo 42: WWC-3 View Looking East



Photo 43: STR-4 View Looking West



Photo 44: STR-5 (Peppermint Branch) View Looking Northeast



Photo 45: WWC-4 View Looking Southwest



Photo 46: STR-6 View Looking Southwest



Photo 47: STR-7 (Crooked Creek) View Looking East



Photo 48: STR-8 (Gravelly Creek) View Looking Southwest

Appendix C
Field Data Sheets

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-22-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-1 / Stream 1 Alternate A
3-Latitude/Longitude	35°47'59.786"N / 83°55'43.252"W
4-Potential Impact	Crossing
5-Feature description:	Intermittent
What is it?	Intermittent
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	Straight
channel bottom width	2.0 ft
top of bank width	2.5 ft
bank height and slope ratio	1:1 ratio
avg. gradient or stream (%)	<5
substratum	50% sand / 50% silt
riffle/run/pool	The stream was mostly pool and run
width of buffer zone	LB: eliminated RB: eliminated
water flow	no stream flow
water depth	1.0 ft
water width	2.0 ft
general water quality	orange tint to water; evidence of iron
OHWM indicators	water stain; abrupt change in plant community
groundwater connection	No
bank stability: LB, RB	LB and RB are both moderately stable with minor sloughing
dominant species: LB, RB	Dominant species for LB and RB are <i>Festuca</i> sp., <i>Typha latifolia</i> , <i>Polygonum punctatum</i> , <i>Vernonia</i> sp., <i>Paspalum</i> sp.
overhead canopy (%)	0%
benthos	benthic invertebrates were absent
fish	fish species were absent
algae or other aquatic life	none present
habitat assessment score	Use TDEC (2006)
photo number(s)	4
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	Jon Sell and Travis Garnto
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-22-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-2 / Stream 2 Alternate A
3-Latitude/Longitude	35°47'59.786"N / 83°55'43.252"W
4-Potential Impact	Crossing
5-Feature description:	Intermittent
What is it?	Intermittent
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	Straight
channel bottom width	2.0 ft
top of bank width	2.5 ft
bank height and slope ratio	2:1 ratio
avg. gradient or stream (%)	<5
substratum	50% sand / 50% silt
riffle/run/pool	The stream was mostly pool and run
width of buffer zone	LB: eliminated RB: eliminated
water flow	no stream flow
water depth	1.0 ft
water width	2.0 ft
general water quality	N/A
OHWM indicators	drastic change in vegetation
groundwater connection	No
bank stability: LB, RB	LB and RB are both eroded with scouring and sloughing
dominant species: LB, RB	Dominant species for LB and RB are <i>Festuca</i> sp., <i>Typha latifolia</i> , <i>Polygonum punctatum</i> , <i>Vernonia</i> sp., <i>Paspalum</i> sp., <i>Fagus grandifolia</i> , <i>Pinus taeda</i> , <i>Platanus occidentalis</i> , <i>Celtis occidentalis</i> , and <i>Cornus florida</i>
overhead canopy (%)	0%
benthos	benthic invertebrates were absent
fish	fish species were absent
algae or other aquatic life	none present
habitat assessment score	Use TDEC (2006)
photo number(s)	5
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	confirmation needed
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-22-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-3 / Stream 3 Alternate A
3-Latitude/Longitude	35°47'56.154"N / 83°55'36.103"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Perennial
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	straightened to slightly meandering; natural channel
channel bottom width	3.0 ft.
top of bank width	6.0 ft
bank height and slope ratio	1:1 ratio
avg. gradient or stream (%)	6-10%
substratum	20% sand, 20% silt, 20% gravel, 20% cobble, and 20% bedrock
rifle/run/pool	The stream was mostly run
width of buffer zone	LB: 150 ft. RB: 150 ft.
water flow	1.0 ft. per second
water depth	0.2 ft
water width	3.0 ft
general water quality	water quality was good and clarity was clear
OHWM indicators	drastic change in vegetation
groundwater connection	No
bank stability: LB, RB	LB and RB are both moderately stable with minor sloughing and scouring
dominant species: LB, RB	Dominant species for LB and RB are <i>Fagus grandifolia</i> , <i>Ligustrum sinense</i> , <i>Cornus florida</i> , <i>Rubus</i> sp., <i>Panicum</i> sp., <i>Quercus alba</i> , <i>Fraxinus americana</i> , <i>Tilia americana</i> , and <i>Smilax rotundifolia</i>
overhead canopy (%)	0%
benthos	None were observed
fish	None were observed
algae or other aquatic life	none present
habitat assessment score	Use TDEC (2006)
photo number(s)	6
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-23-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-4 / Stream 4 Alternate A
3-Latitude/Longitude	35°47'56.154"N / 83°55'36.103"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Perennial
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	straightened to slightly meandering; natural channel
channel bottom width	0.1 ft.
top of bank width	3.0 ft
bank height and slope ratio	1:1 ratio
avg. gradient or stream (%)	6-10%
substratum	25% sand, 25% silt, 20% gravel, 20% cobble, and 30% bedrock
riffle/run/pool	The stream was mostly run
width of buffer zone	LB: >200 ft. RB: 20 ft.
water flow	1.0 ft. per second
water depth	0.5 ft
water width	3.0 ft
general water quality	water quality was good and clarity was clear
OHWM indicators	abrupt change in plant community
groundwater connection	No
bank stability: LB, RB	LB and RB are both moderately stable and gently sloping
dominant species: LB, RB	Dominant species for LB and RB are <i>Fagus grandifolia</i> , <i>Ligustrum sinense</i> , <i>Cornus florida</i> , <i>Rubus sp.</i> , <i>Panicum sp.</i> , <i>Quercus alba</i> , <i>Fraxinus americana</i> , <i>Tilia americana</i> , and <i>Smilax rotundifolia</i>
overhead canopy (%)	40%
benthos	None were observed
fish	None were observed
algae or other aquatic life	none present
habitat assessment score	Use TDEC (2006)
photo number(s)	8
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-23-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-5 / Stream 5 Alternate A (Peppermint Creek)
3-Latitude/Longitude	35°46'51.843"N / 83°54'34.413"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Intermittent
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	straightened; natural channel
channel bottom width	4.0 ft.
top of bank width	1.0 ft.
bank height and slope ratio	3:1 ratio
avg. gradient or stream (%)	<5%
substratum	40% sand, 40% silt, and 20% gravel
riffle/run/pool	The stream was mostly run
width of buffer zone	LB: 100 ft. RB: 200 ft.
water flow	No water within channel
water depth	N/A
water width	N/A
general water quality	N/A
OHWM indicators	abrupt change in plant community
groundwater connection	No
bank stability: LB, RB	LB and RB are both somewhat unstable with minor sloughing and scouring
dominant species: LB, RB	Dominant species for LB and RB are <i>Ligustrum sinense</i> , <i>Panicum</i> sp., <i>Platanus occidentalis</i> , <i>Nyssa Sylvatica</i> , <i>Toxicodendron radicans</i> , <i>Polystichum acrosichoides</i> , <i>Cornus florida</i> , <i>Ulmus americana</i> , <i>Hedera helix</i> , <i>Smilax rotundifolia</i> , and <i>Carya tomentosa</i>
overhead canopy (%)	80%
benthos	benthic invertebrates were absent
fish	fish species were absent
algae or other aquatic life	none present
habitat assessment score	Use TDEC (2006)
photo number(s)	11
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	confirmation needed
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-23-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-6/ Stream 6 Alternate A (Gravelly creek)
3-Latitude/Longitude	35°45'149.636"N / 83°53'48.749"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Perennial
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	slightly meandering; natural channel
channel bottom width	10.0 ft.
top of bank width	12.0 ft
bank height and slope ratio	1:1 ratio
avg. gradient or stream (%)	<5%
substratum	25% sand, 25% silt, 25% gravel, and 25% bedrock
riffle/run/pool	The stream was mostly riffle and run
width of buffer zone	LB: 25 ft. RB: 25 ft.
water flow	moderate
water depth	0.5 ft
water width	10.0 ft.
general water quality	water quality was good and clarity was clear
OHWI indicators	abrupt change in plant community
groundwater connection	No
bank stability: LB, RB	LB and RB are both moderately stable with gentle sloping banks
dominant species: LB, RB	Dominant species for LB and RB are <i>Ulmus americana</i> , <i>Quercus nigra</i> , <i>Solidago</i> sp., <i>Ligustrum sinense</i> , <i>Acer rubrum</i> , <i>Nyssa sylvatica</i> , <i>Toxicodendron radicans</i> , <i>Juniperus virginiana</i> , and <i>Cercis canadensis</i>
overhead canopy (%)	30%
benthos	None were observed
fish	Only family observed was Gyrinidae
algae or other aquatic life	none present
habitat assessment score	Use TDEC (2006)
photo number(s)	15
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-24-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-7 / Stream 7 Alternate A (Flag Branch)
3-Latitude/Longitude	35°45'38.395"N / 83°53'43.482"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Perennial
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	slightly meandering; natural channel
channel bottom width	10.0 ft.
top of bank width	15.0 ft
bank height and slope ratio	4:1 ratio
avg. gradient or stream (%)	<5%
substratum	25% sand, 25% silt, 25% gravel, and 25% bedrock
riffle/run/pool	The stream was mostly riffle and run
width of buffer zone	LB: 25 ft. RB: 25 ft.
water flow	moderate
water depth	0.5 ft
water width	10.0 ft.
general water quality	water quality was good and clarity was slightly poor with light brown tint from sedimentation
OHWM indicators	abrupt change in plant community
groundwater connection	No
bank stability: LB, RB	LB and RB are both moderately stable banks made of bedrock
dominant species: LB, RB	Dominant species for LB and RB are <i>Euonymus americanus</i> , <i>Ulmus rubra</i> , <i>Toxicodendron radicans</i> , <i>Parthenocissus quinquefolia</i> , <i>Nyssa sylvatica</i> , <i>Ligustrum sinense</i> , <i>Magnolia acuminata</i> , <i>Quercus prinus</i> , <i>Juniperus virginiana</i> , <i>Quercus nigra</i> , and <i>Fraxinus pennsylvanica</i>
overhead canopy (%)	20%
benthos	Gyrinidae and Gerridae
fish	Most likely Cyprinidae, <i>Gambusia</i> sp., <i>Lepomis</i> sp., and <i>Micropterus</i> sp.
algae or other aquatic life	none present
habitat assessment score	Use TDEC (2006)
photo number(s)	17
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-22-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	WWC-1 / Wet Weather Conveyance 1 - Alternate A
3-Latitude/Longitude	35°48'8.591"N / 83°56'12.978"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	wet weather conveyance
blue-line on topo? (y/n)	Yes
defined channel (y/n)	no
straight or meandering	straight; in natural run
channel bottom width	1.0 ft.
top of bank width	3.0 ft
bank height and slope ratio	1:1 ratio
avg. gradient or stream (%)	<5%
substratum	100% clay
rifle/run/pool	The stream would be all run
width of buffer zone	LB: 0 ft. RB: 0 ft.
water flow	none
water depth	N/A
water width	N/A
general water quality	No water was present within channel at the time of the survey
OHWM indicators	No OHWM indicators were present
groundwater connection	No
bank stability: LB, RB	LB and RB are both moderately stable with gently sloping banks
dominant species: LB, RB	Dominant species for LB and RB are <i>Polygonum punctatum</i> , <i>Fescue</i> sp., <i>Xanthium</i> sp., and <i>Alopecurus</i> sp.
overhead canopy (%)	0%
benthos	benthic invertebrates were absent
fish	fish species were absent
algae or other aquatic life	none present
habitat assessment score	Use TDEC (2006)
photo number(s)	2
rainfall information	0.2" ON September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	Need confirmation by TDEC or USACE
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	Dry drainage ditch running through cow pasture.

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-23-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	WWC-2 / Wet Weather Conveyance 2 Alternate A
3-Latitude/Longitude	35°47'29.077"N / 83°55'1.374"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Wet Weather Conveyance
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	straightened; natural channel
channel bottom width	0.8 ft.
top of bank width	2.0 ft.
bank height and slope ratio	2:1 ratio.
avg. gradient or stream (%)	<5%
substratum	100% clay
riffle/run/pool	The stream was mostly run
width of buffer zone	LB: eliminated RB: eliminated
water flow	No water within channel
water depth	N/A
water width	N/A
general water quality	N/A
OHWM indicators	abrupt change in plant community
groundwater connection	No
bank stability: LB, RB	LB and RB are both moderately stable
dominant species: LB, RB	Dominant species for LB and RB are <i>Rubus</i> sp., <i>Ligustrum sinense</i> , <i>Solidago canadensis</i> , and <i>Lonicera japonica</i>
overhead canopy (%)	10%
benthos	benthic invertebrates were absent
fish	fish species were absent
algae or other aquatic life	none present
habitat assessment score	Use TDEC (2006)
photo number(s)	10
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	confirmation needed
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-23-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	WWC-3 / Wet Weather Conveyance 3 Alternate A
3-Latitude/Longitude	35°46'16.346"N / 83°54'14.245"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Wet Weather Conveyance
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	straightened; natural channel
channel bottom width	8.0 ft.
top of bank width	11.0 ft.
bank height and slope ratio	3:1 ratio
avg. gradient or stream (%)	<5%
substratum	50% sand and 50% silt
riffle/run/pool	The stream was mostly run
width of buffer zone	LB: 25 ft. RB: 25 ft.
water flow	No water within channel
water depth	N/A
water width	N/A
general water quality	N/A
OHWM indicators	abrupt change in plant community
groundwater connection	No
bank stability: LB, RB	LB and RB are both somewhat stable with minor sloughing and scouring
dominant species: LB, RB	Dominant species for LB and RB are <i>Quercus alba</i> , <i>Ligustrum sinense</i> , <i>Acer rubrum</i> , <i>Liquidambar styraciflua</i> , <i>Rubus</i> sp., <i>Toxicodendron radicans</i> , <i>Ulmus americana</i> , and <i>Ulmus rubra</i>
overhead canopy (%)	80%
benthos	benthic invertebrates were absent
fish	fish species were absent
algae or other aquatic life	none present
habitat assessment score	Use TDEC (2006)
photo number(s)	12
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	confirmation needed
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-23-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	WWC-4/ Wet Weather Conveyance 4 - Alternate A
3-Latitude/Longitude	35°45'51.879"N / 83°53'51.879"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	wet weather conveyance
blue-line on topo? (y/n)	No
defined channel (y/n)	No
straight or meandering	straight; in natural run
channel bottom width	1.0 ft.
top of bank width	3.0 ft
bank height and slope ratio	1:1 ratio
avg. gradient or stream (%)	<5%
substratum	100% clay
riffle/run/pool	The stream would be all run
width of buffer zone	LB: 0 ft. RB: 0 ft.
water flow	none
water depth	N/A
water width	N/A
general water quality	No water was present within channel at the time of the survey
OHWM indicators	abrupt change in plant community
groundwater connection	No
bank stability: LB, RB	LB and RB are both moderately stable with gently sloping banks
dominant species: LB, RB	Dominant species for LB and RB are <i>Solidago gigantea</i> , <i>Fescue</i> sp., <i>Alopecurus</i> sp., and <i>Tridens flavus</i>
overhead canopy (%)	0%
benthos	benthic invertebrates were absent
fish	fish species were absent
algae or other aquatic life	none present
habitat assessment score	Use TDEC (2006)
photo number(s)	13
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-24-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	WWC-5/ Wet Weather Conveyance 5 - Alternate A
3-Latitude/Longitude	35°45'42.871"N / 83°53'40.118"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	wet weather conveyance
blue-line on topo? (y/n)	No
defined channel (y/n)	No
straight or meandering	straight; in natural run
channel bottom width	1.0 ft.
top of bank width	2.0 to 3.0 ft
bank height and slope ratio	1:1 ratio
avg. gradient or stream (%)	<5%
substratum	100% clay
riffle/run/pool	The stream would be all run
width of buffer zone	LB: 0 ft. RB: 0 ft.
water flow	none
water depth	N/A
water width	N/A
general water quality	No water was present within channel at the time of the survey
OHWM indicators	abrupt change in plant community
groundwater connection	No
bank stability: LB, RB	LB and RB are both moderately stable with gently sloping banks
dominant species: LB, RB	Dominant species for LB and RB are <i>Festuca</i> sp., <i>Paspalum laeve</i> , <i>Sisyrinchium montanum</i> , and <i>Alopecurus</i> sp.
overhead canopy (%)	0%
benthos	benthic invertebrates were absent
fish	fish species were absent
algae or other aquatic life	none present
habitat assessment score	Use TDEC (2006)
photo number(s)	16
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-23-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	PND-1 / Pond 1 - Alternate A
3-Latitude/Longitude	35°47'58.125"N / 83°55'30.178"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Pond
blue-line on topo? (y/n)	No, but is blue polygon
defined channel (y/n)	No
straight or meandering	N/A
channel bottom width	Undeterminable
top of bank width	30.0 to 200.0 ft
bank height and slope ratio	3:1 ratio
avg. gradient or stream (%)	N/A
substratum	most likely 100% clay
rifle/run/pool	N/A
width of buffer zone	LB: 400.0 ft. RB: 0.0 ft.
water flow	N/A
water depth	Undeterminable
water width	30.0 to 200.0 ft
general water quality	water quality was good with slight green tint
OHWI indicators	drastic change in vegetation
groundwater connection	No
bank stability: LB, RB	LB and RB are both moderately stable with gently sloping banks
dominant species: LB, RB	RB: <i>Festuca</i> sp. LB: <i>Fagus grandifolia</i> , <i>Ligustrum sinense</i> , <i>Rubus</i> sp., <i>Acer rubrum</i> , <i>Cornus florida</i> , <i>Quercus alba</i> , <i>Quercus falcata</i> , <i>Panicum</i> sp., <i>Polystichum aristichoides</i> , <i>Ilex verticillata</i> , and <i>Carya tomentosa</i>
overhead canopy (%)	0%
benthos	Gyrinidae, Bidessus, Corixidae, and <i>Bidessus</i> sp.
fish	Most likely Cyprinidae, <i>Gambusia</i> sp., <i>Lepomis</i> sp., and <i>Micropterus</i> sp.
algae or other aquatic life	none recorded
habitat assessment score	Use TDEC (2006)
photo number(s)	7
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	Pond is approximately 1.3 acres

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-23-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	PND-2 / Pond 2 - Alternate A
3-Latitude/Longitude	35°47'38.323"N / 83°55'10.334"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Pond
blue-line on topo? (y/n)	No, but is blue polygon
defined channel (y/n)	No
straight or meandering	N/A
channel bottom width	Undeterminable
top of bank width	170.0 ft
bank height and slope ratio	1:1 ratio
avg. gradient or stream (%)	N/A
substratum	most likely 100% clay
riffle/run/pool	N/A
width of buffer zone	LB: 0.0 ft. RB: 0.0 ft.
water flow	N/A
water depth	Undeterminable
water width	150.0 ft
general water quality	water quality was good with slight green tint
OHWM indicators	drastic change in vegetation
groundwater connection	No
bank stability: LB, RB	LB and RB are both moderately stable with gently sloping banks
dominant species: LB, RB	Dominant species for LB and RB are <i>Solidago canadensis</i> and <i>Phytolacca americana</i>
overhead canopy (%)	0%
benthos	Gyrinidae, Bidessus, Corixidae, and <i>Bidessus</i> sp.
fish	Most likely no fish species located within PND-2, PND-2 is an isolated resource
algae or other aquatic life	none present
habitat assessment score	Use TDEC (2006)
photo number(s)	9
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	confirmation needed
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	Pond is approximately 0.4 acres

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-22-08

Biologist: Jon Sell and Travis Garnto Affiliation: Parsons Brinckerhoff

1-Station: from Plans							
2-Map label and Name		WTL-1 / Wetland 1 Alternate A					
3-Latitude/Longitude		35°48'17.499"N/83°56'24.683"W					
4-Potential Impact		Fill					
5-Feature name:		N/A					
6-Feature description		Seasonally Saturated Scrub/ Shrub Wetland					
7-Wetland type:		Forested: ___ Scrub/Shrub: <input checked="" type="checkbox"/> Emergent: ___ Bog/Fen: ___ Aquatic Bed: ___					
Dominant Plant Species		Indicator	Stratum	Dominant Plant Species		Indicator	Stratum
<i>Polygonum punctatum</i>		FACW+	Herb	<i>Salix nigra</i>		OBL	Shrub
<i>Polygonum hydropiperoides</i>		OBL	Herb	<i>Vernonia</i> sp.		FAC+	Herb
<i>Juncus effusus</i>		FACW+	Herb	<i>Solidago gigantea</i>		FACW	Herb
<i>Bidens</i> sp.		FACW	Herb				
<i>Rumex obtusifolius</i>		FACW-	Herb				
Hydrophytic Vegetation		% of Dominants OBL, FACW, FAC=100%			Hydrophytic vegetation Present: <input checked="" type="checkbox"/> Yes ___ No		
Hydrology		Primary Hydrology Indicators			Secondary Hydrology Indicators		
Depth of inundation ___ N/A ___ in		Inundated _____			Oxidized Root Channels _____		
Depth to water in pit ___ >12 ___ in.		Saturated (upper 12") <input checked="" type="checkbox"/>			Water-stained Leaves _____		
Depth to Sat. Soil ___ 6 ___ in.		Water Marks <input checked="" type="checkbox"/>			Fac-Neutral Test _____		
Surface water Connection: <input checked="" type="checkbox"/> Yes ___ No		Drift Lines _____			Other _____		
Ground water connection: ___ Yes <input checked="" type="checkbox"/> No		Sediment Deposits _____			Wetland Hydrology Present: <input checked="" type="checkbox"/> Yes ___ No		
		Drainage Patterns _____					
		Isolated: <input checked="" type="checkbox"/>					
		Abutting: _____					
		Adjacent: _____					
Soils		Map Unit Name:			Drainage Class:		
Soil Profile Description		Subgroup:			Confirmed Map Unit Type: ___ YES ___ NO		
Depth		Matrix	Mottle	Mottle	Texture,		
(inches)	Horizon	Color	Color	Abundance	Concretions	Hydric Soil Indicators	
0-12"	A	7.5YR 4/3	4.5YR 4/2	Common	sandy clay loam	Sulfidic Odor	
						Gleyed or Low Chroma (=1) matrix	
						Chroma \geq 2 w/ mottled	
						<input checked="" type="checkbox"/>	
						Concretions	
						Reducing Conditions	
						Hydric Soils List	
Hydric Soils Present: <input checked="" type="checkbox"/> Yes ___ No							
Rationale/Remarks: The soils were saturated in the upper 12 and contained mottles that were equal to Chroma 2							
approximate Size: (ac.) ___ 0.1 ___		portion affected (ac.)			portion affected (ac.)		
		(permanent) 0.1 acre			(temporary)		
width of buffer zone (ft) 15 feet							
photo number(s)							
8-Watershed		HUC code	60102010107 - Pistol Creek Watershed				
		HUC code					
9-Determination:		Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes ___ No Hydric Soils Present? <input checked="" type="checkbox"/> Yes ___ No					
TDOT/consultant: J. Sell and T. Garnto		Wetland Hydrology Present? <input checked="" type="checkbox"/> Yes ___ No Is Sampling Point in a wetland? <input checked="" type="checkbox"/> Yes ___ No					
10-Determination:							
Confirmed? By?							
10-Mitigation:							
to be included with design							
12-Notes		seasonally saturated scrub/shrub wetland					

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-22-08

Biologist: Jon Sell and Travis Garnto Affiliation: Parsons Brinckerhoff

1-Station: from Plans							
2-Map label and Name		WTL-2 / Wetland 2 Alternate A					
3-Latitude/Longitude		35°47'57.922"N/83°55'44.808"W					
4-Potential Impact		Fill					
5-Feature name:		N/A					
6-Feature description		Seasonally Saturated Emergent Wetland					
7-Wetland type:		Forested: ___ Scrub/Shrub: ___ Emergent: <input checked="" type="checkbox"/> Bog/Fen: ___ Aquatic Bed: ___					
Dominant Plant Species		Indicator	Stratum	Dominant Plant Species		Indicator	Stratum
<i>Scirpus cyperinus</i>		OBL	Herb	<i>Mimulus ringens</i>		OBL	Herb
<i>Typha latifolia</i>		OBL	Herb	<i>Vernonia sp.</i>		FAC+	Herb
<i>Helenium autumnale</i>		FACW	Herb	<i>Solidago gigantea</i>		FACW	Herb
<i>Polygonum hydropiper</i>		OBL	Herb	<i>Polygonum punctatum</i>		FACW	Herb
<i>Bidens sp.</i>		FACW	Herb	<i>Rubus argutus</i>		FAC+	Herb
Hydrophytic Vegetation		% of Dominants OBL, FACW, FAC=100%			Hydrophytic vegetation Present: <input checked="" type="checkbox"/> Yes ___ No		
Hydrology		Primary Hydrology Indicators			Secondary Hydrology Indicators		
Depth of inundation ___ N/A ___ in		Inundated _____			Oxidized Root Channels _____		
Depth to water in pit ___ >12 ___ in.		Saturated (upper 12") <input checked="" type="checkbox"/>			Water-stained Leaves <input checked="" type="checkbox"/>		
Depth to Sat. Soil ___ 0 ___ in.		Water Marks <input checked="" type="checkbox"/>			Fac-Neutral Test _____		
Surface water Connection: <input checked="" type="checkbox"/> Yes ___ No		Drift Lines _____			Other _____		
Ground water connection: ___ Yes <input checked="" type="checkbox"/> No		Sediment Deposits _____			Wetland Hydrology Present: <input checked="" type="checkbox"/> Yes ___ No		
		Drainage Patterns _____					
		Isolated: _____					
		Abutting: _____					
		Adjacent: <input checked="" type="checkbox"/>					
Soils		Map Unit Name:			Drainage Class:		
Soil Profile Description		Subgroup:			Confirmed Map Unit Type: ___ YES ___ NO		
Depth		Matrix	Mottle	Mottle	Texture,		
(inches)	Horizon	Color	Color	Abundance	Concretions	Hydric Soil Indicators	
0-12"	A	10YR 5/2	10YR 4/2	Abundant	clay loam	Sulfidic Odor	
						Gleyed or Low Chroma (=1) matrix	
						Chroma \geq 2 w/ mottled	
						Concretions	
						Reducing Conditions	
						Hydric Soils List	
Hydric Soils Present: <input checked="" type="checkbox"/> Yes ___ No							
Rationale/Remarks: The soils were saturated in the upper 12 and had a Matrix Color equal to Chroma 2							
approximate Size: (ac.) ___ 0.2 ___		portion affected (ac.)			portion affected (ac.)		
		(permanent) 0.2 acre			(temporary)		
width of buffer zone (ft) 5 feet							
photo number(s)							
8-Watershed		HUC code	60102010106 - Little River Watershed				
		HUC code					
9-Determination:		Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes ___ No Hydric Soils Present? <input checked="" type="checkbox"/> Yes ___ No					
TDOT/consultant: J. Sell and T. Garnto		Wetland Hydrology Present? <input checked="" type="checkbox"/> Yes ___ No Is Sampling Point in a wetland? <input checked="" type="checkbox"/> Yes ___ No					
10-Determination:		Confirmed? By?					
10-Mitigation:		to be included with design					
12-Notes		Emergent wetland associated with old cattle pond and STR-1					

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-22-08

Biologist: Jon Sell and Travis Garnto Affiliation: Parsons Brinckerhoff

1-Station: from Plans							
2-Map label and Name		WTL-3 / Wetland 3 Alternate A					
3-Latitude/Longitude		35°47'59.042"N/83°55'38.162"W					
4-Potential Impact		Fill					
5-Feature name:		N/A					
6-Feature description		Inundated Emergent Wetland					
7-Wetland type:		Forested: ___ Scrub/Shrub: ___ Emergent: <input checked="" type="checkbox"/> Bog/Fen: ___ Aquatic Bed: ___					
Dominant Plant Species		Indicator	Stratum	Dominant Plant Species		Indicator	Stratum
<i>Scirpus cyperinus</i>		OBL	Herb	<i>Boehmeria cylindrica</i>		FACW+	Herb
<i>Typha latifolia</i>		OBL	Herb	<i>Commelina communis</i>		FAC	Herb
<i>Leersia virginica</i>		FACW	Herb	<i>Verbena canadensis</i>		FAC-	Herb
<i>Polygonum hydropiper</i>		OBL	Herb				
<i>Juncus effusus</i>		FACW+	Herb				
Hydrophytic Vegetation		% of Dominants OBL, FACW, FAC=88%			Hydrophytic vegetation Present: <input checked="" type="checkbox"/> Yes ___ No		
Hydrology		Primary Hydrology Indicators			Secondary Hydrology Indicators		
Depth of inundation ___ 1 ___ in.		Inundated ___ <input checked="" type="checkbox"/> ___			Oxidized Root Channels ___		
Depth to water in pit ___ 0 ___ in.		Saturated (upper 12") ___ <input checked="" type="checkbox"/> ___			Water-stained Leaves ___ <input checked="" type="checkbox"/> ___		
Depth to Sat. Soil ___ 0 ___ in.		Water Marks ___ <input checked="" type="checkbox"/> ___			Fac-Neutral Test ___		
Surface water Connection:		Drift Lines ___			Other ___		
___ <input checked="" type="checkbox"/> Yes ___ No		Sediment Deposits ___					
Ground water connection:		Drainage Patterns ___					
___ Yes ___ <input checked="" type="checkbox"/> No		Isolated: ___			Wetland Hydrology Present: ___ <input checked="" type="checkbox"/> Yes ___ No		
		Abutting: ___					
		Adjacent: ___ <input checked="" type="checkbox"/> ___					
Soils		Map Unit Name:			Drainage Class:		
Soil Profile Description		Subgroup:			Confirmed Map Unit Type: ___ YES ___ NO		
Depth	Horizon	Matrix	Mottle	Mottle	Texture,		
(inches)		Color	Color	Abundance	Concretions	Hydric Soil Indicators	
0-12"	A	7.5YR 3/1			clay	Sulfidic Odor	
						Gleyed or Low Chroma (=1) matrix <input checked="" type="checkbox"/>	
						Chroma \diamond 2 w/ mottled	
						Concretions	
						Reducing Conditions	
						Hydric Soils List	
Hydric Soils Present: ___ <input checked="" type="checkbox"/> Yes ___ No							
Rationale/Remarks: The soils were inundated and had a Matrix Color equal to Chroma 1							
approximate Size: (ac.) ___ 0.6 ___		portion affected (ac.)			portion affected (ac.)		
		(permanent) 0.6 acre			(temporary)		
width of buffer zone (ft) 15 feet							
photo number(s)							
8-Watershed		HUC code	60102010106 - Little River Watershed				
		HUC code					
9-Determination:		Hydrophytic Vegetation Present? ___ <input checked="" type="checkbox"/> Yes ___ No Hydric Soils Present? ___ <input checked="" type="checkbox"/> Yes ___ No					
TDOT/consultant: J. Sell and T. Garnto		Wetland Hydrology Present? ___ <input checked="" type="checkbox"/> Yes ___ No Is Sampling Point in a wetland? ___ <input checked="" type="checkbox"/> Yes ___ No					
10-Determination:							
Confirmed ? By?							
10-Mitigation:							
to be included with design							
12-Notes		W/L associated with STR-3 Alternate A & Alternate C appears to be old cattle pond					

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-23-08

Biologist: Jon Sell and Travis Garnto Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	WTL-4 / Wetland 4 Alternate A
3-Latitude/Longitude	35°47'54.759"N/83°55'24.978"W
4-Potential Impact	Fill
5-Feature name:	N/A
6-Feature description	Inundated Scrub/ Shrub Wetland
7-Wetland type:	Forested:___ Scrub/Shrub: <input checked="" type="checkbox"/> Emergent:___ Bog/Fen:___ Aquatic Bed:

Dominant Plant Species	Indicator	Stratum	Dominant Plant Species	Indicator	Stratum
<i>Salix nigra</i>	OBL	Shrub	<i>Boehmeria cylindrica</i>	FACW+	Herb
<i>Typha latifolia</i>	OBL	Herb	<i>Dicanthelium</i> sp.	FACW	Herb
<i>Polygonum punctatum</i>	FACW+	Herb	<i>Hypericum</i> sp.	OBL	Herb
<i>Polygonum hydropiper</i>	OBL	Herb	<i>Lonicera japonica</i>	FAC-	Herb
<i>Soldago gigantea</i>	FACW	Herb	<i>Lycopus virginicus</i>	OBL	Herb

Hydrophytic Vegetation	% of Dominants OBL, FACW, FAC=88%	Hydrophytic vegetation Present: <input checked="" type="checkbox"/> Yes ___ No
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Hydrology	Primary Hydrology Indicators	Secondary Hydrology Indicators
Depth of inundation <u>1</u> in.	Inundated <input checked="" type="checkbox"/>	Oxidized Root Channels _____
Depth to water in pit <u>2</u> in.	Saturated (upper 12") <input checked="" type="checkbox"/>	Water-stained Leaves <input checked="" type="checkbox"/>
Depth to Sat. Soil <u>0</u> in.	Water Marks <input checked="" type="checkbox"/>	Fac-Neutral Test _____
Surface water Connection: <input checked="" type="checkbox"/> Yes ___ No	Drift Lines _____	Other _____
Ground water connection: ___ Yes <input checked="" type="checkbox"/> No	Sediment Deposits _____	
	Drainage Patterns <input checked="" type="checkbox"/>	
	Isolated: _____	
	Abutting: _____	
	Adjacent: <input checked="" type="checkbox"/>	
		Wetland Hydrology Present: <input checked="" type="checkbox"/> Yes ___ No

Soils	Map Unit Name:	Drainage Class:
Soil Profile Description	Subgroup:	Confirmed Map Unit Type: ___ YES ___ NO

Depth (inches)	Horizon	Matrix Color	Mottle Color	Mottle Abundance	Texture, Concretions	Hydric Soil Indicators
0-6"	A	2.5YR 4/2			silty clay	Sulfidic Odor
6-12"	B	2.5Y 2.5/1			silty clay	Gleyed or Low Chroma (=1) matrix <input checked="" type="checkbox"/>
						Chroma \geq 2 w/ mottled
						Concretions
						Reducing Conditions
						Hydric Soils List

Hydric Soils Present: Yes ___ No

Rationale/Remarks: The soils were inundated and had a Matrix Color equal to Chroma 1

approximate Size: (ac.) <u>0.3</u>	portion affected (ac.) (permanent) 0.0 acre	portion affected (ac.) (temporary)
width of buffer zone (ft) 15 feet		
photo number(s)		

8-Watershed	HUC code	60102010106 - Little River Watershed
	HUC code	

9-Determination: TDOT/consultant: J. Sell and T. Garnto	Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes ___ No Hydric Soils Present? <input checked="" type="checkbox"/> Yes ___ No Wetland Hydrology Present? <input checked="" type="checkbox"/> Yes ___ No Is Sampling Point in a wetland? <input checked="" type="checkbox"/> Yes ___ No
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10-Determination: Confirmed ? By?	
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10-Mitigation: to be included with design	
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12-Notes	Scrub/shrub wetland associated with PND-1 and STR-4
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Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-23-08

Biologist: Jon Sell and Travis Garnto Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	WTL-5 / Wetland 5
3-Latitude/Longitude	35°45'50.757"N/83°53'52.027"W
4-Potential Impact	Fill
5-Feature name:	N/A
6-Feature description	Inundated Emergent Wetland Adjacent to Stream 8
7-Wetland type:	Forested: ___ Scrub/Shrub: ___ Emergent: <input checked="" type="checkbox"/> Bog/Fen: ___ Aquatic Bed: ___

Dominant Plant Species	Indicator	Stratum	Dominant Plant Species	Indicator	Stratum
<i>Lobelia cardinalis</i>	FACW+	Herb	<i>Boehmeria cylindrica</i>	FACW+	Herb
<i>Helenium autumnale</i>	FACW	Herb	<i>Vernonia</i> sp.	FAC+	Herb
<i>Polygonum punctatum</i>	FACW+	Herb	<i>Impatiens capensis</i>	FACW	Herb
<i>Polygonum hydropiper</i>	OBL	Herb	<i>Mimulus ringens</i>	OBL	Herb
<i>Eupatorium perfoliatum</i>	FACW+	Herb	<i>Lycopus virginicus</i>	OBL	Herb

Hydrophytic Vegetation	% of Dominants OBL, FACW, FAC=100%	Hydrophytic vegetation Present: <input checked="" type="checkbox"/> Yes ___ No
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Hydrology	Primary Hydrology Indicators	Secondary Hydrology Indicators
Depth of inundation <u>2</u> in.	Inundated <input checked="" type="checkbox"/>	Oxidized Root Channels _____
Depth to water in pit <u>1</u> in.	Saturated (upper 12") <input checked="" type="checkbox"/>	Water-stained Leaves _____
Depth to Sat. Soil <u>0</u> in.	Water Marks <input checked="" type="checkbox"/>	Fac-Neutral Test _____
Surface water Connection: <input checked="" type="checkbox"/> Yes ___ No	Drift Lines _____	Other _____
Ground water connection: ___ Yes <input checked="" type="checkbox"/> No	Sediment Deposits _____	
	Drainage Patterns <input checked="" type="checkbox"/>	
	Isolated: _____	
	Abutting: _____	
	Adjacent: <input checked="" type="checkbox"/>	Wetland Hydrology Present: <input checked="" type="checkbox"/> Yes ___ No

Soils	Map Unit Name: _____	Drainage Class: _____
Soil Profile Description	Subgroup: _____	Confirmed Map Unit Type: ___ YES ___ NO

Depth (inches)	Horizon	Matrix Color	Mottle Color	Mottle Abundance	Texture, Concretions	Hydric Soil Indicators
0-12"	A	2.5Y 3/1			silty clay	Sulfidic Odor
						Gleyed or Low Chroma (=1) matrix <input checked="" type="checkbox"/>
						Chroma \geq 2 w/ mottled
						Concretions
						Reducing Conditions
						Hydric Soils List

Hydric Soils Present: Yes ___ No

Rationale/Remarks: The soils were inundated and had a Matrix Color equal to Chroma 1

approximate Size: (ac.) <u>0.1</u>	portion affected (ac.) (permanent) 0.1 acre	portion affected (ac.) (temporary)
width of buffer zone (ft) 25 feet		
photo number(s)		

8-Watershed	HUC code	60102010105 - Little River Watershed
	HUC code	

9-Determination: TDOT/consultant: J. Sell and T. Garnto	Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes ___ No Hydric Soils Present? <input checked="" type="checkbox"/> Yes ___ No Wetland Hydrology Present? <input checked="" type="checkbox"/> Yes ___ No Is Sampling Point in a wetland? <input checked="" type="checkbox"/> Yes ___ No
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10-Determination: Confirmed? By?	
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10-Mitigation: to be included with design	
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12-Notes	Emergent wetland adjacent to STR-8
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Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-25-08

Biologist: Jon Sell and Travis Garnto Affiliation: Parsons Brinckerhoff

1-Station: from Plans							
2-Map label and Name		WTL-6 / Wetland 6					
3-Latitude/Longitude		35°45'34.473"N/83°53'46.997"W					
4-Potential Impact		Fill					
5-Feature name:		N/A					
6-Feature description		Emergent / Scrub/Shrub wetland created by drainage. Lack of maintenance has allowed Hydric Veg. to dom.					
7-Wetland type:		Forested: ___ Scrub/Shrub: <input checked="" type="checkbox"/> Emergent: ___ Bog/Fen: ___ Aquatic Bed: ___					
Dominant Plant Species		Indicator	Stratum	Dominant Plant Species		Indicator	Stratum
<i>Salix nigra</i>		OBL	Shrub	<i>Rumex crispus</i>		FAC	Herb
<i>Erigeron annuus</i>		FACU	Herb	<i>Juncus effusus</i>		FACW	Herb
<i>Polygonum punctatum</i>		FACW+	Herb	<i>Rumex orbiculatus</i>		OBL	Herb
<i>Typha latifolia</i>		OBL	Herb	<i>Mimulus ringens</i>		OBL	Herb
<i>Eupatorium perfoliatum</i>		FACW+	Herb	<i>Leersia virginica</i>		FACW	Herb
Hydrophytic Vegetation		% of Dominants OBL, FACW, FAC=90%			Hydrophytic vegetation Present: <input checked="" type="checkbox"/> Yes ___ No		
Hydrology		Primary Hydrology Indicators			Secondary Hydrology Indicators		
Depth of inundation ___ 0 ___ in.		Inundated _____			Oxidized Root Channels _____		
Depth to water in pit ___ 8 ___ in.		Saturated (upper 12") <input checked="" type="checkbox"/>			Water-stained Leaves _____		
Depth to Sat. Soil ___ 0 ___ in.		Water Marks <input checked="" type="checkbox"/>			Fac-Neutral Test _____		
Surface water Connection: <input checked="" type="checkbox"/> Yes ___ No		Drift Lines _____			Other _____		
Ground water connection: ___ Yes <input checked="" type="checkbox"/> No		Sediment Deposits _____			Wetland Hydrology Present: <input checked="" type="checkbox"/> Yes ___ No		
		Drainage Patterns _____					
		Isolated: _____					
		Abutting: _____					
		Adjacent: <input checked="" type="checkbox"/>					
Soils		Map Unit Name:			Drainage Class:		
Soil Profile Description		Subgroup:			Confirmed Map Unit Type: ___ YES ___ NO		
Depth		Matrix	Mottle	Mottle	Texture,		
(inches)	Horizon	Color	Color	Abundance	Concretions	Hydric Soil Indicators	
0-6"	A	7.5YR 4/2			clay	Sulfidic Odor	
6-12"	B	10YR 5/1			clay	Gleyed or Low Chroma (=1) matrix <input checked="" type="checkbox"/>	
						Chroma ≥ 2 w/ mottled	
						Concretions	
						Reducing Conditions <input checked="" type="checkbox"/>	
						Hydric Soils List	
Hydric Soils Present: <input checked="" type="checkbox"/> Yes ___ No							
Rationale/Remarks: The soils were inundated and had a Matrix Color equal to Chroma 1							
approximate Size: (ac.) ___ 0.37 ___		portion affected (ac.)			portion affected (ac.)		
		(permanent) 0.0 acre			(temporary)		
width of buffer zone (ft) 5 feet							
photo number(s)							
8-Watershed		HUC code	60102010105 - Little River Watershed				
		HUC code					
9-Determination:		Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes ___ No Hydric Soils Present? <input checked="" type="checkbox"/> Yes ___ No					
TDOT/consultant: J. Sell and T. Garnto		Wetland Hydrology Present? <input checked="" type="checkbox"/> Yes ___ No Is Sampling Point in a wetland? <input checked="" type="checkbox"/> Yes ___ No					
10-Determination:							
Confirmed ? By?							
10-Mitigation:							
to be included with design							
12-Notes							

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-22-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-1 / Stream 1 Alternate C
3-Latitude/Longitude	35°47'59.786"N / 83°55'43.252"W
4-Potential Impact	Crossing
5-Feature description:	Intermittent
What is it?	Intermittent
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	Straight
channel bottom width	2.0 ft
top of bank width	2.5 ft
bank height and slope ratio	1:1 ratio
avg. gradient or stream (%)	<5
substratum	50% sand / 50% silt
riffle/run/pool	The stream was mostly pool and run
width of buffer zone	LB: eliminated RB: eliminated
water flow	no stream flow
water depth	1.0 ft
water width	2.0 ft
general water quality	orange tint to water; evidence of iron
OHWM indicators	water stain; abrupt change in plant community
groundwater connection	No
bank stability: LB, RB	LB and RB are both moderately stable with minor sloughing
dominant species: LB, RB	Dominant species for LB and RB are <i>Festuca</i> sp., <i>Typha latifolia</i> , <i>Polygonum punctatum</i> , <i>Vernonia</i> sp., <i>Paspalum</i> sp.
overhead canopy (%)	0%
benthos	benthic invertebrates were absent
fish	fish species were absent
algae or other aquatic life	none present
habitat assessment score	Use TDEC (2006)
photo number(s)	22
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	Jon Sell and Travis Garnto
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-22-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-2 / Stream 2 Alternate C
3-Latitude/Longitude	35°47'59.786"N / 83°55'43.252"W
4-Potential Impact	Crossing
5-Feature description:	Intermittent
What is it?	Intermittent
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	Straight
channel bottom width	2.0 ft
top of bank width	2.5 ft
bank height and slope ratio	2:1 ratio
avg. gradient or stream (%)	<5
substratum	50% sand / 50% silt
riffle/run/pool	The stream was mostly pool and run
width of buffer zone	LB: eliminated RB: eliminated
water flow	no stream flow
water depth	1.0 ft
water width	2.0 ft
general water quality	N/A
OHWM indicators	drastic change in vegetation
groundwater connection	No
bank stability: LB, RB	LB and RB are both eroded with scouring and sloughing
dominant species: LB, RB	Dominant species for LB and RB are <i>Festuca</i> sp., <i>Typha latifolia</i> , <i>Polygonum punctatum</i> , <i>Vernonia</i> sp., <i>Paspalum</i> sp.
overhead canopy (%)	0%
benthos	benthic invertebrates were absent
fish	fish species were absent
algae or other aquatic life	none present
habitat assessment score	Use TDEC (2006)
photo number(s)	23
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	confirmation needed
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-22-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-3 / Stream 3 Alternate C
3-Latitude/Longitude	35°47'56.154"N / 83°55'36.103"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Perennial
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	straightened to slightly meandering; natural channel
channel bottom width	3.0 ft.
top of bank width	6.0 ft
bank height and slope ratio	1:1 ratio
avg. gradient or stream (%)	6-10%
substratum	20% sand, 20% silt, 20% gravel, 20% cobble, and 20% bedrock
rifle/run/pool	The stream was mostly run
width of buffer zone	LB: 150 ft. RB: 150 ft.
water flow	1.0 ft. per second
water depth	0.2 ft
water width	3.0 ft
general water quality	water quality was good and clarity was clear
OHWI indicators	drastic change in vegetation
groundwater connection	No
bank stability: LB, RB	LB and RB are both moderately stable with minor sloughing and scouring
dominant species: LB, RB	Dominant species for LB and RB are <i>Fagus grandifolia</i> , <i>Ligustrum sinense</i> , <i>Cornus florida</i> , <i>Rubus</i> sp., <i>Panicum</i> sp., <i>Quercus alba</i> , <i>Fraxinus americana</i> , <i>Tilia americana</i> , and <i>Smilax rotundifolia</i>
overhead canopy (%)	0%
benthos	None were observed
fish	None were observed
algae or other aquatic life	none present
habitat assessment score	Use TDEC (2006)
photo number(s)	24
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-23-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-4 / Stream 4 Alternate C
3-Latitude/Longitude	35°47'56.154"N / 83°55'36.103"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Perennial
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	straightened to slightly meandering; natural channel
channel bottom width	0.1 ft.
top of bank width	3.0 ft
bank height and slope ratio	1:1 ratio
avg. gradient or stream (%)	6-10%
substratum	25% sand, 25% silt, 20% gravel, 20% cobble, and 30% bedrock
riffle/run/pool	The stream was mostly run
width of buffer zone	LB: >200 ft. RB: 20 ft.
water flow	1.0 ft. per second
water depth	0.5 ft
water width	3.0 ft
general water quality	water quality was good and clarity was clear
OHWM indicators	abrupt change in plant community
groundwater connection	No
bank stability: LB, RB	LB and RB are both moderately stable and gently sloping
dominant species: LB, RB	Dominant species for LB and RB are <i>Fagus grandifolia</i> , <i>Ligustrum sinense</i> , <i>Cornus florida</i> , <i>Rubus sp.</i> , <i>Panicum sp.</i> , <i>Quercus alba</i> , <i>Fraxinus americana</i> , <i>Tilia americana</i> , and <i>Smilax rotundifolia</i>
overhead canopy (%)	40%
benthos	None were observed
fish	None were observed
algae or other aquatic life	none present
habitat assessment score	Use TDEC (2006)
photo number(s)	26
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-23-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-5 / Stream 5 Alternate C (Peppermint Creek)
3-Latitude/Longitude	35°46'59.212"N / 83°54'20.465"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Perennial
blue-line on topo? (y/n)	No
defined channel (y/n)	No
straight or meandering	slightly meandering; natural channel
channel bottom width	7.0 ft.
top of bank width	8.0 ft.
bank height and slope ratio	4:1 ratio
avg. gradient or stream (%)	<5%
substratum	25% sand, 25% silt, 25% gravel, and 25% cobble
riffle/run/pool	had a good riffle/run/pool complex
width of buffer zone	LB: 50 ft. RB: eliminated
water flow	1.0 foot per second
water depth	0.5 ft
water width	7.0 ft
general water quality	quality was good, and clarity was clear
OHWM indicators	abrupt change in plant community
groundwater connection	No
bank stability: LB, RB	LB and RB are both highly incised
dominant species: LB, RB	Dominant species for LB and RB are <i>Tilia americana</i> , <i>Ulmus americana</i> , <i>Fraxinus pennsylvanica</i> , <i>igustrum sinense</i> , <i>Festuca</i> sp., <i>Quercus nigra</i> , and <i>Acer rubrum</i>
overhead canopy (%)	30%
benthos	benthic invertebrates were not observed
fish	fish species were not observed
algae or other aquatic life	None present
habitat assessment score	Use TDEC (2006)
photo number(s)	30
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-24-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-6 / Stream 6 Alternate C
3-Latitude/Longitude	35°47'59.007"N / 83°54'19.784"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Perennial
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	slightly meandering; natural channel
channel bottom width	1.5 ft.
top of bank width	3.0 ft.
bank height and slope ratio	1:1 ratio
avg. gradient or stream (%)	<5%
substratum	50% sand and 50% silt
riffle/run/pool	had a good riffle and run
width of buffer zone	LB: partailly eliminated. RB: partially eliminated
water flow	1.0 foot per second
water depth	0.5 ft
water width	1.5 ft
general water quality	quality was good, and clarity was clear
OHWM indicators	abrupt change in plant community
groundwater connection	Yes a spring
bank stability: LB, RB	LB and RB are both stable
dominant species: LB, RB	Dominant species for LB and RB are <i>Festuca</i> sp. and <i>Polygonum hydropiperoides</i> , <i>Paspalum</i> sp.
overhead canopy (%)	10%
benthos	benthic invertebrates were absent
fish	fish species were absent
algae or other aquatic life	None present
habitat assessment score	Use TDEC (2006)
photo number(s)	31
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	Confirmation needed
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-24-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-7 / Stream 7 Alternate C (Gravelly Creek)
3-Latitude/Longitude	35°46'5.971"N / 83°53'23.522"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Perennial
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	straight; natural channel
channel bottom width	11.0 ft.
top of bank width	15.0 ft.
bank height and slope ratio	4:1 ratio
avg. gradient or stream (%)	<5%
substratum	35% sand, 35% silt, and 30% gravel
riffle/run/pool	Mostly riffle and run
width of buffer zone	LB: 25 ft. RB: 25 ft.
water flow	1.0 foot per second
water depth	0.5 ft.
water width	11.0 ft.
general water quality	water quality was good and clarity was clear
OHWM indicators	abrupt change in plant community
groundwater connection	no
bank stability: LB, RB	LB and RB are both highly incised
dominant species: LB, RB	Dominant species for LB and RB are <i>Fagus grandiflora</i> , <i>Liquidambar styraciflua</i> , and <i>Acer rubrum</i>
overhead canopy (%)	70%
benthos	benthic invertebrates were not observed
fish	fish species were not observed
algae or other aquatic life	None present
habitat assessment score	Use TDEC (2006)
photo number(s)	34
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-24-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-8 / Stream 8 Alternate C (Flag branch)
3-Latitude/Longitude	35°46'49.178"N / 83°53'30.372"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Perennial
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	straight; natural channel
channel bottom width	5.0 ft
top of bank width	8.0 ft
bank height and slope ratio	2:1 ratio
avg. gradient or stream (%)	<5%
substratum	35% sand, 35% silt, and 30% small gravel
riffle/run/pool	Mostly riffle and run
width of buffer zone	LB: partially eliminated RB: partially eliminated
water flow	1.0 foot per second
water depth	0.2 ft.
water width	5.0 ft.
general water quality	water quality was good and clarity was clear
OHWM indicators	abrupt change in plant community
groundwater connection	no
bank stability: LB, RB	LB and RB are both moderately stable and gently sloping
dominant species: LB, RB	Dominant species for LB and RB are <i>Fagus grandiflora</i> , <i>Liquidambar styraciflua</i> , and <i>Acer rubrum</i>
overhead canopy (%)	20%
benthos	benthic invertebrates were not observed
fish	fish species were not observed
algae or other aquatic life	None present
habitat assessment score	Use TDEC (2006)
photo number(s)	35
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-22-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	WWC-1 / Wet Weather Conveyance 1 - Alternate C
3-Latitude/Longitude	35°48'8.591"N / 83°56'12.978"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	wet weather conveyance
blue-line on topo? (y/n)	Yes
defined channel (y/n)	no
straight or meandering	straight; in natural run
channel bottom width	1.0 ft.
top of bank width	3.0 ft
bank height and slope ratio	1:1 ratio
avg. gradient or stream (%)	<5%
substratum	100% clay
rifle/run/pool	The stream would be all run
width of buffer zone	LB: 0 ft. RB: 0 ft.
water flow	none
water depth	N/A
water width	N/A
general water quality	No water was present within channel at the time of the survey
OHWM indicators	No OHWM indicators were present
groundwater connection	No
bank stability: LB, RB	LB and RB are both moderately stable with gently sloping banks
dominant species: LB, RB	Dominant species for LB and RB are <i>Polygonum punctatum</i> , <i>Fescue</i> sp., <i>Xanthium</i> sp., and <i>Alopecurus</i> sp.
overhead canopy (%)	0%
benthos	benthic invertebrates were absent
fish	fish species were absent
algae or other aquatic life	none present
habitat assessment score	Use TDEC (2006)
photo number(s)	20
rainfall information	0.2" ON September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	Need confirmation by TDEC or USACE
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	Dry drainage ditch running through cow pasture.

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-23-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	WWC-2/Wet Weather Conveyance 2 Alternate C
3-Latitude/Longitude	35°47'29.077"N / 83°55'1.374"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Wet Weather Conveyance
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	straightened; natural channel
channel bottom width	0.8 ft.
top of bank width	2.0 ft.
bank height and slope ratio	2:1 ratio.
avg. gradient or stream (%)	<5%
substratum	100% clay
riffle/run/pool	The stream was mostly run
width of buffer zone	LB: eliminated RB: eliminated
water flow	No water within channel
water depth	N/A
water width	N/A
general water quality	N/A
OHWM indicators	abrupt change in plant community
groundwater connection	No
bank stability: LB, RB	LB and RB are both moderately stable
dominant species: LB, RB	Dominant species for LB and RB are <i>Rubus</i> sp., <i>Ligustrum sinense</i> , <i>Solidago canadensis</i> , and <i>Lonicera japonica</i>
overhead canopy (%)	10%
benthos	benthic invertebrates were absent
fish	fish species were absent
algae or other aquatic life	none present
habitat assessment score	Use TDEC (2006)
photo number(s)	10
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	confirmation needed
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-24-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	WWC-3 /Wet Weather Conveyance 3 Alternate C
3-Latitude/Longitude	35°47'04.356"N / 83°54'33.78"W
4-Potential Impact	None
5-Feature description:	
What is it?	Wet Weather Conveyance
blue-line on topo? (y/n)	No
defined channel (y/n)	No
straight or meandering	straightened; natural channel
channel bottom width	3.0 ft.
top of bank width	4.0 ft.
bank height and slope ratio	2:1 ratio
avg. gradient or stream (%)	<5%
substratum	50% clay, 50% silt
riffle/run/pool	The stream was mostly run
width of buffer zone	LB: 100 ft. RB: 100 ft.
water flow	No water within channel
water depth	N/A
water width	N/A
general water quality	N/A
OHWM indicators	abrupt change in plant community
groundwater connection	No
bank stability: LB, RB	LB and RB are both unstable with scouring and sloughing
dominant species: LB, RB	Dominant species for LB and RB are <i>Cornus florida</i> , <i>Hedera helix</i> , <i>Ulmus americana</i> , <i>Ligustrum sinense</i> , <i>Fagus grandifolia</i> , <i>Smilax rotundifolia</i> , <i>Lonicera japonica</i> , <i>Quercus marilandrica</i> , <i>Quercus prinus</i> , <i>Ilex opaca</i> , <i>Toxicodendron radicans</i> , <i>Acer rubrum</i> , <i>Campsis radicans</i> , and <i>Liquidambar styraciflua</i>
overhead canopy (%)	90%
benthos	benthic invertebrates were absent
fish	fish species were absent
algae or other aquatic life	None present
habitat assessment score	Use TDEC (2006)
photo number(s)	29
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-24-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	WWC-4 /Wet Weather Conveyance 4 Alternate C
3-Latitude/Longitude	35°46'30.534"N / 83°53'39.713"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Wet Weather Conveyance
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	slightly meandering; natural channel
channel bottom width	11.0 ft.
top of bank width	12.0 ft.
bank height and slope ratio	3:1 ratio
avg. gradient or stream (%)	<5%
substratum	100% clay
rifle/run/pool	Mostly run
width of buffer zone	LB: 25 ft. RB: 25 ft.
water flow	no water was present
water depth	N/A
water width	N/A
general water quality	N/A
OHWM indicators	abrupt change in plant community
groundwater connection	no
bank stability: LB, RB	LB and RB are both moderately unstable with sloughing and scouring
dominant species: LB, RB	Dominant species for LB and RB are <i>Ligustrum sinense</i> , <i>Cornus florida</i> , <i>Smilax glauca</i> , <i>Lonicera japonica</i> , <i>Fagus grandifolia</i> , <i>Festuca</i> sp., <i>Rubus</i> sp., and <i>Campsis radicans</i>
overhead canopy (%)	70%
benthos	benthic invertebrates were absent
fish	fish species were absent
algae or other aquatic life	None present
habitat assessment score	Use TDEC (2006)
photo number(s)	33
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	Cofirmation needed
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-23-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	PND-1 / Pond 1 - Alternate C
3-Latitude/Longitude	35°47'58.125"N / 83°55'30.178"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Pond
blue-line on topo? (y/n)	No, but is blue polygon
defined channel (y/n)	No
straight or meandering	N/A
channel bottom width	Undeterminable
top of bank width	30.0 to 200.0 ft
bank height and slope ratio	3:1 ratio
avg. gradient or stream (%)	N/A
substratum	most likely 100% clay
rifle/run/pool	N/A
width of buffer zone	LB: 400.0 ft. RB: 0.0 ft.
water flow	N/A
water depth	Undeterminable
water width	30.0 to 200.0 ft
general water quality	water quality was good with slight green tint
OHWI indicators	drastic change in vegetation
groundwater connection	No
bank stability: LB, RB	LB and RB are both moderately stable with gently sloping banks
dominant species: LB, RB	RB: <i>Festuca</i> sp. LB: <i>Fagus grandifolia</i> , <i>Ligustrum sinense</i> , <i>Rubus</i> sp., <i>Acer rubrum</i> , <i>Cornus florida</i> , <i>Quercus alba</i> , <i>Quercus falcata</i> , <i>Panicum</i> sp., <i>Polystichum aristichoides</i> , <i>Ilex verticillata</i> , and <i>Carya tomentosa</i>
overhead canopy (%)	0%
benthos	Gyrinidae, Bidessus, Corixidae, and <i>Bidessus</i> sp.
fish	Most likely Cyprinidae, <i>Gambusia</i> sp., <i>Lepomis</i> sp., and <i>Micropterus</i> sp.
algae or other aquatic life	none recorded
habitat assessment score	Use TDEC (2006)
photo number(s)	25
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	Pond is approximately 1.3 acres

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-22-08

Biologist: Jon Sell and Travis Garnto Affiliation: Parsons Brinckerhoff

1-Station: from Plans							
2-Map label and Name		WTL-1 / Wetland 1 Alternate C					
3-Latitude/Longitude		35°48'17.499"N/83°56'24.683"W					
4-Potential Impact		Fill					
5-Feature name:		N/A					
6-Feature description		Seasonally Saturated Scrub/ Shrub Wetland					
7-Wetland type:		Forested: ___ Scrub/Shrub: <input checked="" type="checkbox"/> Emergent: ___ Bog/Fen: ___ Aquatic Bed: ___					
Dominant Plant Species		Indicator	Stratum	Dominant Plant Species		Indicator	Stratum
<i>Polygonum punctatum</i>		FACW+	Herb	<i>Salix nigra</i>		OBL	Shrub
<i>Polygonum hydropiperoides</i>		OBL	Herb	<i>Vernonia</i> sp.		FAC+	Herb
<i>Juncus effusus</i>		FACW+	Herb	<i>Solidago gigantea</i>		FACW	Herb
<i>Bidens</i> sp.		FACW	Herb				
<i>Rumex obtusifolius</i>		FACW-	Herb				
Hydrophytic Vegetation		% of Dominants OBL, FACW, FAC=100%			Hydrophytic vegetation Present: <input checked="" type="checkbox"/> Yes ___ No		
Hydrology		Primary Hydrology Indicators			Secondary Hydrology Indicators		
Depth of inundation ___ N/A ___ in		Inundated _____			Oxidized Root Channels _____		
Depth to water in pit ___ >12 ___ in.		Saturated (upper 12") <input checked="" type="checkbox"/>			Water-stained Leaves _____		
Depth to Sat. Soil ___ 6 ___ in.		Water Marks <input checked="" type="checkbox"/>			Fac-Neutral Test _____		
Surface water Connection: <input checked="" type="checkbox"/> Yes ___ No		Drift Lines _____			Other _____		
Ground water connection: ___ Yes <input checked="" type="checkbox"/> No		Sediment Deposits _____			Wetland Hydrology Present: <input checked="" type="checkbox"/> Yes ___ No		
		Drainage Patterns _____					
		Isolated: <input checked="" type="checkbox"/>					
		Abutting: _____					
		Adjacent: _____					
Soils		Map Unit Name:			Drainage Class:		
Soil Profile Description		Subgroup:			Confirmed Map Unit Type: ___ YES ___ NO		
Depth		Matrix	Mottle	Mottle	Texture,		
(inches)	Horizon	Color	Color	Abundance	Concretions	Hydric Soil Indicators	
0-12"	A	7.5YR 4/3	4.5YR 4/2	Common	sandy clay loam	Sulfidic Odor	
						Gleyed or Low Chroma (=1) matrix	
						Chroma \geq 2 w/ mottled	
						<input checked="" type="checkbox"/>	
						Concretions	
						Reducing Conditions	
						Hydric Soils List	
Hydric Soils Present: <input checked="" type="checkbox"/> Yes ___ No							
Rationale/Remarks: The soils were saturated in the upper 12 and contained mottles that were equal to Chroma 2							
approximate Size: (ac.) ___ 0.1 ___		portion affected (ac.)			portion affected (ac.)		
		(permanent) 0.1 acre			(temporary)		
width of buffer zone (ft) 15 feet							
photo number(s)							
8-Watershed		HUC code 60102010107 - Pistol Creek Watershed					
		HUC code					
9-Determination:		Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes ___ No Hydric Soils Present? <input checked="" type="checkbox"/> Yes ___ No					
TDOT/consultant: J. Sell and T. Garnto		Wetland Hydrology Present? <input checked="" type="checkbox"/> Yes ___ No Is Sampling Point in a wetland? <input checked="" type="checkbox"/> Yes ___ No					
10-Determination:							
Confirmed ? By?							
10-Mitigation:							
to be included with design							
12-Notes		seasonally saturated scrub/shrub wetland					

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-22-08

Biologist: Jon Sell and Travis Garnto Affiliation: Parsons Brinckerhoff

1-Station: from Plans							
2-Map label and Name		WTL-2 / Wetland 2 Alternate C					
3-Latitude/Longitude		35°47'57.922"N/83°55'44.808"W					
4-Potential Impact		Fill					
5-Feature name:		N/A					
6-Feature description		Seasonally Saturated Emergent Wetland					
7-Wetland type:		Forested: ___ Scrub/Shrub: ___ Emergent: <input checked="" type="checkbox"/> Bog/Fen: ___ Aquatic Bed: ___					
Dominant Plant Species		Indicator	Stratum	Dominant Plant Species		Indicator	Stratum
<i>Scirpus cyperinus</i>		OBL	Herb	<i>Mimulus ringens</i>		OBL	Herb
<i>Typha latifolia</i>		OBL	Herb	<i>Vernonia sp.</i>		FAC+	Herb
<i>Helenium autumnale</i>		FACW	Herb	<i>Solidago gigantea</i>		FACW	Herb
<i>Polygonum hydropiper</i>		OBL	Herb	<i>Polygonum punctatum</i>		FACW	Herb
<i>Bidens sp.</i>		FACW	Herb	<i>Rubus argutus</i>		FAC+	Herb
Hydrophytic Vegetation		% of Dominants OBL, FACW, FAC=100%			Hydrophytic vegetation Present: <input checked="" type="checkbox"/> Yes ___ No		
Hydrology		Primary Hydrology Indicators			Secondary Hydrology Indicators		
Depth of inundation ___ N/A ___ in		Inundated _____			Oxidized Root Channels _____		
Depth to water in pit ___ >12 ___ in.		Saturated (upper 12") <input checked="" type="checkbox"/>			Water-stained Leaves <input checked="" type="checkbox"/>		
Depth to Sat. Soil ___ 0 ___ in.		Water Marks <input checked="" type="checkbox"/>			Fac-Neutral Test _____		
Surface water Connection: <input checked="" type="checkbox"/> Yes ___ No		Drift Lines _____			Other _____		
Ground water connection: ___ Yes <input checked="" type="checkbox"/> No		Sediment Deposits _____			Wetland Hydrology Present: <input checked="" type="checkbox"/> Yes ___ No		
		Drainage Patterns _____					
		Isolated: _____					
		Abutting: _____					
		Adjacent: <input checked="" type="checkbox"/>					
Soils		Map Unit Name:			Drainage Class:		
Soil Profile Description		Subgroup:			Confirmed Map Unit Type: ___ YES ___ NO		
Depth		Matrix	Mottle	Mottle	Texture,		
(inches)	Horizon	Color	Color	Abundance	Concretions	Hydric Soil Indicators	
0-12"	A	10YR 5/2	10YR 4/2	Abundant	clay loam	Sulfidic Odor	
						Gleyed or Low Chroma (=1) matrix	
						Chroma \geq 2 w/ mottled	
						Concretions	
						Reducing Conditions	
						Hydric Soils List	
Hydric Soils Present: <input checked="" type="checkbox"/> Yes ___ No							
Rationale/Remarks: The soils were saturated in the upper 12 and had a Matrix Color equal to Chroma 2							
approximate Size: (ac.) <u>0.2</u>		portion affected (ac.)			portion affected (ac.)		
		(permanent) 0.2 acre			(temporary)		
width of buffer zone (ft) 5 feet							
photo number(s)							
8-Watershed		HUC code	60102010106 - Little River Watershed				
		HUC code					
9-Determination:		Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes ___ No Hydric Soils Present? <input checked="" type="checkbox"/> Yes ___ No					
TDOT/consultant: J. Sell and T. Garnto		Wetland Hydrology Present? <input checked="" type="checkbox"/> Yes ___ No Is Sampling Point in a wetland? <input checked="" type="checkbox"/> Yes ___ No					
10-Determination:							
Confirmed? By?							
10-Mitigation:							
to be included with design							
12-Notes		Emergent wetland associated with old cattle pond and STR-1					

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-22-08

Biologist: Jon Sell and Travis Garnto Affiliation: Parsons Brinckerhoff

1-Station: from Plans							
2-Map label and Name		WTL-3 / Wetland 3 Alternate C					
3-Latitude/Longitude		35°47'59.042"N/83°55'38.162"W					
4-Potential Impact		Fill					
5-Feature name:		N/A					
6-Feature description		Inundated Emergent Wetland					
7-Wetland type:		Forested: ___ Scrub/Shrub: ___ Emergent: <input checked="" type="checkbox"/> Bog/Fen: ___ Aquatic Bed: ___					
Dominant Plant Species		Indicator	Stratum	Dominant Plant Species		Indicator	Stratum
<i>Scirpus cyperinus</i>		OBL	Herb	<i>Boehmeria cylindrica</i>		FACW+	Herb
<i>Typha latifolia</i>		OBL	Herb	<i>Commelina communis</i>		FAC	Herb
<i>Leersia virginica</i>		FACW	Herb	<i>Verbena canadensis</i>		FAC-	Herb
<i>Polygonum hydropiper</i>		OBL	Herb				
<i>Juncus effusus</i>		FACW+	Herb				
Hydrophytic Vegetation		% of Dominants OBL, FACW, FAC=88%			Hydrophytic vegetation Present: <input checked="" type="checkbox"/> Yes ___ No		
Hydrology		Primary Hydrology Indicators			Secondary Hydrology Indicators		
Depth of inundation <u>1</u> in.		Inundated <input checked="" type="checkbox"/>			Oxidized Root Channels <input type="checkbox"/>		
Depth to water in pit <u>0</u> in.		Saturated (upper 12") <input checked="" type="checkbox"/>			Water-stained Leaves <input checked="" type="checkbox"/>		
Depth to Sat. Soil <u>0</u> in.		Water Marks <input checked="" type="checkbox"/>			Fac-Neutral Test <input type="checkbox"/>		
Surface water Connection: <input checked="" type="checkbox"/> Yes ___ No		Drift Lines <input type="checkbox"/>			Other <input type="checkbox"/>		
Ground water connection: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Sediment Deposits <input type="checkbox"/>			Wetland Hydrology Present: <input checked="" type="checkbox"/> Yes ___ No		
		Drainage Patterns <input type="checkbox"/>					
		Isolated: <input type="checkbox"/>					
		Abutting: <input type="checkbox"/>					
		Adjacent: <input checked="" type="checkbox"/>					
Soils		Map Unit Name:		Drainage Class:			
Soil Profile Description		Subgroup:		Confirmed Map Unit Type: ___ YES ___ NO			
Depth	Horizon	Matrix	Mottle	Mottle	Texture,	Hydric Soil Indicators	
(inches)		Color	Color	Abundance	Concretions		
0-12"	A	7.5YR 3/1			clay	Sulfidic Odor	
						Gleyed or Low Chroma (=1) matrix <input checked="" type="checkbox"/>	
						Chroma ≥ 2 w/ mottled	
						Concretions	
						Reducing Conditions	
						Hydric Soils List	
Hydric Soils Present: <input checked="" type="checkbox"/> Yes ___ No							
Rationale/Remarks: The soils were inundated and had a Matrix Color equal to Chroma 1							
approximate Size: (ac.) <u>0.6</u>		portion affected (ac.)			portion affected (ac.)		
		(permanent) 0.6 acre			(temporary)		
width of buffer zone (ft) 15 feet							
photo number(s)							
8-Watershed		HUC code	60102010106 - Little River Watershed				
		HUC code					
9-Determination:		Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes ___ No Hydric Soils Present? <input checked="" type="checkbox"/> Yes ___ No					
TDOT/consultant: J. Sell and T. Garnto		Wetland Hydrology Present? <input checked="" type="checkbox"/> Yes ___ No Is Sampling Point in a wetland? <input checked="" type="checkbox"/> Yes ___ No					
10-Determination:							
Confirmed ? By?							
10-Mitigation:							
to be included with design							
12-Notes		W/L associated with STR-3 Alternate A & Alternate C appears to be old cattle pond					

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-23-08

Biologist: Jon Sell and Travis Garnto Affiliation: Parsons Brinckerhoff

1-Station: from Plans							
2-Map label and Name		WTL-4 / Wetland 4 Alternate C					
3-Latitude/Longitude		35°47'54.759"N/83°55'24.978"W					
4-Potential Impact		Fill					
5-Feature name:		N/A					
6-Feature description		Inundated Scrub/ Shrub Wetland					
7-Wetland type:		Forested: ___ Scrub/Shrub: <input checked="" type="checkbox"/> Emergent: ___ Bog/Fen: ___ Aquatic Bed: ___					
Dominant Plant Species		Indicator	Stratum	Dominant Plant Species		Indicator	Stratum
<i>Salix nigra</i>		OBL	Shrub	<i>Boehmeria cylindrica</i>		FACW+	Herb
<i>Typha latifolia</i>		OBL	Herb	<i>Dicanthelium</i> sp.		FACW	Herb
<i>Polygonum punctatum</i>		FACW+	Herb	<i>Hypericum</i> sp.		OBL	Herb
<i>Polygonum hydropiper</i>		OBL	Herb	<i>Lonicera japonica</i>		FAC-	Herb
<i>Soldago gigantea</i>		FACW	Herb	<i>Lycopus virginicus</i>		OBL	Herb
Hydrophytic Vegetation		% of Dominants OBL, FACW, FAC=88%			Hydrophytic vegetation Present: <input checked="" type="checkbox"/> Yes ___ No		
Hydrology		Primary Hydrology Indicators			Secondary Hydrology Indicators		
Depth of inundation <u>1</u> in.		Inundated <input checked="" type="checkbox"/>			Oxidized Root Channels _____		
Depth to water in pit <u>2</u> in.		Saturated (upper 12") <input checked="" type="checkbox"/>			Water-stained Leaves <input checked="" type="checkbox"/>		
Depth to Sat. Soil <u>0</u> in.		Water Marks <input checked="" type="checkbox"/>			Fac-Neutral Test _____		
Surface water Connection: <input checked="" type="checkbox"/> Yes ___ No		Drift Lines _____			Other _____		
Ground water connection: ___ Yes <input checked="" type="checkbox"/> No		Sediment Deposits _____			Wetland Hydrology Present: <input checked="" type="checkbox"/> Yes ___ No		
		Drainage Patterns <input checked="" type="checkbox"/>					
		Isolated: _____					
		Abutting: _____					
		Adjacent: <input checked="" type="checkbox"/>					
Soils		Map Unit Name:			Drainage Class:		
Soil Profile Description		Subgroup:			Confirmed Map Unit Type: ___ YES ___ NO		
Depth		Matrix	Mottle	Mottle	Texture,		
(inches)	Horizon	Color	Color	Abundance	Concretions	Hydric Soil Indicators	
0-6"	A	2.5YR 4/2			silty clay	Sulfidic Odor	
6-12"	B	2.5Y 2.5/1			silty clay	Gleyed or Low Chroma (=1) matrix <input checked="" type="checkbox"/>	
						Chroma \geq 2 w/ mottled	
						Concretions	
						Reducing Conditions	
						Hydric Soils List	
Hydric Soils Present: <input checked="" type="checkbox"/> Yes ___ No							
Rationale/Remarks: The soils were inundated and had a Matrix Color equal to Chroma 1							
approximate Size: (ac.) <u>0.3</u>		portion affected (ac.)			portion affected (ac.)		
		(permanent) 0.0 acre			(temporary)		
width of buffer zone (ft) 15 feet							
photo number(s)							
8-Watershed		HUC code	60102010106 - Little River Watershed				
		HUC code					
9-Determination:		Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes ___ No Hydric Soils Present? <input checked="" type="checkbox"/> Yes ___ No					
TDOT/consultant: J. Sell and T. Garnto		Wetland Hydrology Present? <input checked="" type="checkbox"/> Yes ___ No Is Sampling Point in a wetland? <input checked="" type="checkbox"/> Yes ___ No					
10-Determination:							
Confirmed ? By?							
10-Mitigation:							
to be included with design							
12-Notes		Scrub/shrub wetland associated with PND-1 and STR-4					

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-24-08

Biologist: Jon Sell and Travis Garnto Affiliation: Parsons Brinckerhoff

1-Station: from Plans							
2-Map label and Name		WTL-5 / Wetland 5 Alternate C					
3-Latitude/Longitude		35°46'53.558"N/83°18.782"W					
4-Potential Impact		N/A					
5-Feature name:		N/A					
6-Feature description		Emergent wetland associated with Stream 3 Alternate C					
7-Wetland type:		Forested: ___ Scrub/Shrub: ___ Emergent: <input checked="" type="checkbox"/> Bog/Fen: ___ Aquatic Bed: ___					
Dominant Plant Species		Indicator	Stratum	Dominant Plant Species		Indicator	Stratum
<i>Mikania scandens</i>		FACW+	Herb	<i>Cladium mariscoides</i>		OBL	Herb
<i>Polygonum hydropiper</i>		OBL	Herb				
<i>Polygonum punctatum</i>		FACW+	Herb				
<i>Solidago elliotii</i>		OBL	Herb				
<i>Carpinus caroliniana</i>		FAC	Herb				
Hydrophytic Vegetation		% of Dominants OBL, FACW, FAC=100%			Hydrophytic vegetation Present: <input checked="" type="checkbox"/> Yes ___ No		
Hydrology		Primary Hydrology Indicators			Secondary Hydrology Indicators		
Depth of inundation <u>1</u> in.		Inundated <input checked="" type="checkbox"/>			Oxidized Root Channels _____		
Depth to water in pit <u>4</u> in.		Saturated (upper 12") <input checked="" type="checkbox"/>			Water-stained Leaves _____		
Depth to Sat. Soil <u>0</u> in.		Water Marks <input checked="" type="checkbox"/>			Fac-Neutral Test _____		
Surface water Connection: <input checked="" type="checkbox"/> Yes ___ No		Drift Lines _____			Other _____		
Ground water connection: ___ Yes <input checked="" type="checkbox"/> No		Sediment Deposits _____			Wetland Hydrology Present: <input checked="" type="checkbox"/> Yes ___ No		
		Drainage Patterns <input checked="" type="checkbox"/>					
		Isolated: _____					
		Abutting: _____					
		Adjacent: <input checked="" type="checkbox"/>					
Soils		Map Unit Name:			Drainage Class:		
Soil Profile Description		Subgroup:			Confirmed Map Unit Type: ___ YES ___ NO		
Depth		Matrix	Mottle	Mottle	Texture,		
(inches)	Horizon	Color	Color	Abundance	Concretions	Hydric Soil Indicators	
0-12"	A	2.5Y 4/2			clay	Sulfidic Odor	<input checked="" type="checkbox"/>
						Gleyed or Low Chroma (=1) matrix	
						Chroma \geq 2 w/ mottled	
						Concretions	
						Reducing Conditions	<input checked="" type="checkbox"/>
						Hydric Soils List	
Hydric Soils Present: <input checked="" type="checkbox"/> Yes ___ No							
Rationale/Remarks: The soils were inundated and had a Matrix Color equal to Chroma 1							
approximate Size: (ac.) <u>0.06</u>		portion affected (ac.)			portion affected (ac.)		
		(permanent) 0.0 acre			(temporary)		
width of buffer zone (ft) 5 feet							
photo number(s)							
8-Watershed		HUC code	60102010105 - Little River Watershed				
		HUC code					
9-Determination:		Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes ___ No Hydric Soils Present? <input checked="" type="checkbox"/> Yes ___ No					
TDOT/consultant: J. Sell and T. Garnto		Wetland Hydrology Present? <input checked="" type="checkbox"/> Yes ___ No Is Sampling Point in a wetland? <input checked="" type="checkbox"/> Yes ___ No					
10-Determination:		Confirmed? By?					
10-Mitigation:		to be included with design					
12-Notes		Emergent wetland associated with STR-8					

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-29-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-1 / Stream 1 Alternate D
3-Latitude/Longitude	35°48'28.101"N / 83°55'41.425"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Intermittent
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	Straight
channel bottom width	1.0 ft
top of bank width	4.5 ft
bank height and slope ratio	2:1 ratio
avg. gradient or stream (%)	<5
substratum	35% sand, 30% silt, 20% gravel, and 15% cobble
riffle/run/pool	The stream was mostly run
width of buffer zone	LB: 25 ft RB: 25 ft.
water flow	no flowing water within channel
water depth	0.1 ft
water width	1.0 ft
general water quality	N/A
OHWM indicators	abrupt change in plant community
groundwater connection	No
bank stability: LB, RB	LB and RB are both moderately stable with minor sloughing and scouring
dominant species: LB, RB	Dominant species for LB and RB are <i>Ligustrum sinense</i> , <i>Toxicodendron radicans</i> , <i>Acer negundo</i> , <i>Vitis rotundifolia</i> , <i>Ulmus americana</i> , <i>ubus</i> sp., and <i>Festuca</i> sp.
overhead canopy (%)	40%
benthos	benthic invertebrates were absent
fish	fish species were absent
algae or other aquatic life	None present
habitat assessment score	Use TDEC (2006)
photo number(s)	36
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	Confirmation needed???????
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-29-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-2 / Stream 2 Alternate D
3-Latitude/Longitude	35°48'27.933"N / 83°55'31.687"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Perennial
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	Slightly meandering; natural channel
channel bottom width	4.0 ft
top of bank width	12.0 ft
bank height and slope ratio	1:1 ratio
avg. gradient or stream (%)	<5
substratum	35% sand, 30% silt, 20% gravel, and 15% cobble
riffle/run/pool	The stream was mostly run
width of buffer zone	LB: 25 ft RB: 25 ft.
water flow	no flowing water within channel
water depth	0.3 ft
water width	4.0 ft
general water quality	N/A
OHWM indicators	abrupt change in plant community
groundwater connection	No
bank stability: LB, RB	LB and RB are both moderately stable with minor sloughing and scouring
dominant species: LB, RB	Dominant species for LB and RB are <i>Acer negundo</i> , <i>Toxicodendron radicans</i> , <i>Lobelia cardinalis</i> , <i>Ligustrum sinense</i> , <i>Lonicera japonica</i> , <i>Euonymus americanus</i> , and <i>Campsis radicans</i>
overhead canopy (%)	40%
benthos	benthic invertebrates were not observed
fish	fish species were not observed
algae or other aquatic life	None present
habitat assessment score	Use TDEC (2006)
photo number(s)	37
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-29-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-3 / Stream 3 Alternate D
3-Latitude/Longitude	35°48'25.699"N / 83°54'39.091"W
4-Potential Impact	None
5-Feature description:	
What is it?	Intermittent
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	straight; natural channel
channel bottom width	0.5 ft
top of bank width	1.5 ft
bank height and slope ratio	4:1 ratio
avg. gradient or stream (%)	<5
substratum	35% sand, 35% gravel, 30% bedrock
riffle/run/pool	The stream was mostly riffle and run
width of buffer zone	LB: 45 ft RB: 45 ft.
water flow	no flowing water within channel
water depth	N/A
water width	N/A
general water quality	N/A
OHWM indicators	abrupt change in plant community
groundwater connection	No
bank stability: LB, RB	LB and RB are both moderately stable with some scouring and sloughing
dominant species: LB, RB	Dominant species for LB and RB are <i>Acer negundo</i> , <i>Lonicera japonica</i> , <i>Ligustrum sinense</i> , <i>Acer rubrum</i> , <i>Nyssa sylvatica</i> , <i>Parthenocissus quinquefolia</i> , <i>Quercus marilandica</i> , <i>Liriodendron tulipifera</i> , <i>Vitis rotundifolia</i> , and <i>Rosa multiflora</i>
overhead canopy (%)	80%
benthos	benthic invertebrates were absent
fish	fish species were absent
algae or other aquatic life	None present
habitat assessment score	Use TDEC (2006)
photo number(s)	40
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-29-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-4 / Stream 4 Alternate D
3-Latitude/Longitude	35°47'38.752"N / 83°54'16.009"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Intermittent
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	straight; natural channel
channel bottom width	2.0 ft
top of bank width	3.5 ft
bank height and slope ratio	1:1 ratio
avg. gradient or stream (%)	<5
substratum	50% silt and 50% sand
riffle/run/pool	The stream was mostly run and pool
width of buffer zone	LB: eliminated RB: eliminated
water flow	no flowing water within channel
water depth	0.1'
water width	2
general water quality	water was stagnant and muddy
OHWM indicators	abrupt change in plant community
groundwater connection	No
bank stability: LB, RB	LB and RB are both incised with scouring and sloughing
dominant species: LB, RB	Dominant species for LB and RB are <i>Ligustrum sinense</i> , <i>Rubus</i> sp., and <i>Smilax rotundifolia</i>
overhead canopy (%)	10%
benthos	benthic invertebrates were absent
fish	fish species were absent
algae or other aquatic life	None present
habitat assessment score	Use TDEC (2006)
photo number(s)	43
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	Confirmation Needed
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-29-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-5 / Stream 5 Alternate D (Peppermint Branch)
3-Latitude/Longitude	35°47'12.681"N / 83°54'6.714"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Perennial
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	straight; natural channel
channel bottom width	1.0 ft
top of bank width	2.5 ft
bank height and slope ratio	3:1 ratio
avg. gradient or stream (%)	<5
substratum	50% sand, 25% gravel, and 25% cobble
riffle/run/pool	The stream was mostly riffle and run
width of buffer zone	LB: eliminated RB: eliminated
water flow	0.5 foot per second
water depth	0.4 ft
water width	1.0 ft
general water quality	water quality was good and clarity was clear
OHWM indicators	abrupt change in plant community
groundwater connection	No
bank stability: LB, RB	LB and RB are both incised
dominant species: LB, RB	Dominant species for LB and RB are <i>Festuca</i> sp., <i>Solidago gigantea</i> , and <i>Rubus</i> sp.
overhead canopy (%)	10%
benthos	benthic invertebrates were absent
fish	fish species were absent
algae or other aquatic life	None present
habitat assessment score	Use TDEC (2006)
photo number(s)	44
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-24-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-6 / Stream 6 Alternate D (Crooked Creek)
3-Latitude/Longitude	35°46'01.585"N / 83°53'21.043"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Perennial
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	slightly meandering; natural channel
channel bottom width	30.0 ft.
top of bank width	35
bank height and slope ratio	4:1 ratio
avg. gradient or stream (%)	<5%
substratum	35% sand, 35% silt, and 30% gravel
riffle/run/pool	Good riffle/run/pool/complex
width of buffer zone	LB: 200 ft. RB: 25 ft.
water flow	2.0 feet per second
water depth	1.0 - 2.0 ft.
water width	30.0 ft.
general water quality	quality was good and clarity was clear
OHWM indicators	abrupt change in plant community
groundwater connection	no
bank stability: LB, RB	LB and RB are both incised with sloughing and scouring
dominant species: LB, RB	Dominant species for LB and RB are <i>Fagus grandifolia</i> , <i>Liquidambar styraciflua</i> , and <i>Acer rubrum</i>
overhead canopy (%)	70%
benthos	benthic invertebrates were not observed
fish	fish species were not observed
algae or other aquatic life	None present
habitat assessment score	Use TDEC (2006)
photo number(s)	47
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-24-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-7 / Stream 7 Alternate D (Gravelly Creek)
3-Latitude/Longitude	35°46'5.971"N / 83°53'23.522"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Perennial
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	straight; natural channel
channel bottom width	11.0 ft.
top of bank width	15.0 ft.
bank height and slope ratio	2:1 ratio
avg. gradient or stream (%)	<5%
substratum	35% sand, 35% silt, and 30% gravel
riffle/run/pool	Mostly riffle and run
width of buffer zone	LB: 25 ft. RB: 100 ft.
water flow	1.0 foot per second
water depth	0.5 ft.
water width	11.0 ft.
general water quality	water quality was good and clarity was clear
OHWM indicators	abrupt change in plant community
groundwater connection	no
bank stability: LB, RB	LB and RB are both highly incised
dominant species: LB, RB	Dominant species for LB and RB are <i>Fagus grandifolia</i> , <i>Liquidambar styraciflua</i> , and <i>Acer rubrum</i>
overhead canopy (%)	70%
benthos	benthic invertebrates were absent
fish	fish species were absent
algae or other aquatic life	None present
habitat assessment score	Use TDEC (2006)
photo number(s)	48
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-29-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	WWC-1/Wet Weather Conveyance 1 Alternate D
3-Latitude/Longitude	35°48'30.992"N / 83°54'50.086"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Wet Weather Conveyance
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	straight; natural channel
channel bottom width	0.5 ft
top of bank width	1.0 ft
bank height and slope ratio	3:1 ratio
avg. gradient or stream (%)	<5
substratum	50% silt and 50% clay
riffle/run/pool	The stream was mostly run
width of buffer zone	LB: 15 ft RB: 15 ft.
water flow	no flowing water within channel
water depth	N/A
water width	N/A
general water quality	N/A
OHWM indicators	abrupt change in plant community
groundwater connection	No
bank stability: LB, RB	LB and RB are both moderately stable and gently sloping
dominant species: LB, RB	Dominant species for LB and RB are <i>Acer negundo</i> , <i>Ligustrum sinense</i> , <i>Rubus</i> sp., and <i>Smilax rotundifolia</i>
overhead canopy (%)	40%
benthos	benthic invertebrates were absent
fish	fish species were absent
algae or other aquatic life	None present
habitat assessment score	Use TDEC (2006)
photo number(s)	38
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	Confirmation needed
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-29-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	WWC-2/Wet Weather Conveyance 2 Alternate D
3-Latitude/Longitude	35°48'16.577"N / 83°54'39.091"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Wet Weather Conveyance
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	straight; channel created at toe of slope from previous road construction
channel bottom width	0.5 ft
top of bank width	1.0 ft
bank height and slope ratio	1:1 ratio
avg. gradient or stream (%)	<5
substratum	70% silt and 30% sand
riffle/run/pool	The stream was mostly run and pool
width of buffer zone	LB: eliminated RB: eliminated
water flow	no flowing water within channel
water depth	0.1'
water width	0.1'
general water quality	water was stagnant and not flowing
OHWM indicators	abrupt change in plant community
groundwater connection	No
bank stability: LB, RB	LB and RB are both straight and incised banks
dominant species: LB, RB	Dominant species for LB and RB are <i>Solidago</i> sp., <i>Festuca</i> sp., <i>Rubus</i> sp., <i>Polygonum hydropiperoides</i> , <i>Rosa multiflora</i> , and <i>Lonicera japonica</i>
overhead canopy (%)	100%
benthos	benthic invertebrates were absent
fish	fish species were absent
algae or other aquatic life	None present
habitat assessment score	Use TDEC (2006)
photo number(s)	41
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-29-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	WWC-3 /Wet Weather Conveyance 3 Alternate D
3-Latitude/Longitude	35°47'51.514"N / 83°21.244"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Wet Weather Conveyance
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	straight; channel created at toe of slope from previous road construction
channel bottom width	2.0 ft
top of bank width	3.0 ft
bank height and slope ratio	3:1 ratio
avg. gradient or stream (%)	<5
substratum	50% silt and 50% sand
riffle/run/pool	The stream was mostly run and pool
width of buffer zone	LB: 25 ft RB: 25 ft
water flow	no flowing water within channel
water depth	N/A
water width	N/A
general water quality	N/A
OHWM indicators	abrupt change in plant community
groundwater connection	No
bank stability: LB, RB	LB and RB are both incised with scouring and sloughing
dominant species: LB, RB	Dominant species for LB and RB are <i>Liquidambar styraciflua</i> , <i>Acer rubrum</i> , <i>Fagus grandifolia</i> , and <i>Platanus occiden</i>
overhead canopy (%)	90%
benthos	benthic invertebrates were absent
fish	fish species were absent
algae or other aquatic life	None present
habitat assessment score	Use TDEC (2006)
photo number(s)	42
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	Confirmation needed
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-29-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	WWC-4 /Wet Weather Conveyance 4 Alternate D
3-Latitude/Longitude	35°47'8.253"N / 83°54'2.189"W
4-Potential Impact	none
5-Feature description:	
What is it?	Wet Weather Conveyance
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	straight; natural channel
channel bottom width	3.0 ft
top of bank width	4.0 ft
bank height and slope ratio	1:1 ratio
avg. gradient or stream (%)	<5
substratum	40% sand, 40% silt, and 20% cobble
riffle/run/pool	The stream was mostly riffle and run
width of buffer zone	LB: 50 ft RB: partially eliminated
water flow	no flowing section
water depth	N/A
water width	N/A
general water quality	N/A
OHWM indicators	abrupt change in plant community
groundwater connection	No
bank stability: LB, RB	LB and RB are both stable and sloping
dominant species: LB, RB	Dominant species for LB and RB are <i>Liquidambar styraciflua</i> , <i>Acer rubrum</i> , and <i>Carya tomentosa</i>
overhead canopy (%)	50%
benthos	benthic invertebrates were absent
fish	fish species were absent
algae or other aquatic life	None present
habitat assessment score	Use TDEC (2006)
photo number(s)	45
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	Confirmation Needed
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Project: (Blount County: Pellissippi Parkway Extension, TDOT PIN: 101423.00)

Date of survey: 9-24-08

Biologist: Jon Sell & Travis Garnto

Affiliation: Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	WWC-5 /Wet Weather Conveyance 5 Alternate D
3-Latitude/Longitude	35°46'30.534"N / 83°53'39.713"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Wet Weather Conveyance
blue-line on topo? (y/n)	Yes
defined channel (y/n)	Yes
straight or meandering	slightly meandering; natural channel
channel bottom width	11.0 ft.
top of bank width	12.0 ft.
bank height and slope ratio	3:1 ratio
avg. gradient or stream (%)	<5%
substratum	100% clay
riffle/run/pool	Mostly run
width of buffer zone	LB: 25 ft. RB: 25 ft.
water flow	no water was present
water depth	N/A
water width	N/A
general water quality	N/A
OHWM indicators	abrupt change in plant community
groundwater connection	no
bank stability: LB, RB	LB and RB are both moderately unstable with sloughing and scouring
dominant species: LB, RB	Dominant species for LB and RB are <i>Ligustrum sinense</i> , <i>Cornus florida</i> , <i>Smilax glauca</i> , <i>Lonicera japonica</i> , <i>Fagus grandifolia</i> , <i>Festuca sp.</i> , <i>Rubus sp.</i> , and <i>Campsis radicans</i>
overhead canopy (%)	70%
benthos	benthic invertebrates were absent
fish	fish species were absent
algae or other aquatic life	None present
habitat assessment score	Use TDEC (2006)
photo number(s)	46
rainfall information	0.2" on September 18, 2008
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	Confirmation needed
8-Mitigation: yes/no (If yes, include on Form J)	
9-Notes Indicate if stream is ETW or ONRW or on 303(d) list Estimate size (acres) of lake or pond if applicable	

Appendix D

TDEC Database Records



United States Department of the Interior

FISH AND WILDLIFE SERVICE

446 Neal Street
Cookeville, TN 38501

January 12, 2000

Mr. Keven Brown
Biologist
Tennessee Department of Transportation
Suite 900, James K. Polk Building
505 Deaderick Street
Nashville, Tennessee 37243-0334

Dear Mr. Brown:

Thank you for your facsimile transmission of December 29, 1999, regarding the proposed State Route 162 (Pellissippi Parkway) extension from State Route 33 to State Route 73 in Blount County, Tennessee. The Fish and Wildlife Service (Service) has reviewed the information submitted and offers the following comments.

Information available to the Service does not indicate that wetlands exist in the vicinity of the proposed project. However, our wetland determination has been made in the absence of a field inspection and does not constitute a wetland delineation for the purposes of Section 404 of the Clean Water Act. The Corps of Engineers should be contacted if other evidence, particularly that obtained during an on-site inspection, indicates the potential presence of wetlands.

We note that the proposed highway will require stream crossings. We recommend that silt barriers be put in place when working adjacent to all streams to prevent runoff of sediment. If a stream crossing is necessary, it should be accomplished during low flow periods and the streambanks reseeded with native vegetation beneficial to wildlife immediately following completion of the stream crossing.

According to our records, the federally endangered Indiana bat (*Myotis sodalis*) is known to occur in the vicinity of the project. This species normally uses exfoliating (i.e., with loose bark) trees greater than six inches in diameter at breast height as maternity and roost sites. If the construction of the highway involves the removal of any trees greater than six inches in diameter at breast height, and tree removal can be accomplished between October 15 and March 31, we believe that the project is not likely to adversely affect this species. If the above recommendation regarding tree size and removal dates is accepted as a project condition and is stringently enforced, then we believe that the requirements of Section 7 of the Endangered Species Act will be satisfied. However, obligations under Section 7 of the Act must be reconsidered if (1) new information reveals impacts of the

2-1

proposed action that may affect listed species or critical habitat in a manner not previously considered, (2) the proposed action is subsequently modified to include activities which were not considered during this consultation, or (3) new species are listed or critical habitat designated that might be affected by the proposed action. **If this recommendation is not acceptable, the project should be delayed and consultation with this office should continue.** Please provide us a written response relative to our recommendation.

Thank you for the opportunity to comment on this proposed action. If you have any questions regarding the information which we have provided, please contact Wally Brines of my staff at 931/528-6481, extension 222.

Sincerely,



Lee A. Barclay, Ph.D.
Field Supervisor



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
OFFICE OF ENVIRONMENTAL PLANNING AND PERMITS
SUITE 900, JAMES K. POLK BUILDING
505 DEADERICK STREET
NASHVILLE, TENNESSEE 37243-0334

February 27, 2002

Mr. Charles Boyd
Division Administrator
Federal Highway Administration
640 Grassmere Park, Suite 112
Nashville, TN 37211

Subject: State Route 162 (Pellissippi Parkway) from SR-33
to SR-73 (U.S. 321), Blount County, Tennessee
FWS# 00-0663

Dear Mr. Boyd:

Enclosed is a response letter for the subject project. This response is submitted for a February 5, 2002 information request from the U. S. Fish and Wildlife Service (Service). The information request was part of a Service response to the December 5, 2001 Biological Assessment submitted by the Tennessee Department of Transportation (TDOT) for the subject project.

The Service expressed concern that the snail darter (*Percina tanasi*), duskytail darter (*Etheostoma percnurum*), and fine-rayed pigtoe (*Fusconaia cuneolus*) could be present in some of the smaller tributary streams that will be crossed by the subject project. Based on available information from literature, field reviews, and contacts with reliable field personnel, it is our conclusion that these species are not likely to be present in these tributary streams and therefore, are "not likely to be adversely affected" by the proposed project.

We request that you forward this information to the U. S. Fish and Wildlife Service with a request for their concurrence or other response. We also request that any subsequent correspondence relative to this issue include the entire project name and termini as stated in the subject line of this letter.

Please address any questions specific to this letter to Keven Brown at (865) 594-9395. Thank you for your assistance in this matter.

Sincerely,

Lilah Miller
Ecological Studies Section

LM:KB

Xc: Mr. Jim Bryson
Mr. Tom Love
Mr. Keven Brown
Reading File



**STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
ENVIRONMENTAL PLANNING & PERMITS DIVISION**
SUITE 900, JAMES K. POLK BUILDING
505 DEADERICK STREET
NASHVILLE, TENNESSEE 37243-0334

February 27, 2002

Dr. Lee Barclay
U.S. Department of Interior
Fish and Wildlife Service
446 Neal Street
Cookeville, TN 38501

Re: State Route 162 (Pellissippi Parkway) from SR-33
to SR-73 (U.S. 321), Blount County, Tennessee
FWS# 00-0663

Dear Dr. Barclay:

Thank you for your February 5, 2002 response and comments to our Biological Assessment submitted December 5, 2001 for the subject project. Specifically, you expressed concern that the snail darter (*Percina tanasi*), duskytail darter (*Etheostoma percnurum*), and fine-rayed pigtoe (*Fusconaia cuneolus*) could be present in Peppermint Branch, Gravelly Creek, and Flag Branch. All three of these streams will be crossed by the proposed project. We will attempt to address this concern to your satisfaction.

Photos of Peppermint Branch, Gravelly Creek, and Flag Branch are attached for your use. These three streams typically range from three to six feet in width. Depths range from three to six inches in riffle areas and from six to twelve inches in pools. Riffle sections are typically composed of gravel or cobble mixed with sand and silt, while pool reaches are generally covered in a layer of silt mixed with sand. Flows are slow to moderate in each of these streams.

As seen in the attached photos, livestock have access to long reaches of these streams and have caused severe damage to stream banks. Groundcover adjacent to these streams has eliminated completely at several locations. The substrates have been altered in a large portion of these streams as well where livestock have trampled and disturbed them. Stream sections that may have at

one time consisted predominantly of gravel or sand/gravel mixtures have been covered by sediments from livestock walking directly in the streams and from storm runoff over disturbed areas adjacent to the streams. In addition, much of the canopy along these streams has been either removed completely or has been reduced to the point that it provides little benefit through either bank stabilization or shading. The portion of Flag Branch located within the project limits appears to have been channelized at some time as well.

The snail darter (*Percina tanasi*) and duskytail darter (*Etheostoma percnurum*) are known to occur in Little River. Several records are noted for these two species, with the most recent being in 2000. However, no records were noted from any of the tributary streams crossed by the project. Dr. David Etnier was contacted by phone on February 12, 2002, concerning the possibility of these two darter species occurring in the smaller tributary streams to Little River. Dr. Etnier indicated that he had collected the snail darter and duskytail darter from Little River, but not from the smaller tributaries, including Peppermint Branch, Gravelly Creek, and Flag Branch. Dr. Etnier also indicated that these two species are typically found in larger streams and would not likely be present in the smaller tributary streams crossed by this project. Available literature for *Percina tanasi* and *Etheostoma percnurum* also indicates these two species as occurring in major tributaries, not smaller type streams. Based on this information, it does not appear that either the snail darter or duskytail darter are likely to be present in Peppermint Branch, Gravelly Creek, and Flag Branch.

The fine-rayed pigtoe (*Fusconaia cuneolus*) is also known to occur in Little River, with collection records as recent as 1981 noted. However, no records for this species were noted from any of the tributary streams that will be crossed by the proposed project. Mr. Steven Ahlstedt (USGS) was contacted by phone on February 12, 2002, to discuss the possibility of this mussel species being present in the tributary streams crossed by the proposed project. Mr. Ahlstedt indicated that one individual of this species had been collected from Little River, but none from the smaller tributary streams. He also indicated that *Fusconaia cuneolus* is generally found in larger streams than those crossed by the proposed project. Based on this information, it does not appear likely that the fine-rayed pigtoe is present in Peppermint Branch, Gravelly Creek, and Flag Branch.

Available information indicates that neither the snail darter (*Percina tanasi*), duskytail darter (*Etheostoma percnurum*), nor fine-rayed pigtoe (*Fusconaia cuneolus*) are likely to be present in any of the smaller tributary streams crossed by the proposed project. This is due to both the small size of these streams and lack of suitable habitat in them. However, these three species do occur in Little River. These species are also highly sensitive to the effects of excess sedimentation that could result from poor erosion and siltation control during

project construction. Provided the necessary erosion and sediment control measures are implemented and maintained throughout project construction, it is the opinion of the Tennessee Department of Transportation that the snail darter (*Percina tanasi*), duskytail darter (*Etheostoma percnurum*), and fine-rayed pigtoe (*Fusconaia cuneolus*) are "not likely to be adversely affected".

Thank you for your assistance with this project. We hope the above information will be sufficient to address your concerns with the proposed project. If you have any questions, or need additional information, please contact Keven Brown at (865) 594-9395.

Sincerely,

Lilah Miller
Ecological Studies Section

LM:KB

Attachments

Xc: Mr. Jim Bryson
Mr. Tom Love
Mr. Keven Brown
Reading File



Typical reach of Peppermint Branch downstream of project crossing. Banks are severely trampled and substrate heavily disturbed.



Typical reach of Peppermint Branch showing adverse effects of livestock access. Note degraded banks and open canopy.



Downstream view of Gravelly Creek at project crossing. Banks heavily trampled by livestock. Canopy also sparse except for larger trees.



Upstream view of Gravelly Creek at project crossing. Little to no groundcover adjacent to this section of stream due to livestock usage.



Flag Branch within limits of proposed project crossing. Mostly pool habitat with slows flow through this stream section. Heavy silt load present in substrate.



Flag Branch within limits of proposed project crossing. Mostly pool habitat with slow flows and high silt load through this stream section.



STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Division of Natural Heritage
7th Floor L&C Annex
401 Church Street
Nashville, Tennessee 37243
Phone 615/532-0431 Fax 615/532-0046

May 8, 2006

Charles Bush
State Department of Transportation
Environmental Division
Suite 900 - James K. Polk Building
505 Deaderick Street
Nashville, Tennessee 37243-0334

**Subject: Pellissippi Parkway Extension (SR 162) from SR 33 to US 321 (SR 73),
Blount County, Tennessee**

Dear Mr. Bush:

Thank you for your letter and enclosures regarding the above proposed highway improvement. The Tennessee Department of Transportation (TDOT) proposes to extend and construct Pellissippi Parkway (SR 162) from SR 33 to SR 73. The total length of the proposed extension is approximately 4.4 miles. We have reviewed the project summary information and submit the following comments for consideration.

A review of our rare species database indicates that the following listed species have been documented within a 1-mile radius of the proposed project corridor. These species are listed below:

Scientific Name	Common Name	Federal Status	State Status	Global Rank	State Rank
Vertebrate Animal					
<i>Etheostoma percnurum</i>	Duskytail Darter	LE,XN	E	G1	S1
<i>Percina aurantiaca</i>	Tangerine Darter		D	G4	S3
<i>Percina macrocephala</i>	Longhead Darter		T	G3	S2
<i>Percina tanasi</i>	Snail Darter	LT	T	G2G3	S2S3
Invertebrate Animal					
<i>Fusconaia cuneolus</i>	Fine-rayed Pigtoe	LE	E	G1	S1

These Federal and State listed species have been documented from the Little River approximately a half-mile to the east of the proposed extension route. While the Division of Natural Heritage (DNH) does not anticipate adverse impacts to

these species as a result of the project, we do recommend adherence to stringent, site-specific Best Management Practices (BMPs) to protect sensitive aquatic environments from excessive erosion and stream sedimentation.

We have also attached a separate list of rare species that have been documented within a 4-mile radius of the proposed corridor. Consideration for these species should be given, if suitable habitat exists in the project area for these species. Please keep in mind that not all areas of Tennessee have been surveyed and that a lack of records for a particular site is not a statement that rare species or unique ecological features are absent from that area. For additional information regarding Tennessee's rare and endangered species or interpretation of Status or Ranks, please visit our website at <http://www.state.tn.us/environment/nh/>.

Thank you for the opportunity to comment on the subject proposal and for considering Tennessee's rare species throughout the planning of this project. Should you have any questions, please do not hesitate to contact me at (615) 532-0440.

Sincerely,

Kirstin Condict, Data Manager



**Rare Species Documented Within 4-Mile Radius
Pellissippi Parkway Extension (SR 162)
Blount County, TN**

Tennessee Division of Natural Heritage
www.state.tn.us/environment/nh/

Vascular Plant		Federal Status	State Status	Global Rank	State Rank
<i>Cimicifuga rubifolia</i>	Appalachian Bugbane		T	G3	S3
<i>Draba ramosissima</i>	Branching Whitlow-grass		S	G4	S2
Nonvascular Plant					
<i>Radula voluta</i>	A Liverwort		S	G3	S2
Vertebrate Animal					
<i>Cryptobranchus alleganiensis</i>	Hellbender	No Status	D	G3G4	S3
<i>Etheostoma cinereum</i>	Ashy Darter		T	G2G3	S2S3
<i>Etheostoma percnurum</i>	Duskytail Darter	LE,XN	E	G1	S1
<i>Gyrinophilus palleucus</i>	Tennessee Cave Salamander		T	G2G3	S2
<i>Hemitremia flammea</i>	Flame Chub		D	G3	S3
<i>Ixobrychus exilis</i>	Least Bittern		D	G5	S2B
<i>Percina aurantiaca</i>	Tangerine Darter		D	G4	S3
<i>Percina burtoni</i>	Blotchside Darter		D	G2	S2
<i>Percina macrocephala</i>	Longhead Darter		T	G3	S2
<i>Percina tanasi</i>	Snail Darter	LT	T	G2G3	S2S3
<i>Rallus elegans</i>	King Rail		D	G4	S2
<i>Rallus limicola</i>	Virginia Rail			G5	S1B,S3
<i>Tyto alba</i>	Common Barn-owl		D	G5	S3
Invertebrate Animal					
<i>Fusconaia cuneolus</i>	Fine-rayed Pigtoe	LE	E	G1	S1
<i>Io fluviialis</i>	Spiny Riversnail			G2	S2
Other (Ecological)					
<i>Heron rookery</i>	Heron Rookery			GNR	SNR

Appendix E
2001 Biological Assessment



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
OFFICE OF ENVIRONMENTAL PLANNING AND PERMITS
SUITE 900, JAMES K. POLK BUILDING
505 DEADERICK STREET
NASHVILLE, TENNESSEE 37243-0334

November 14, 2001

Mr. Charles Boyd
Division Administrator
Federal Highway Administration
640 Grassmere Park, Suite 112
Nashville, TN 37211

Subject: State Route 162 (Pellissippi Parkway), from SR-33
to SR-73 (US 321), Blount County, Tennessee

Dear Mr. Boyd:

Enclosed is a Biological Assessment for the subject project. This BA has been prepared pursuant to Section 7(c) of the Endangered Species Act of 1973, as amended, and addresses the following species:

Ashy darter (*Etheostoma cinereum*)
Longhead darter (*Percina macrocephala*)
Snail darter (*Percina tanasi*)
Duskytail darter (*Etheostoma percnurum*)
Fine-rayed pigtoe (*Fusconaia cuneolus*)
Indiana bat (*Myotis sodalis*)

This is based on information received from the U. S. Fish and Wildlife Service dated January 12, 2000 responding to a December 29, 1999 Tennessee Department of Transportation (TDOT) letter requesting information. This information was updated on September 21, 2001 with Mr. Jim Widlak of the U.S. Fish and Wildlife Service. Information from the Tennessee Department of Environment and Conservation, Division of Natural Heritage was also utilized.

Based on available information from literature and field reviews, and the information in the attached report, it is our conclusion that the proposed project is not likely to adversely affect any of the above species.

We request that you forward this Biological Assessment to the U. S. Fish and Wildlife Service with a request for their concurrence or other response. We also request that any subsequent correspondence relative to this BA include the entire project name and termini as stated in the subject line of this letter.

Please address any questions specific to the BA to Keven Brown at (865) 594-9395. Thank you for your assistance in this matter.

Sincerely,

Jim Bryson
Transportation Director
Environmental Planning & Permits

JB:KB

Xc: Mr. Charles Bush
Dr. W. E. Brode
Ms. Lilah Miller
Mr. Keven Brown

STATE ROUTE 162, PELISSIPPI PARKWAY, EXTENSION
FROM SR-33 TO SR-73 (US 321)
BLOUNT COUNTY, TENNESSEE

BIOLOGICAL ASSESSMENT
FOR

ASHY DARTER (*Etheostoma cinereum*)
LONGHEAD DARTER (*Percina macrocephala*)
SNAIL DARTER (*Percina tanasi*)
DUSKYTAIL DARTER (*Etheostoma percnurum*)
FINE-RAYED PIGTOE (*Fusconaia cuneolus*)
INDIANA BAT (*Myotis sodalis*)

U.S. FISH AND WILDLIFE SERVICE
LOG# 00-0663

November 14, 2001

Prepared Pursuant To
Section 7(c) of the Endangered Species Act of 1973
As Amended

Prepared By:
Keven Brown, Staff Biologist
Environmental Planning and Permits Division
Tennessee Department of Transportation

INTRODUCTION

The Tennessee Department of Transportation (TDOT) proposes to extend SR-62, Pellissippi Parkway, from SR-33 to SR-73 (U.S. 321) in Blount County, Tennessee (Figure 1). Both state and federal funds will be utilized on this project. Information received from the Tennessee Department of Environment and Conservation, Division of Natural Heritage (TDEC/DNH) database on September 14, 2001 indicated that the following species could be present in the project impact area:

<u>Species</u>	<u>Status</u>	
	<u>State</u>	<u>Federal</u>
Ashy darter (<i>Etheostoma cinereum</i>)	T	MC
Longhead darter (<i>Percina macrocephala</i>)	T	--
Snail darter (<i>Percina tanasi</i>)	T	LT
Duskytail darter (<i>Etheostoma percnurum</i>)	E	LE
Fine-rayed pigtoe (<i>Fusconaia cuneolus</i>)	E	LE

E – State endangered LE – Federally endangered MC – Candidate for federal listing
T – State threatened LT – Federally threatened

Response from the U. S. Fish and Wildlife Service on January 12, 2000 indicated that the federally endangered Indiana bat (*Myotis sodalis*) could possibly be present in the project impact area. Information from the Service was updated by email on September 27, 2001 and no changes from the January 12, 2000 coordination were indicated.

Due to the possible presence of the above species in the project impact area, informal consultation was initiated. Results of this coordination indicated that a biological assessment would be necessary to evaluate potential project impacts to these species.

PROJECT DESCRIPTION

The existing portion of Pellissippi Parkway (SR-162) has a cross-section consisting of 4 @ 12' traffic lanes, 2 @ 12' paved shoulders and a 48' depressed grass median, all within a minimum 250' right-of-way. The cross-section for the proposed SR-162 extension will be similar to that of the existing. The proposed project will be constructed on new alignment and will require acquisition of additional right-of-way. Total length of the proposed project will be 4.4 miles.

LITERATURE REVIEW

Ashy Darter – *Etheostoma cinereum* State Threatened

Species Description – The ashy darter was first described from near Florence, Alabama in 1845, but has not been recorded from that state since (Clay 1975). Distribution for the ashy darter in the Tennessee River drainage includes the Buffalo, Duck, Emory, and Little rivers (Starnes and Etnier 1980). *Etheostoma cinereum* typically inhabits small to medium upland rivers, occurring locally in areas of bedrock or gravel substrate with boulders, water willow, or other cover with minimal silt deposits (Etnier and Starnes 1993). Depths in these areas are generally 0.5 m to 2.0 m and have sluggish currents (Etnier and Starnes 1993). Etnier and Starnes (1993) indicated that the healthiest known population for this species is located in the Little River, Blount County, Tennessee, from Melrose Mill Dam downstream to SR-33 in Rockford. One of the most productive collection locations described is just downstream of the US-411 bridge (Etnier and Starnes 1993) at Little River Mile (LRM) 17.3. This site is approximately 1.6

miles downstream of where the proposed project will cross a small, unnamed tributary to the Little River. Information from the TDEC/DNH database indicated records for the ashy darter from LRM 13.3 (1970), 14.2 (1968), 17.3 (1976), and 17.6 (1970). These records are all downstream from tributaries that will be crossed by the proposed project.

Longhead Darter – *Percina macrocephala*
State Threatened

Species Description – The longhead darter is widely recorded from the Ohio River drainage but is rare (Clay 1975; Starnes and Etnier 1980; Etnier and Starnes 1993). Starnes and Etnier (1993) indicated that in some years, this species is common in portions of the Little River, Blount County, Tennessee. Habitat for the longhead darter is generally described as larger upland creeks and small to medium sized rivers with good water quality, pools one meter or so deep, and gentle currents that provide silt free bottoms composed of bedrock, boulder, and gravel substrates (Clay 1975; Starnes and Etnier 1980; Etnier and Starnes 1993). Information from the TDEC/DNH database indicates records for *Percina macrocephala* from the Little River near LRM 8.5 (1985), 14.2 (1993), and 16.0 (1974). These records are all downstream of tributaries that will be crossed by the proposed project.

Snail Darter – *Percina tanasi*
Federally Threatened

Species Description – D.A. Etnier and R.A. Stiles discovered the snail darter in the lower Little Tennessee River in 1973 (Etnier 1976). This discovery set in motion an environmental controversy that ascended to the Supreme Court, and is still debated by many today. As a result, the term “snail darter types” has been used to describe “ultra liberal environmentalists”. *Percina tanasi* is generally thought to have inhabited the main channel of the upper Tennessee River and lower reaches of its major tributaries (Starnes and Etnier 1980; Etnier and Starnes 1993). Preferred habitat is described by Starnes and Etnier (1980) as consisting of large free-flowing rivers with extensive areas of clean-swept gravel shoals. Impoundment of the Little Tennessee River by Tellico Dam in 1979 effectively eliminated critical habitat in this area (Starnes and Etnier 1980; Page 1983; Kuehne and Barbour 1983; Etnier and Starnes 1993). However, a transplant population was established in the Hiwassee River in 1976 by TVA biologists, which still persists. Other transplants were attempted in the Nolichucky River (1975), Holston River (1979), and Elk River (1980) but with little success (USFWS 1983). Additional populations of snail darters were discovered in South Chickamauga Creek in Chattanooga (1980) and in Big Sewee Creek in Meigs County, Tennessee (1981) by fisheries biologists (Etnier and Starnes 1993). Several other small populations, represented by only one or a few specimens of *Percina tanasi*, have been discovered in the Sequatchie River in Marion County, Little River in Blount County, lower French Broad River in Sevier County, and lower Paint Rock River in Madison County, Alabama (Etnier and

Starnes 1993). Although the snail darter was listed as federally endangered on October 9, 1975, it was reclassified as federally threatened on July 5, 1984 due to the discovery of additional populations outside the Little Tennessee River (USFWS 1984, 1992). Records from the TDEC/DNH database indicate records for the snail darter from the Little River from LRM 8.5 (1983), LRM 9.4 (2000), LRM 15.9 (2000), and LRM 17.3 (2000). These records are all downstream from tributaries that will be crossed by the proposed project.

**Duskytail Darter – *Etheostoma percnurum*
Federally Endangered**

Species Description – Etnier and Starnes (1993) list four known populations of duskytail darters - Little River, Blount County, Tenn., from the U.S.-411 bridge downstream to just below the SR-33 bridge; the lower several miles of Citico Creek, Monroe County, Tenn., where it is rare; Copper Creek, tributary to Clinch River, Scott Co., Va.; and in the Cumberland River Drainage from the Big South Fork near the mouth of Station Camp Creek, Scott County, Tenn. *Etheostoma percnurum* occurs in pools of larger streams with bedrock rubble substrates. These pools are typically one to three feet in depth and have gently flowing current and are for the most part silt-free (Etnier and Starnes 1993). Records from the TDEC/DNH database indicate records for the duskytail darter from LRM 8.5 (1992), LRM 9.4 (2000), and LRM 17.3 (1992). These records are all downstream from tributaries that will be crossed by the proposed project.

Fine-rayed Pigtoe – *Fusconaia cuneolus*
Federally Endangered

Species Description – The fine-rayed pigtoe is restricted to the Tennessee River drainage except for the Duck River (Bogan and Parmalee 1983). This species occurred in the Clinch River from the mouth upstream to Hancock County; in the Emory River, Roane County and Poplar Creek, Anderson County (both tributaries to the Clinch River); Powell River from Union to Hancock County; and in the Holston River from its mouth in Knox County up to the North Fork Holston River in Sullivan County (Bogan and Parmalee 1983). Bogan and Parmalee (1983) reported that *Fusconaia cuneolus* presently occurs in the upper Clinch, Powell, North Fork Holston and Holston Rivers. Records for this species are also reported from the North Fork Holston, Clinch, Powell, Sequatchie, Elk, and Little rivers in Tennessee by Neves (1991). The fine-rayed pigtoe has also been collected from the mouth of the Nolichucky River, tributary to the French Broad, and from Pistol Creek, a small tributary to Little River in Blount County (Bogan and Parmalee 1983). Information from the TEDC/DNH database indicated records for *Fusconaia cuneolus* from LRM 9.7 (1981) and Pistol Creek (1914) approximately 0.5 mile before its confluence with Little River at LRM 8.1. Neves (1991:274) described the fine-rayed pigtoe as being a “lotic, riffle-dwelling species that usually inhabits ford and shoal areas of rivers with moderate gradient”. Collection of the fine-rayed pigtoe by Hickman (1937) and Ortmann (1925:330) both were from sandy substrates. The fine-rayed pigtoe has been extirpated throughout most of its former range, with the last remaining viable

population in Tennessee occurring in the Clinch (Hancock County) and Powell (Hancock and Claiborne counties) rivers (Parmalee and Bogan 1998).

Indiana Bat – *Myotis sodalis*
Federally Endangered

Species Description – The Indiana bat (*Myotis sodalis*) was placed on the federal endangered species list in 1973. This species occurs in the midwest and eastern United States from the western edge of the Ozark region in Oklahoma to southern Wisconsin, east to Vermont, and as far south as northern Florida (USFWS 1991). Typically, two distinct habitat types are utilized through the course of a given year. During the winter months this species hibernates in limestone caves where temperatures average 3-6 °C with relative humidities of 66-95% (Barbour and Davis 1969). Hibernation generally takes place from October to April, depending on climactic conditions (Harvey and Pride 1986). After emerging from hibernation, the bats disperse. Males apparently spend the summer months in the vicinity of the hibernacula with the location of their daytime whereabouts not known (Hall 1962; LaVal et al. 1977). Females form maternity colonies that are typically located under the loose bark or in cavities of trees (Humphrey et al. 1977; Kennedy and Harvey 1980). These trees generally have a diameter at breast height of six (6) inches or greater (USFWS, pers. comm.). Humphreys et al. (1977) found that foraging habitat for this species was confined to air space from 6'-100' near foliage of riparian and floodplain trees. Cope et al. (1978) indicated that Indiana bats would not fly over open country or open water when flying to a foraging area.

There are records for the Indiana bat from the TDEC/DNH database for Blount County, Tennessee. Coordination with the USFWS also indicated that there are records for this species from Blount County. Barr (1961) and Matthews (1971) recorded numerous caves in Blount County. Harvey and Pride (1986) listed three caves from Blount County that are utilized by *Myotis sodalis* as hibernacula. These are Bull Cave, Kelly Ridge Cave, and White Oak Blowhole Cave and are 9.2, 8.25, and 11.5 miles respectively southeast of the proposed project. All three lie within the Great Smoky Mountains National Park. White Oak Blowhole Cave is one of three caves listed as Critical Habitat for the Indiana bat in the Southeast (USFWS 1991). No known hibernacula for the Indiana bat are present within five (5) miles of the proposed project (Harvey and Pride 1986; Harvey 1992).

FIELD REVIEW

A field review of the proposed project was conducted in September 1997 and again in October 2001. Terrain along the project alignment ranges from somewhat level to quite hilly. Land use is varied in the project area, with the most common uses being pasture for livestock and hay. Cultivated fields of corn, tobacco, and soybeans are also present. Residential lots are prevalent throughout the project area. Wooded sites are scattered throughout the area, ranging from only a few clustered trees to several acres in size. The wooded sites are located either in upland areas too steep for cultivation or along stream drainages. The upland sites contain mixed hardwoods including southern red

oak, post oak, white oak, scarlet oak, blackgum, Virginia pine, loblolly pine, red cedar, dogwood, redbud, yellow poplar, red maple, sugar maple, black cherry, American elm, winged elm, beech, white ash, and persimmon. Wooded sites along area streams contain boxelder, green ash, black willow, sycamore, hackberry, and black walnut.

Several "blue-line" streams will be crossed by the proposed project. These range in size from small trickles to moderately sized flows. Substrates in these channels consist mainly of sand, gravel, and mud. Most of these streams lack canopy at the proposed crossing sites, as they are located in open fields. Livestock have access to a large percentage of these stream lengths. Where canopy is present, it is sparse for the most part, and limited to within a few feet of the top of the streambanks. Most of the proposed crossings will be accomplished as close to perpendicular as possible. However, channel changes will likely be required at three locations.

POTENTIAL IMPACTS

Several streams that are tributaries to the Little River will be crossed by the proposed project. No records for any of the listed species discussed in this assessment were found from these streams. However, the project crossings are only one to two miles upstream from their respective confluences with the Little River, where several listed species are recorded. Construction of the required drainage structures at these stream crossings, along with adjacent earthwork, has the potential to adversely affect the four darters and the mussel of concern.

Installation of drainage structures can result in direct disturbance of stream sediments. Although the proposed work will be accomplished "in the dry", any loose material in the affected channels at the work locations could be released once stream flows are returned to the finished structures. Some of these structures will be long (<200') which will result in a loss of "day-lighted" stream channel. These encapsulated stream sections may be rendered unusable for many aquatic species. These structures could also act as barriers for movement of aquatic organisms both upstream and downstream. Although these are viewed as negative impacts, one positive impact may also be realized. On streams where no canopy is present, especially in open pastures or hayfields, these long structures can provide a definite cooling effect that would not otherwise be available.

Material used to fill over the installed structures could be lost into a given stream unless protective measures are taken. Areas that are cleared and grubbed for the roadway itself can also be a significant source for silt, which could seriously affect the streams that flow through the project. Serious erosion problems could result unless these areas are stabilized in a timely and efficient manner. Any such impacts to these streams could potentially affect the aquatic species present in a negative manner.

Excessive siltation can clog the gills of both fish and aquatic invertebrates. In addition, eggs and larvae of many aquatic species could be smothered. Escape cover, foraging areas, and crucial spawning habitats can be significantly degraded or destroyed. High amounts of silt in the water column can significantly

affect the ability many aquatic species to forage effectively as well by reducing visibility.

While loose soil materials are of great concern, other materials such as mortar, concrete, or petroleum products could enter a stream at these locations and create additional problems. These pollutants could not only degrade crucial habitats, but can also be directly toxic to many aquatic species and their respective forages.

The primary impact that the proposed project could have on the Indiana bat would be cutting of trees suitable for summer roost habitat. Cutting of roost trees could not only affect adult bats, but also the young bats that may be present. This could lead to loss of vital individuals necessary for bolstering the population of this federally endangered species.

Several caves are located in Blount County, three of which are known to be hibernacula for the Indiana bat. However, the closest of these caves is approximately 8.25 miles from the proposed project, and lies inside the Great Smoky Mountains National Park. No known hibernacula for the Indiana bat are present within five miles of the proposed project (Harvey and Pride 1986; Harvey 1992). Therefore, this habitat type will not be affected by project construction.

MEASURES TO MINIMIZE HARM

Installation and maintenance of effective erosion control structures throughout the duration of the project will be essential in prevention of adverse impacts to the aquatic species discussed in this assessment. The use of silt

fence, hay bales, rock checkdams, detention ponds, slope drains, and erosion control blankets are just a few of the measures that can be utilized to reduce the amount of sediment that could enter streams in the project limits. However, these measures must be maintained on a regular basis if they become damaged or ineffective, and as work areas shift through the duration of the project.

Construction of drainage structures will be accomplished "in the dry" so that minimal material is allowed to enter the streams and thus affect aquatic species present. Streams can be temporarily routed through work areas using pipes or open channels with non-erodible liners until the respective structures are completed. Flows can then be returned to the natural channels with a minimum of sediment disturbance. Where stream crossings are required, these will be accomplished as close to perpendicular as feasible to minimize the stream lengths that will be encapsulated.

Equipment staging areas will be located a sufficient distance from streams such that no coolants, lubricants, fuels, or other petroleum products can enter the streams. Waste and borrow areas will be stabilized, seeded, and mulched once they have been completed. Provided these measures for erosion and siltation control are implemented and maintained, no adverse impacts to aquatic species downstream of the project are anticipated.

The most effective measure to avoid adversely impacting the Indiana bat will be to restrict any needed clearing to the months that are outside the known summer roosting period. Coordination with the U.S. Fish and Wildlife Service indicated that the time period between October 15 and March 31 is the optimal

time to accomplish this activity. Not only would this protect the adult bats, but also any young that might be present. Limiting tree removal to this time period should effectively minimize the likelihood of adversely affecting any Indiana bats that could be utilizing the project area.

CONCLUSIONS

There are records for the ashy darter (*Etheostoma cinereum*), longhead darter (*Percina macrocephala*), snail darter (*Percina tanasi*), duskytail darter (*Etheostoma percnurum*), and fine-rayed pigtoe (*Fusconaia cuneolus*) from the Little River, downstream of the proposed project. Although the project will not cross the Little River, it will cross several small tributary streams one to two miles upstream of their respective confluences with Little River. There are no records for any of the above darter species or the mussel species from these tributary streams. Project construction will cause some stream disturbances at the proposed crossing locations. However, installation and maintenance of effective erosion and siltation control measures throughout project construction should minimize the impacts to these streams. Provided the necessary precautions are taken, it is the opinion of TDOT that the proposed project is **NOT LIKELY TO ADVERSELY AFFECT** the ashy darter (*Etheostoma cinereum*), longhead darter (*Percina macrocephala*), snail darter (*Percina tanasi*), duskytail darter (*Etheostoma percnurum*), or the fine-rayed pigtoe (*Fusconaia cuneolus*)

Information from the U.S. Fish and Wildlife Service indicated that the Indiana bat (*Myotis sodalis*) could be present within the project impact area.

Review of available information indicated no records for this species from within five miles of the proposed project. In addition, no known hibernacula for the Indiana bat are present within five miles of the proposed project. Although some suitable summer roost habitat does appear to be present in the project area, very little will be affected by project construction. Even if a suitable tree is removed, there are sufficient trees left outside the project limits to accommodate any Indiana bats that may utilize this area. Therefore, it is the opinion of TDOT that the proposed project is **NOT LIKELY TO ADVERSELY AFFECT** the Indiana bat.

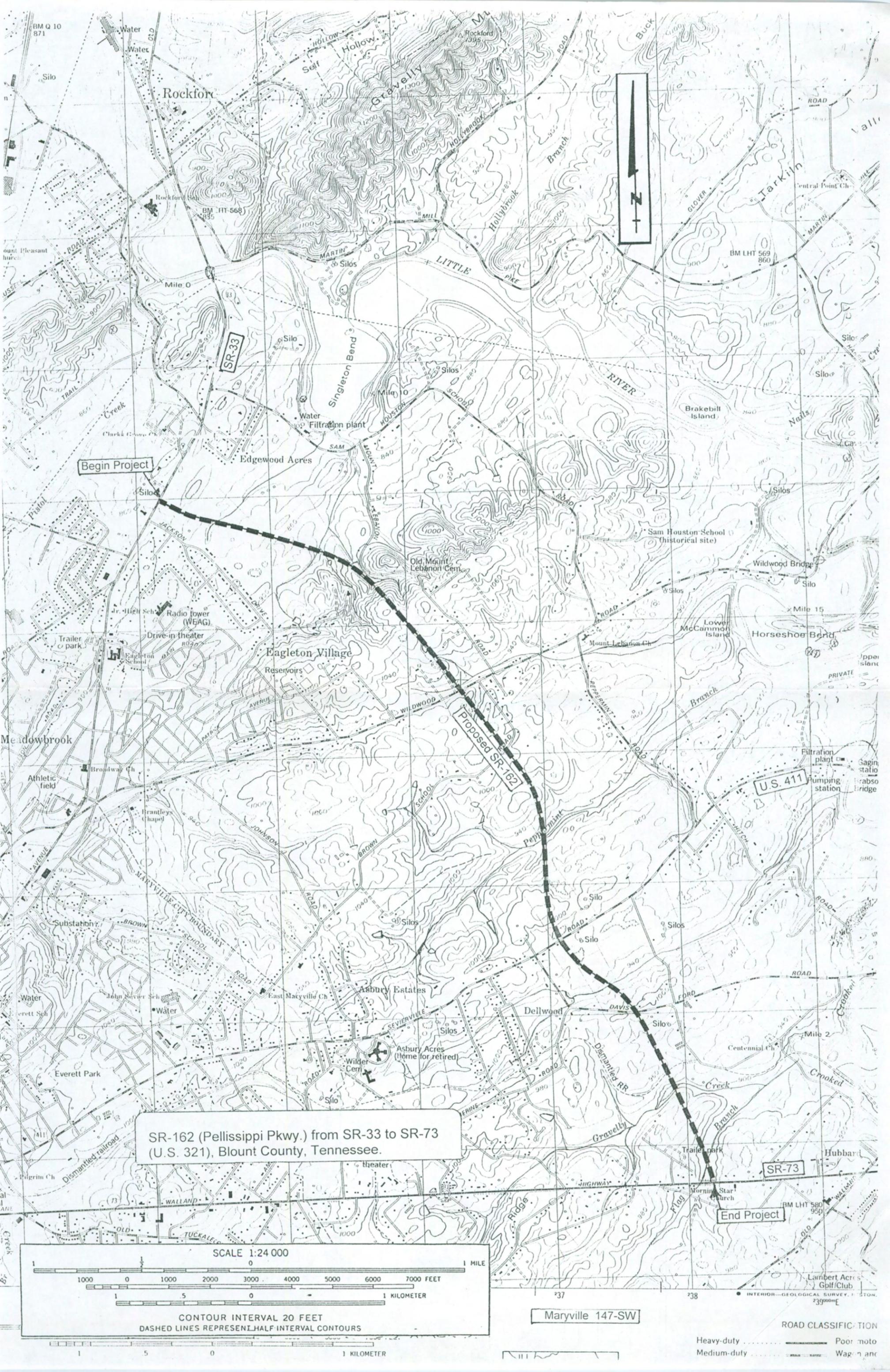
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Begin Project

Proposed SR-162

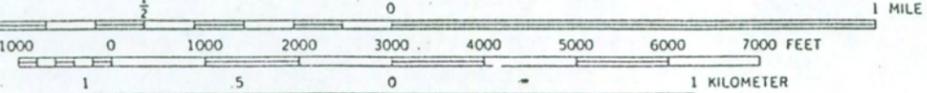
U.S. 411

SR-73

End Project

SR-162 (Pellissippi Pkwy.) from SR-33 to SR-73
(U.S. 321), Blount County, Tennessee.

SCALE 1:24 000



CONTOUR INTERVAL 20 FEET
DASHED LINES REPRESENT HALF INTERVAL CONTOURS

Maryville 147-SW

ROAD CLASSIFICATION

Heavy-duty Poor: moto
Medium-duty Wagon and

INTERIOR GEOLOGICAL SURVEY

Appendix F
Agency Concurrence Letters



United States Department of the Interior

FISH AND WILDLIFE SERVICE

446 Neal Street
Cookeville, TN 38501

February 5, 2002

DEPT. OF TRANSPORTATION
RECEIVED

FEB 28 2002

SURVEY & DESIGN OFFICE
KNOXVILLE

Ms. Leigh Ann Tribble
Area Engineer
Federal Highway Administration
640 Grassmere Business Park, Suite 112
Nashville, Tennessee 37211

Re: FWS# 00-0663

Dear Ms. Tribble:

Fish and Wildlife Service personnel have reviewed the biological assessment for four federally listed species and two federal "Species of Management Concern," submitted on December 5, 2001, for the proposed construction of the S.R. 162 extension (Pellissippi Parkway), in Blount County, Tennessee. We provide the following comments in accordance with Section 7 of the Endangered Species Act (as amended).

We concur with the biological assessment conclusion of "not likely to adversely affect" for the Indiana bat (*Myotis sodalis*), provided that no forested areas along the project corridor are cleared between October 15 and March 31. If this recommendation is acceptable and incorporated into the project contract, we believe that the requirements of Section 7 of the Endangered Species Act (Act) for the Indiana bat have been fulfilled. However, obligations under Section 7 of the Act must be reconsidered if: (1) new information reveals that the proposed action may affect this species in a manner or to an extent not previously considered or (2) the proposed action is subsequently modified to include activities which were not considered in this biological assessment. If the tree-clearing limitation is unacceptable, please notify us and Section 7 consultation on the Indiana bat will continue.

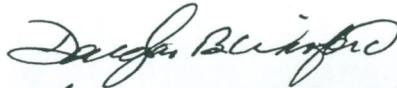
We are unable to occur with the assessment's determination of "not likely to adversely affect" for the snail darter (*Percina tanasi*), the fine-rayed pigtoe (*Fusconaia cuneolus*), or the duskytail darter (*Etheostoma percnurum*). While we agree that the Division of Natural Heritage has no records of these species from the proposed project corridor, we note that the Division's collection records may not be all-inclusive. The Heritage data are a compilation of collection records made available by various individuals and resource agencies. This information is seldom based on comprehensive surveys of all potential habitat and thus does not necessarily provide conclusive evidence that protected species are present or absent at a specific locality. Three of the larger Little River tributaries that would be crossed by the proposed project, Gravelly Branch, Peppermint Creek, and Flag Branch, may be of sufficient size and quality to contain these rare fishes and mussels.

We recommend that these streams be surveyed for suitable habitat for these species. The surveys should include color photographs of the stream reaches that are to be crossed by the S.R. 162 extension. If suitable habitat (clean swept gravel and sand, perennial flow, and low turbidity) is encountered, we recommend that you perform a fish and mussel survey to better determine the presence or absence of listed species. The results of the surveys should be transmitted to this office for review and concurrence.

We appreciate your attention to two federal "Species of Management Concern," the ashy darter (*Etheostoma cinereum*) and the longhead darter (*Percina macrocephala*). While these species are not federally protected, they are ostensibly rare and we appreciate any measures that you may take to avoid impacts to individuals and their habitat.

Your interest in the protection of endangered and threatened species is greatly appreciated. If you have questions or if we can be of further assistance, please contact Rob Tawes of my staff at 931/528-6481, ext.213.

Sincerely,



fa Lee A. Barclay, Ph.D.
Field Supervisor

xc: Lilah Miller, TDOT, Nashville
Dan Sherry, TWRA, Nashville
Reggie Reeves, TDEC, Nashville



United States Department of the Interior

FISH AND WILDLIFE SERVICE

446 Neal Street
Cookeville, TN 38501

April 16, 2002

Ms. Leigh Ann Tribble
Area Engineer
Federal Highway Administration
640 Grassmere Business Park, Suite 112
Nashville, Tennessee 37211

Re: Construction of State Route 162 (Pellissippi Parkway) from State Route 33 to State Route 73 (US 321)

Dear Ms. Tribble:

Thank you for your letter and enclosure of March 7, 2002, transmitting additional information regarding the proposed construction of the Pellissippi Parkway from State Route 33 to State Route 73 in Blount County, Tennessee. Fish and Wildlife Service biologists have reviewed the information submitted and we offer the following comments.

Based on the information provided by Dr. David Etnier and Steven Ahlstedt about habitat conditions required by the snail darter (*Percina tanasi*), duskytail darter (*Etheostoma percnurum*), and fine-rayed pigtoe (*Fusconaia cuneolus*), we concur that the proposed crossings of Peppermint Branch, Gravelly Creek, and Flag Branch are not likely to adversely affect these listed species. In view of this, we believe that the requirements of Section 7 of the Endangered Species Act have been fulfilled. Obligations under Section 7 must be reconsidered, however, if: (1) new information reveals that the proposed action may affect listed species in a manner or to an extent not previously considered, (2) the proposed action is subsequently modified to include activities which were not considered during this consultation, or (3) new species are listed or critical habitat designated that might be affected by the proposed action.

Although it is likely that none of the three listed species considered in this consultation occur in the tributaries to be crossed by the proposed project, we concur that Best Management Practices for sediment control should be employed and strictly enforced during construction to prevent potential effects to these species in the Little River.

Thank you for providing additional information about the federally listed species addressed during planning of the proposed project. Your concern for the protection of listed species is greatly appreciated. If you have any questions, please contact Jim Widlak of my staff at 931/528-6481, ext. 202.

Sincerely,

A handwritten signature in black ink, appearing to read "Lee A. Barclay". The signature is written in a cursive style with a large initial "L".

Lee A. Barclay, Ph.D.
Field Supervisor

xc: Ms. Lilah Miller, TDOT, Nashville, TN

Appendix G
Preliminary Geologic Report



STATE OF TENNESSEE
TENNESSEE DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING SECTION
6601 CENTENNIAL BOULEVARD
NASHVILLE, TENNESSEE 37243-0360

February 17, 2009

Mr. Tom Love, Transportation Mgr. 1
Environmental Planning
9th floor – James K. Polk
505 Deaderick Street
Nashville, TN 37243

RE: Project No. 05097-1226-04
Pin No. 104213.00
Pellissippi Parkway Extension (SR-162) from
SR-33 to SR-73 (321) alternates A, C, and D
Blount County

Dear Mr. Love:

Enclosed is the Geotechnical Report on the above project.

If additional information is needed, please advise.

Sincerely,

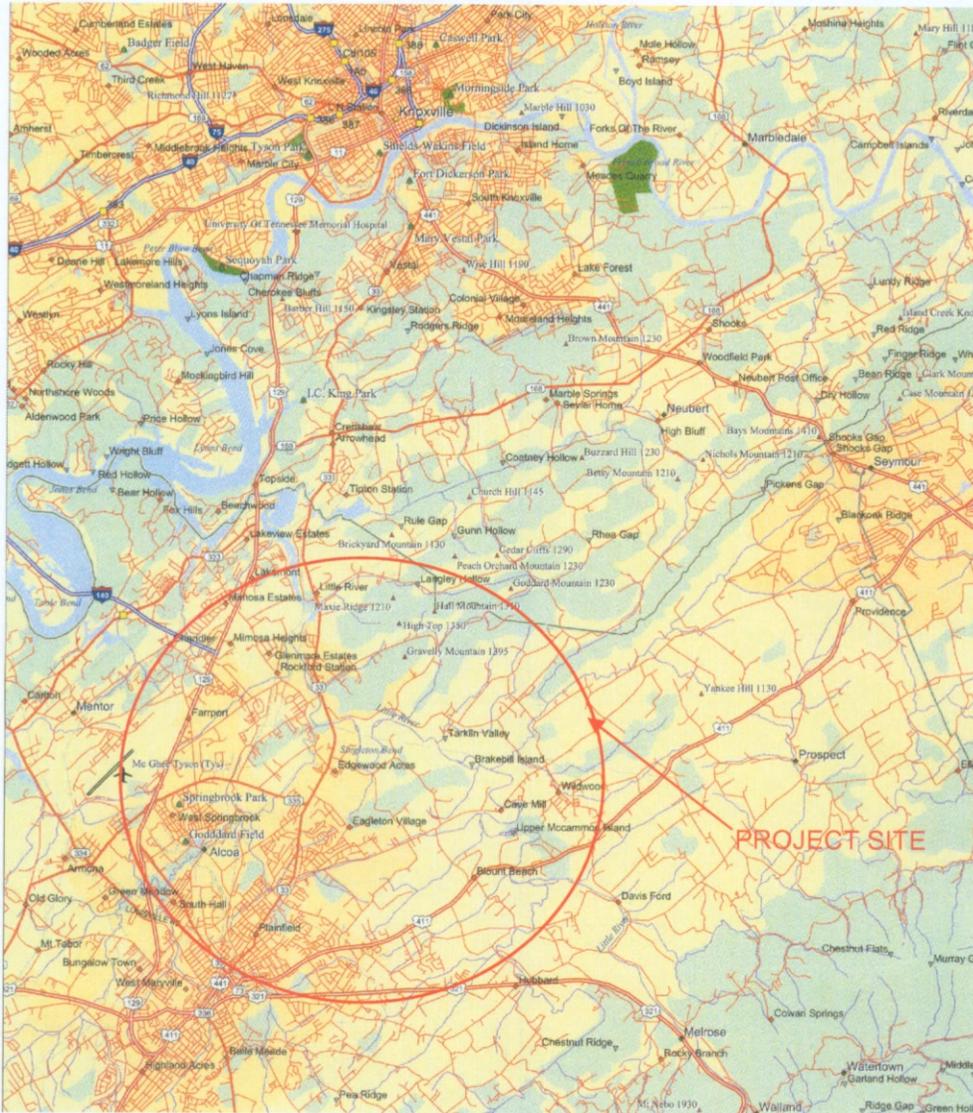
A handwritten signature in blue ink, appearing to read "MLO", written over a circular stamp.

M. Leonard Oliver, P.E.
Civil Engineering Manager 2

MLO:CJW
Enclosure

cc: Harry Moore

GEOLOGICAL REPORT
PRELIMINARY
PELLISSIPPI PARKWAY EXTENSION (SR-162)
FROM SR 33 TO SR73 (321)
ALTERNATES A, C, AND D
STATE PROJECT NO. 05097-1226-04
PIN NO. 104213.00
BLOUNT COUNTY



PRELIMINARY GEOLOGIC REPORT
PELLISSIPPI PARKWAY EXTENSION (SR 162)
FROM SR 33 TO SR 73 (US 321), BLOUNT COUNTY (ALTERNATES A, C, & D)

PROJECT NO. 05097-1226-04
GES FILE NO. 0505508
PIN 1014213.00

EXECUTIVE SUMMARY

A Preliminary Geologic Report has been prepared to address the proposed Pellissippi Parkway Extension (SR 162) project in Blount County. The extension will connect the Parkway's present terminus at SR 33 (Old Knoxville Highway/Maryville Pike) with SR 73 (US 321/East Lamar Alexander Parkway). Three options are being considered for the extension of Pellissippi Parkway. Limited field inspections of the three Alternate Routes (A, C, and D) were conducted by driving reconnaissance in December 2008 and January 2009. Functional plans and various maps were also referenced during the desktop phase of the study. A figure illustrating the proposed Alternate Routes is provided in the attachment.

Topography varies considerably throughout the project site, ranging from nearly level to steeply rolling terrain, and will require the implementation of cut slopes and fill embankments where appropriate in order to construct the proposed roadway. The cuts and fills will require consideration upon selection of the final alignment. They are assumed to be generally minor to moderate in height and thickness, respectively, although more substantial cuts are expected in the steepest terrain.

Based on the results of the preliminary geologic study, there do not appear to be any significant geotechnical issues that can not be addressed during the design or construction phases of the proposed project.

PRELIMINARY GEOLOGIC REPORT
PELLISSIPPI PARKWAY EXTENSION (SR 162)
FROM SR 33 TO SR 73 (US 321), BLOUNT COUNTY (ALTERNATES A, C, & D)

PROJECT NO. 05097-1226-04
GES FILE NO. 0505508
PIN 1014213.00

INTRODUCTION AND BACKGROUND

Pursuant to a request received by the Geotechnical Engineering Section from the Environmental Planning Office, the Preliminary Geologic Report presented herein has been prepared to address the proposed Pellissippi Parkway Extension project and the three associated Alternate Routes under consideration. Limited field inspections of the proposed roadway alternates were conducted by driving reconnaissance in December 2008 and January 2009. Functional plans and geologic and topographic maps were utilized as sources of information.

Alternate A is the western-most of the three alignments, and it is generally parallel with the first half or so of Alignment C, from their common origin to a point of divergence just south of Wildwood Road. Both of these alternates are proposed four-lane divided routes with 300-foot Rights of Way. The alignments are generally cross-country, with variable areas of residential and commercial development being encountered, and follow no particular existing roadway. Several roadways intersect these proposed alignments.

Alternate D is the eastern-most alignment, with its origin located further north of the other two alternates. It is a proposed two-lane arterial route with 150-foot Right-of-Way. Alternate D initially follows the general route of the existing Sam Houston School Road, with a southern departure at Wildwood Road and subsequent intermittent

overlap with both Peppermint Road and Hitch Road. A very brief overlap is shared with Alternate C, immediately north of Davis Ford Road. The alignment is partially cross-country, with some residential and commercial development being encountered. Several roadways intersect the proposed alignment.

A fourth alignment, Alternate B, was previously proposed as an additional, eastern-most alternate. However, according to the design consultant, it was dismissed from further consideration and is not discussed in this report. A figure illustrating the proposed Alternate Routes is provided in the attachment.

GEOLOGY AND SITE CONDITIONS

The proposed project site is located within the varied topography of the Valley and Ridge Physiographic Province, in the north central portion of Blount County. The regional topography is dominated by alternating linear valleys and ridges that strike generally northeast to southwest. Topography within the project area ranges from rolling to hilly terrain, and from nearly level to moderately steep slopes. Much of the project area is underlain by grass-covered fields, and to a lesser extent wooded areas, with varying degrees of residential and commercial development throughout.

The Little River is located to the east-northeast of the project area, and drains a considerable portion of the regional area.

Geologic data were derived from the site investigation and from review of available geologic maps. Geologic mapping indicates that the proposed project vicinity is underlain by limestone and dolostone to calcareous shale and clastic shale bedrock. The geology of the area is relatively complex, with a number of minor and major thrust

faults being present, resulting in the repetition of several geologic formations at the ground surface.

Residual soils developed from weathering of the underlying geologic parent materials range in thickness from a thin mantle cover to a relatively thick layer of several feet. Additionally, karst topography with sinkhole features is present within the project area. A review of topographic mapping indicates a few areas of sinkholes that could possibly impact the proposed alignments. It must be noted that sinkholes may be encountered during construction of any of the alternate routes.

The greatest number of mapped sinkholes is located along SR 35/US 411 (Sevierville Road), from east of Davis Ford Road to east of Hitch Road, and primarily to the south of Sevierville Road. Short segments of all three alternates could possibly be affected by the presence of sinkholes in these areas.

A smaller number of mapped sinkholes is present along the northern half of Peppermint Road, which could affect a short segment of Alternate D.

A large sinkhole is mapped on the north side of Brown School Road, near its eastern intersection with Wildwood Road. The concurrence point of Alternates A and C lies within this sinkhole, and flooding was observed during a field reconnaissance in early January 2009 (further discussed below). Periodic flooding in this area may be an issue in the evaluation of these alternates. Areas of mapped sinkholes of potential interest to the project are tentatively defined in Figure 1 (attached).

Vegetation along the proposed alignments ranges from grass cover to wooded areas. Several small streams are located along the alignments, with generally shallow banks with light to moderate vegetation. A number of small ponds are present, with a few being located within the limits of the proposed alignments.

The greatest cuts are expected at the beginning of Alternates A and C, particularly within the ridge located west of Old Mount Lebanon Road and east of Jackson Heights Road. Moderate to steep cuts may be encountered throughout these alignments, with less steep cuts being anticipated along Alternate D. Minor to moderate fills are also to be expected.

RECOMMENDATIONS

As is conventional practice, a subsurface investigation program with auger drilling and potential core drilling should be conducted along the finalized alignment.

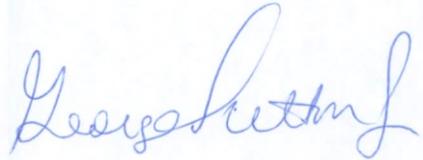
The topography encountered along each of the proposed alignments is varied, and a range of minor to moderate cuts and fills are anticipated.

Although no specific areas of unstable ground were observed, there is always the potential for slope stability problems to exist throughout the proposed alignments, both in soil and in rock. Detailed evaluation of the actual slope conditions, particularly within cut slopes in steep rocky terrain, will be necessary prior to determination of actual stability analyses and slope geometry. However, it appears that any slope stability problems, should they exist, may be addressed either during the design phase or the construction phase of the finalized alignment. Cut slopes in soil and rock that are anticipated to be higher than about 30 feet in elevation should be considered as candidate slopes for benching.

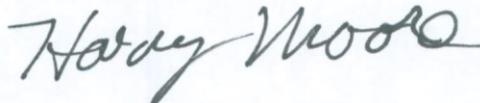
Limited areas of flooding were observed immediately north of East Brown School Road during a field reconnaissance in early January 2009. The flooded area involved the centerline of Alignments A and C at their concurrence point, both left and right of centerline. The flooding was due to the extensive and significant rainfall events that

occurred prior to January 9 across the region. The potential for flooding in the future should be considered as these alignments are being evaluated. In addition, several small streams and a few ponds throughout the project area will require consideration.

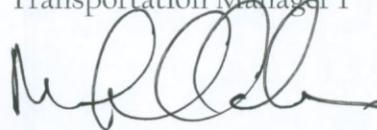
If further information is needed regarding the soil and geologic conditions along the proposed roadway alignments, please contact the Region I Geotechnical Engineering Office.



George E. Sutton, Jr., PG
Geologist 3



Harry Moore, PG
Transportation Manager 1



M. Leonard Oliver, PE
Civil Engineering Manager 2

GS:kw
January 26, 2009

FIGURES

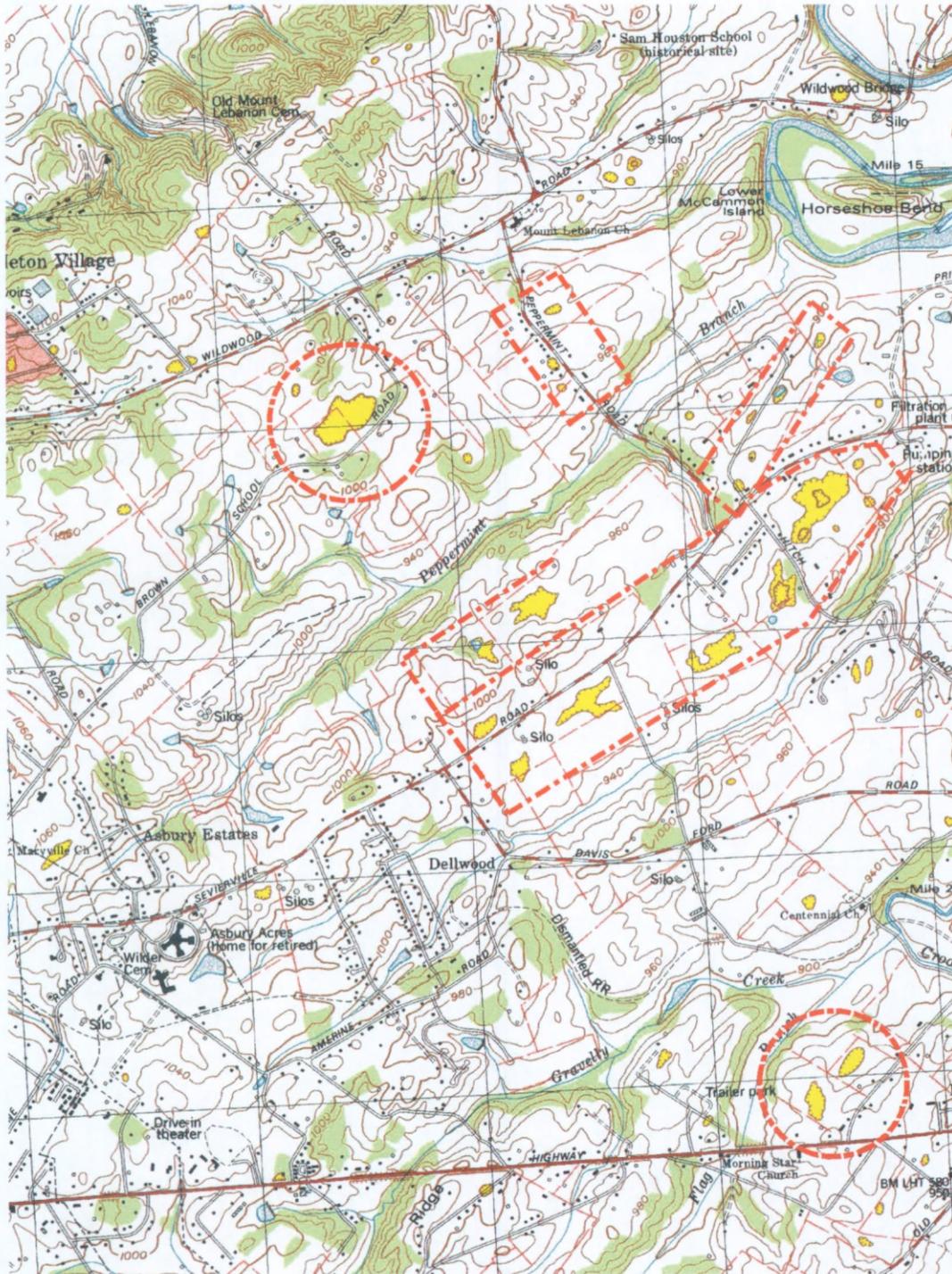


Figure 1: Sinkholes (in yellow) of potential interest to the project. Areas of karst are generally outlined with dashed red lines (from USGS 7.5-minute Maryville Quadrangle).

FIGURES



Figure 2: Area of flooding northwest of East Brown School Road, just west of its intersection with Talbott Lane.



Figure 3: Enlargement of area of flooding shown in Figure 2.

FIGURES



Figure 4: Relatively flat to gently sloping meadow, southeast of East Brown School Road, west of Talbott Lane (viewing opposite direction from Figure 2).



Figure 5: Typical rolling topography, viewing northwest from Wildwood Road at East Brown School Road intersection.

FIGURES

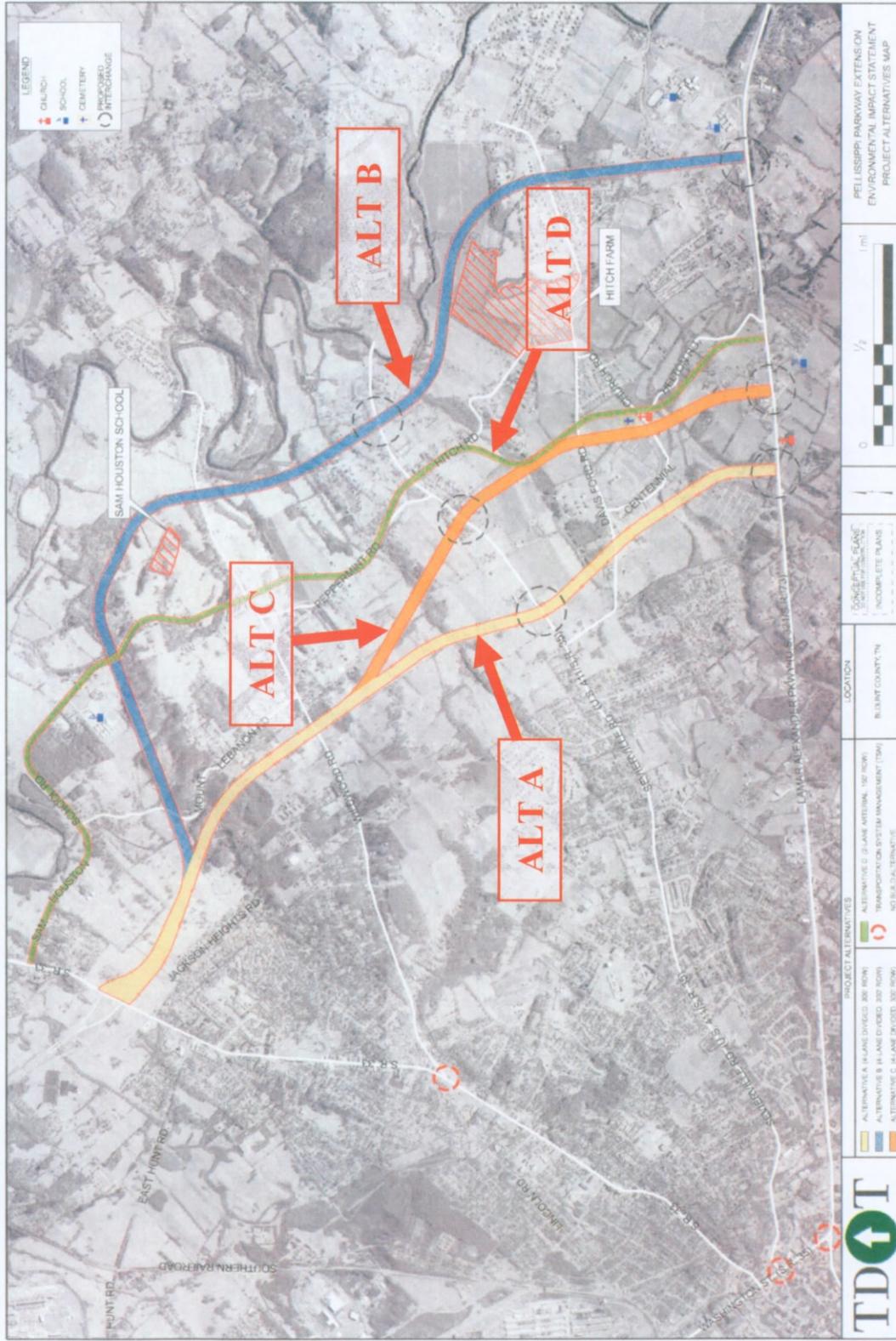


Figure 6: Conceptual Plan indicating four (4) originally proposed Alternate Routes (A, B, C, and D).