APPENDIX K

ECOLOGY REPORTS, 2012 - 2014

June 2014 Ecology Report

July 2013 Addendum to 2009 Ecology Report

July 2013 Biological Assessment

2012 Indiana Bat Mist Net and Acoustical Survey Report

Ecology Report

Blount County, Tennessee

Project: SR-162 EXT; Pellissippi Parkway,
From SR-33 to SR-73 (US-321); Alternative C and D; TDOT Region I;
P.E. 05097-0229-14; PIN: 101423.00

(Roadway – Document Phase)
Study of Alternatives C and D

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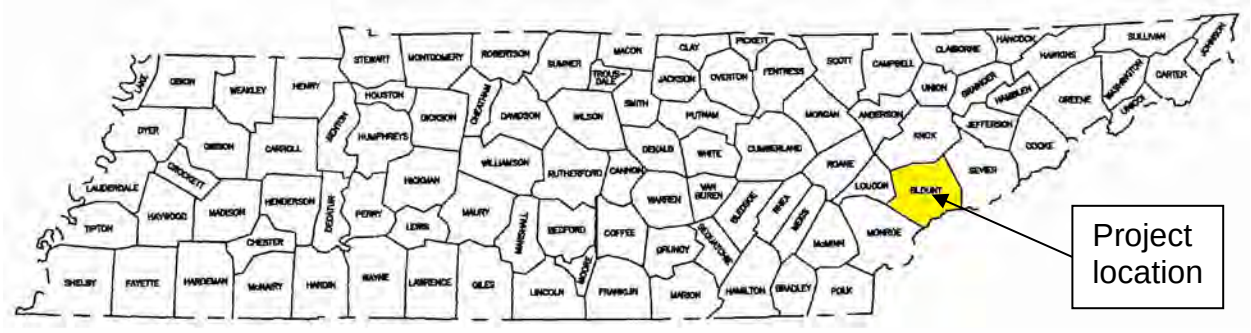

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Introduction

Studies to determine the impacts of the proposed alignment on the local ecology were conducted by Civil & Environmental Consultants, Inc. (CEC) Biologists Jose Garcia and Casey Hertwig from May 6-7, 2014. Studies included literature and database surveys as well as pedestrian reconnaissance. Particular attention was given to locating streams, wetlands, and specialized habitats such as glades, caves, springs, and sinkholes which could harbor protected species or influence water quality (See Appendix A).

Project Type

In 2009, a survey of the alternatives evaluated in the project's Draft Environmental Impact Statement, was conducted. Three Build Alternatives (A, C and D) were investigated in addition to the No-Build Alternative. The results of that study are document in the 2009 *Ecology Report* (Parsons Brinckerhoff, revised March 2010). DEIS Alternative A, which was selected as the Preferred Alternative in 2012, and two modifications of the Preferred Alternative (West Shift and East Shift) have been evaluated in a separate report, (Parsons Brinckerhoff, Addendum to the 2009 Ecology Report. *Addendum to the 2009 Ecology Report,* June 2013).

DEIS Alternatives C and D are the subject of this investigation. At the time of these studies, Alternative C is proposed to extend from just south of the intersection of Wildwood Road and Mount Lebanon Road to SR-73 (US-321) in Blount County. Alternative D is proposed to extend from SR-33 at Sam Houston School Road to SR-73 (US-321) in Blount County. Alternative C involves new alignment and Alternative D involves both existing and new alignment. Alternative C 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. The facility type anticipated for this alternative is 4 travel lanes, 2 in each direction, with a 300' ROW. 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. The facility type anticipated for this alternative is a 2-lane arterial with 150' ROW.

Project Setting

The proposed project is located in north central Blount County. It is shown on the USGS 7.5 minute topographic quadrangle in Maryville, TN (147-SW). This project is located within the Valley and Ridge physiographic unit (Miller, 1974), and is underlain by dolomite, limestone, shale, chert, siltstone, and sandstone; Ordovician-Cambrian periods.

Soils along the proposed project in Blount County are derived from the Dewey-Decatur-Dunmore Association, Dunmore-Pace-Greendale Association, Sequoia-Litz-Hamblen Association, and the Farragut-Sequoia Association. The Dewey-Decatur-Dunmore Association makes up about 22 percent of the county. It is important to the agriculture of

the area because it has a large acreage of suitable cropland. The area is prevailingly rolling to hilly and has a very irregular pattern of dendritic drainage that is modified by sinks and subterranean streams. The Dunmore-Pace-Greendale Association is underlain by dolomitic limestone, which ranges from low to moderately high grade. The topography, dominantly rolling to hilly, is characterized by short hillslopes with broad smooth tops. The drainage pattern is dendritic and highly irregular. It is modified by sinks and subterranean streams. Because of these subterranean streams, a large part of the area has no surface water. The Sequoia-Litz-Hamblen Association occupies about 10 percent of the county. It consists predominantly of soils that are shallow and moderately deep over leached shale. The area is rolling to hilly and has short, moderately steep slopes with rather broad, gently sloping and rolling tops. It has a well-defined pattern of dendritic drainage. The Farragut-Sequoia Association occupies undulating to rolling valley positions. This association consists of moderately deep and deep soils overlying shale or shaly limestone. Areas in this association make up about 1 percent of the county. (USDA NRCS Soil Survey of Blount County, Tennessee 1959).

This project is located in the Southern Limestone/Dolomite Valleys and Low Rolling Hill**s** Ecoregion (67f) and the Southern Shale Valleys Ecoregion (67g). The Southern Limestone/Dolomite Valleys and Low Rolling Hills form a heterogeneous region composed predominantly of limestone and cherty dolomite. Landforms are mostly low rolling ridges and valleys, and the soils vary in their productivity. Landcover includes intensive agriculture, urban and industrial, or areas of thick forest. White oak forests, bottomland oak forests, and sycamore-ash-elm riparian forests are the common forest types, and grassland barrens intermixed with cedar-pine glades also occur here. The Southern Shale Valleys consist of lowlands, rolling valleys, and slopes and hilly areas that are dominated by shale materials. Small farms and rural residences subdivide the land. The steeper slopes are used for pasture or have reverted to brush and forested land, while small fields of hay, corn, tobacco, and garden crops are grown on the foot slopes and bottom land.

Terrestrial Ecology

Most of the land in the project corridor has been disturbed at one time or another. Some of the land is forested or in scrub/shrub thickets. There are also many habitats in early stages of succession; and also, commercial and residential lands which have limited habitat values.

Plant communities found in the area are characteristic of communities formed over limestone and sandstone. Different communities may develop on different limestone and sandstone strata; elevation differences also have an influence. The forested plant community includes hackberry, black walnut, box elder, American elm, white oak, and hickory. 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, and an assortment of insects.

Old-field habitats in various stages of succession are also useful to many types of wildlife. These areas are most often dominated by grasses and legumes, multiflora rose, Japanese honeysuckle, and privet. The commercial and residential lands generally have limited wildlife value, as they are usually paved or mowed, except for undisturbed vegetation along fencerows or boundaries. Agricultural lands in the area have slightly better wildlife values with perhaps more cover and food opportunities.

Terrestrial Effects:

Direct effects: For Alternative C, the loss of approximately 15.7 acres of forested habitat is the most significant impact. For Alternative D, the loss of approximately 19.92 acres of forested habitat is the most significant impact. There will be direct long-term adverse impacts when productive forests are converted to roadway. Bat habitat along the construction corridors will be permanently removed. However, impacts to the organism should be temporary as they will move to other forested areas nearby. Scrub/shrub habitat located along the construction corridor will also be removed. 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 (disease, habitat degradation or elimination, etc.), then traffic-related mortality can contribute to the demise of the population. Highway noise can affect the utilization of habitats by wildlife. Since this is primarily an urban/rural project that connects two state highways, and intersects other local highways, noise is already a factor within existing habitats. After project construction, areas that remain undisturbed within highway rights-of-way (ROW) will, over time, provide some degree of refuge for local wildlife as the surrounding areas continue to urbanize and habitats are destroyed.

Indirect effects: The plant communities found along the project corridor serve as shelter, nesting, and foraging habitat for area wildlife. Loss of habitat initially displaces wildlife from the area, forcing them to concentrate into a smaller area, which causes over-use of the habitat. This ultimately lowers the carrying capacity of the remaining habitat and can be manifested in some species as becoming more susceptible to disease, predation, and starvation. These indirect impacts are anticipated to be minimal as a result of the proposed project because adequate habitat for the maintenance of populations that will be displaced is present adjacent to the project area.

Cumulative effects: In a mixed urban/rural area such as the proposed alignments for Pellissippi Parkway, the amount of forested habitat is relatively small. For Alternative D, the section of the project south of Wildwood Road (new alignment), will have the most negative terrestrial impacts. The section of Alternative D that is north of Wildwood road is proposed to run along the existing Sam Houston School Road so terrestrial impacts in this area would be minor/temporary. The Alternative C corridor consists of new alignment only. The majority of forested habitat in Alternative C is located north of Davis Ford Road and is primarily located along the floodplain of streams. Impacts in this area will have the most negative terrestrial impacts for Alternative C. After project construction, areas that remain undisturbed within the rights-of-way will, over time,

provide refuge for local wildlife as the surrounding area continues to urbanize and habitats are destroyed.

Table 1. Total terrestrial habitat acreages potentially affected per alternative (estimated)*

Alternative (or quadrant)	Forested, scrub/shrub, forested floodplain	Pasture, agricultural, or early stages of old-field succession	Commercial/ Industrial/ Residential	Total acres per alternative
Alternative C	15.7	61.77	20.77	98.23
Alternative D	19.92	48.04	45.16	113.13

*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 used for project construction. Not all of the habitat amounts shown will actually be disturbed, since lands outside those needed for actual construction or work zones or for other reasons will not be cleared.

AQUATIC ECOLOGY

The project has been located, and the chosen alternatives will be designed, to avoid major impacts to waters of the state to the extent practicable. Efforts to further minimize impacts will continue throughout the design, permitting, and construction processes. Unavoidable impacts will be mitigated as required by applicable laws and regulations. Mitigation will be discussed further in the sections applying to streams and wetlands. In an effort to minimize sedimentation impacts, erosion and sediment control plans will be included in the project construction plans. TDOT will also implement measures as described in 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 (bridge) improvement.

Streams, Springs, and Seeps, and other Waterbodies: Streams, springs, seeps, impoundments and other watercourses and waterbodies which are known at this time to be potentially affected by the project are listed in Tables 2 & 3 of this report. Potential direct impacts to these resources are also listed. The determinations as to which are waters of the State and/or of the U.S. have not been confirmed by either the Tennessee Department of Environment and Conservation (TDEC) or the U.S. Army Corps of Engineers (Corps). All aquatic impacts identified as project development continues will be avoided, minimized, or mitigated to the extent possible, and incorporated into the permitting.

Direct effects: Alternative C will, or could potentially impact five streams, and four wet weather conveyances. Alternative D will, or could potentially impact ten streams, eight wet weather conveyances, three ponds, and one sinkhole. It is difficult to determine the exact impact type at these sites with our current information; therefore, the information in Tables 2 & 3 represents the anticipated worst-case impact, with the assumption that these impacts will be reduced, where possible, during further project design. It appears that some of the streams will be crossed and existing culverts replaced or extended.

Any project related impacts to aquatic resources within the project limits will be mitigated as required by the appropriate permitting agency/ies. Please refer to Appendix A for field data sheets, locations, and photos of the above-mentioned aquatic resources.

Indirect effects: The implementation of the proposed alignment could add some sedimentation impacts; these impacts will be minimized by good sediment control planning and implementation.

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

Mitigation: Stream channels requiring relocation or channelization will be replaced on-site to the extent possible, using techniques that will replace existing stream characteristics such as channel profile, elevation, gradient, and tree canopy. Use of "Natural Channel Design" may be required if the portion of affected stream is generally >200 feet long. Stream or water body impacts that cannot be mitigated on site, such as impacts of culverts > 200 feet, or impacts to springs or seeps which require rock fill to allow for movement of water underneath the roadway, will either be mitigated off-site by improving a degraded system or by making a comparable payment to an in-lieu-fee program or mitigation bank which will perform such off-site mitigation under the direction of state and federal regulatory and resource agencies.

WETLANDS: One wetland was identified on Alternative C and one wetland was identified on Alternative D during the site visit (Tables 2 & 3). These potential wetlands were evaluated using the criteria established in the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: *Eastern Mountains and Piedmont*. Location and size of the areas were estimated; therefore, a survey to determine the exact size and location within the project ROW is needed.

Direct Impacts: Direct wetland impacts are shown in Tables 2 & 3. Efforts will be made during further project design to avoid or minimize impacts as much as possible. Wetlands located within the cut or fill lines will likely be destroyed and will be mitigated for as required by the appropriate permitting agency/ies.

Indirect Impacts: The drainage patterns of the remaining (unfilled) wetland areas may be affected and this could result in localized changes in water levels and vegetation patterns. Efforts will be made during further project design to minimize these effects.

Cumulative Impacts: The project could potentially destroy any of the area within cut or fill lines and may have additional impacts (see indirect impacts) on the remaining wetland area.

Avoidance of Wetland Impacts: The proposed alignment will include new roadway as well as an expansion of the existing roadway. As such, direct and/or indirect impacts may occur.

Minimization: As project design proceeds, further efforts will be made to minimize impacts to wetlands remaining outside the ROW and to reduce impacts to drainage patterns and water levels.

Mitigation: Mitigation is required for all wetland impacts which do not meet requirements for general Aquatic Resource Alteration Permits (State of Tennessee) or for certain Nationwide Section 404 permits (U.S. Army Corps of Engineers). The minimum replacement ratio for wetlands is 2:1 and may be higher depending on hydro-geomorphic analyses or whether optimum mitigation sites are unavailable. The first option for any substantial replacement mitigation is on-site (near the project, and within the watershed). The mitigation option most favored by regulatory agencies is that of restoration of a former wetland. Enhancement of an existing but degraded wetland may also be an option, but higher replacement ratios are generally required. Both the site selection and the mitigation, when proposed, will be subject to the approval of regulatory agencies. In the event that no acceptable mitigation site can be obtained locally, the regulatory agencies may allow mitigation further away, or allow use of credits in a mitigation bank.

Table 2. Alternative C - Ecological features including streams, watercourses, springs, seeps, wetlands, ponds, and sink holes located within the estimated impact area.

Map Label/ Feature Name	Lat/Long	Feature Designation	Potential Impact	Estimated Impact Quantity	ETW or ONRW (Y/N)	303d Listed (Y/N) Reason for Listing
WWC-1	N35.78467971 W83.90951683	Wet weather conveyance	Fill/runoff	~420’	N	N
WWC-2	N35.78391114 W83.90829976	Wet weather conveyance	Fill/runoff	None	N	N
STR-1 (Peppermint Branch)	N35.78303418 W83.90595703	Perennial stream	Crossing/ encapsulation/ fill	~450’	N	Y - Siltation
STR-2	N35.78283476 W83.90584282	Perennial stream	Fill/runoff	~100’	N	N
STR-3	N35.77526235 W83.89413778	Intermittent stream	Crossing/ Encapsulation/ Fill	~320’	N	N

Map Label/ Feature Name	Lat/Long	Feature Designation	Potential Impact	Estimated Impact Quantity	ETW or ONRW (Y/N)	303d Listed (Y/N) Reason for Listing
STR-4 (Gravelly Creek)	N35.76485954 W83.89032228	Perennial stream	Crossing/ Encapsulation/ Fill	~325’	N	Y - Siltation
STR-5 (Flag Branch)	N35.76411882 W83.89121303	Perennial stream	Runoff	None – off ROW	N	Y - Siltation
WWC-3	N35.76359396 W83.89139799	Wet weather conveyance	Runoff	None – off ROW	N	N
WTL-1	N35.76334256 W83.89088476	Wetland	Fill/runoff	~ 0.002 acres	N	N
WWC-4	N35.76245878 W83.88980234	Wet weather conveyance	Fill/runoff	~315’	N	N

Table 3. Alternative D - Ecological features including streams, watercourses, springs, seeps, wetlands, ponds, and sink holes located within the estimated impact area.

Map Label/ Feature Name	Lat/Long	Feature Designation	Potential Impact	Estimated Impact Quantity	ETW or ONRW (Y/N)	303d Listed (Y/N) Reason for Listing
STR-1	N35.80762608 W83.92830559	Intermittent stream	Crossing/ Encapsulation/ Fill	~175’	N	N
WTL-1	N35.80722969 W83.92868707	Wetland	Fill/runoff	~ 0.025 acres	N	N
STR-2	N35.80706121 W83.92533599	Perennial stream	Crossing/ encapsulation/ fill	~170’	N	N - Threatened
WWC-1	N35.80855964 W83.91403423	Wet weather conveyance	Crossing/ encapsulation/ fill	~80’	N	N
PND-1	N35.80895413 W83.91258378	Pond	Runoff	None – off ROW	N	N
STR-3	N35.80492083 W83.91040158	Intermittent stream	Crossing/ encapsulation/ fill	~400’	N	N
STR-4	N35.80587239 W83.91018933	Intermittent stream	Runoff	None – off ROW	N	N
PND-2	N35.79845301 W83.90808658	Pond	Runoff	None – off ROW	N	N

Map Label/ Feature Name	Lat/Long	Feature Designation	Potential Impact	Estimated Impact Quantity	ETW or ONRW (Y/N)	303d Listed (Y/N) Reason for Listing
STR-5	N35.79770508 W83.90670539	Intermittent stream	Crossing/ encapsulation/ fill	~200’	N	N - Threatened
WWC-2	N35.79706418 W83.90560153	Wet weather conveyance	Runoff	None – off ROW	N	N
STR-6	N35.7941347 W83.90447451	Intermittent stream	Crossing/ encapsulation/ fill	~190’	N	N
STR-7 (Peppermint Branch)	N35.786738 W83.90187304	Perennial stream	Crossing/ encapsulation/ fill	~185’	N	Y – Siltation
WWC-3	N35.78633755 W83.90163037	Wet weather conveyance	Crossing/ encapsulation/ fill	~290’	N	N
SNK-1	N35.78000076 W83.89388115	Sinkhole	Fill/runoff	<0.10 acres	N	N
WWC-4	N35.78049426 W83.89330938	Wet weather conveyance	Fill/runoff	~130’	N	N
WWC-5	N35.7759043 W83.89376801	Wet weather conveyance	Runoff	None – off ROW	N	N
STR-8	N35.77526799 W83.89408752	Intermittent stream	Crossing/ encapsulation/ fill	~190’	N	N
WWC-6	N35.77186967 W83.8914195	Wet weather conveyance	Crossing/ encapsulation/ fill	~150’	N	N
WWC-7	N35.7661253 W83.88932574	Wet weather conveyance	Runoff	None – off ROW	N	N
STR-9 (Gravelly Creek)	N35.76586658 W83.88879956	Perennial stream	Crossing/ encapsulation/ fill	~185’	N	Y – Siltation
STR-10 (Crooked Creek)	N35.76599191 W83.88874282	Perennial stream	Runoff	None – off ROW	N	Y – Habitat
PND-3	N35.76218208 W83.88518202	Pond	Fill/runoff	~ 0.02 acres	N	N
WWC-8	N35.76143277 W83.88376632	Wet weather conveyance	Runoff	None – off ROW	N	N

Beneficial ecological floodplain values:

Ecological values associated with the floodplains of the surveyed streams are the bottomland hardwoods that provide shading, bank stabilization, filtration of sediments, food attenuation, and cover for wildlife and fishes. Impacts to these have been avoided or minimized by crossing the floodplain at a near-perpendicular angle, with appropriately sized bridges and culverts. A copy of the available sections of the Flood Insurance Rate Maps (FIRM) for Blount County is located in Appendix B.

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 a TDEC database search performed by TDOT on May 22, 2013, consultation with the US Fish and Wildlife Service (USFWS), and the Tennessee Wildlife Resources Agency (TWRA). Four state listed threatened or endangered species and four federally listed threatened or endangered species are documented within 1 mile to a 4 mile radius of the project.

Direct and Indirect effects: Protected species records were shown within 4 miles of the project as listed in Table 4. A letter from the U.S. Fish and Wildlife Service (June 10, 2013) listed four species for consideration: the federally endangered Indiana bat, duskytail darter, fine-rayed pigtoe, and the federally threatened snail darter. The letter indicated that the Indiana bat *(Myotis sodalis)* is “not likely to be adversely affected” by this project due to mist netting and acoustical survey results performed in the summer of 2012. In regards to aquatic species, the USFWS response letter states that, “Due to proximity of the stream crossings to listed species occurrences in the Little River, we request that TDOT commit to implementing a 5-year design for water quality BMPs on all project area stream crossings.” Additionally a letter from the TWRA (Tennessee Wildlife Resource Agency) dated June 6, 2013 lists other concerns for area streams that could harbor protected species in the area. See the USFWS and TWRA letters attached in Appendix C for complete information regarding protected species.

Table 4. Species Listed by TDEC, TWRA and FWS for Consideration

Species	Status		Species Likely Present (Y/N)	BA required (Y/N)	BA Conclusion
	Fed.	State			
Snail darter, (*Percina tanasi*)	LT	T	N	Y	Not likely to adversely affect
Marbled darter, (*Etheostoma marmorpinnum*) {formerly the duskytail darter - *Etheostoma percnurum*}	LE	E	N	Y	Not likely to adversely affect
Fine-rayed pigtoe, (*Fusconaia cuneolus*)	LE	E	N	Y	Not likely to adversely affect
Ashy darter, (*Etheostoma cinereum*)		T	N	Y	Not likely to adversely affect
Longhead darter, (*Percina macrocephala*)		T	N	Y	Not likely to adversely affect
Indiana bat, (*Myotis sodalis*)	E	LE	N	Y	Not likely to adversely affect
Tennessee cave salamander, (*Gyrinophilus palleucus)*		T	N	N	--
Appalachian bugbane, (*Actaea Rubifolia)*		T	N	N	--

*Bat mist net and acoustical survey was conducted from July to August 2012 for the Indiana bat. No species were found. See USFWS concurrence letter attached.

Indiana bat – The federally listed endangered Indiana bat typically spends its winter months in caves or mines. Bottomland and floodplain forests were once thought to be the most important habitats during the summer, but subsequent studies have shown that upland forest habitats may be equally important (USFWS). The USFWS stated that, “Upon review of the information provided and our database, we concur with TDOT's determination of "not likely to adversely affect" for the Indiana bat due to a lack of suitable habitat within the project area.”

Snail Darter – 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). The preferred habitat of the snail darter consists of large free flowing rivers and 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. Habitat for this fish does not exist within ROW of the proposed project.

Marbled Darter (formerly the duskytail darter) – The marbled darter was initially included as part of the duskytail darter (*Etheostoma percnurum*) species complex, which was listed as federally endangered on April 27, 1993. However, Blanton and Jenkins (2008) described *Etheostoma marmorpinnum* as one of four distinct species from this complex.

The preferred habitat of the marbled darter (*Etheostoma marmorpinnum*) is pools of larger streams with bedrock rubble substrate. These pools are typically one to three feet in depth and have a gently flowing current and are for the most part silt-free (Etnier and Starnes, 1993). The TDEC Division of Natural Heritage has documented records of the marbled darter in the Litter River which is located downstream from the tributaries that would be crossed by the proposed alternatives. Habitat for this species does not exist within ROW of the proposed project.

Fine-rayed pigtoe -The fine-rayed pigtoe (*Fusconia cuneolus*) is described as a lotic, riffle-dwelling species that usually inhabits ford and shoal areas of rivers with moderate gradient. It is believed that this mussel species is restricted to the Tennessee River drainage except for the Duck River. The TDEC Division of Natural Heritage has documented occurrences of the fine-rayed pigtoe in the Little River at LRM 9.7 (1981) and Pistol Creek (1914) approximately 0.5 miles upstream of its confluence with the Little River at LRM 8.1. Habitat for this species does not exist within ROW of the proposed project.

Ashy Darter - 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 feet to 6.5 feet 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 in Blount County, Tennessee. The known sites are located more than a mile upstream from the site of where the proposed project would cross a small unnamed tributary to the Little River. Habitat for this fish does not exist within ROW of the proposed project.

Longhead Darter – 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; Etnier and Starnes, 1993). There are known occurrences of the longhead darter in the Little River; however, the locations are downstream of tributaries that would be crossed by the proposed alternatives.

Tennessee Cave Salamander – The Tennessee cave salamander (*Gyrinophilus palleucus*) prefers streams in caves that contain amphipods and other aquatic organisms that can serve as 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 that includes rock, gravel, sand and mud (Godwin, 1995). Habitat for this salamander does not exist within ROW of the proposed project.

Appalachian Bugbane - The Appalachian bugbane (*Actaea rubifolia*) is typically found at or near the base of the north-facing slopes on talus and rocky soils derived from dolomite (Ramsey, 1993d). 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. Habitat for this species does not exist within ROW of the proposed project.

Conclusions: At this time, no state or federally listed protected species are likely to be affected by the proposed project, other than potential sedimentation impacts to any of the listed aquatic organisms that may occur downstream of project construction, and potential habitat reduction to the ground dwelling animals. As noted in the USFWS letter, and documented in the Biological Assessment prepared by TDOT on June 21, 2013, the project is determined to "not likely to adversely affect" the Indiana bat (*Myotis sodalis*), the snail darter (*Percina tanasi*), marbled darter (*Etheostoma marmorpinnum*), fine-rayed pigtoe (*Fusconaia cuneolus*), ashy darter (*Etheostoma cinereum*), or the longhead darter (*Percina macrocephala*) due to a lack of suitable habitat.. Impacts have been coordinated with the appropriate agencies and all requirements will be complied with.
Information received from the Tennessee Department of Environment and Conservation is periodically reviewed and updated. If any protected species or their habitats are identified as project development continues, they will be addressed in accordance with applicable laws and regulations. Please refer to Appendix C for a copy of Form N and USFWS Correspondence.

REQUIRED PERMITS

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

Wetland Permits: All wetland impacts require confirmation by, and coordination with, permitting agencies. All require either general or individual Aquatic Resources Alteration Permits (ARAP) from the State of Tennessee. Almost all require either Nationwide or Individual permits from the U. S. Army Corps of Engineers pursuant to Section 404 of the Clean Water Act. Other agencies such as the U. S. Fish and Wildlife Service 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 impacts typically require compensatory mitigation. Small isolated wetlands with less than 0.10 acre impacts may come under the guidelines of a general permit issued by the State of Tennessee and no mitigation is required. General permits may be used if the total of a series of small impacts is less than 0.25 acres. Some wetland impacts of less than 0.5 acres qualify for Corps of Engineers Nationwide permits. Both wetlands in Alternative C and D are individually less than 0.10 acre in terms of impacts and should qualify for a general permit issued by the State of Tennessee and no mitigation will be required.

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

SUMMARY OF FINDINGS

This study addresses the two previously considered DEIS Alternatives that were not part of the Preferred Alternative (Alternatives C and D). Alternative C would be a new four-lane roadway on new locations and Alternative D would primarily be an upgrade to existing roadway networks with some new location area. Field surveys were conducted on the two proposed alternative alignments to update 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.

Alternative C may impact approximately 15 acres of forested land, 61 acres of agricultural fields/pastureland, and 20 of commercial and industrial businesses. Alternative D may impact approximately 19 acres of forested land, 48 acres of agricultural/pastureland, and 45 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.

A total of five streams were identified within the limits of Alternative C and ten streams were identified within the limits of Alternative D. Every stream identified is subject to some loss of open channel length and canopy disturbance. Sedimentation from stormwater runoff could also impact all of the project streams to varying degrees. However, implementation and maintenance of effective erosion and sediment control measures throughout the construction process should keep the overall impacts to these aquatic resources to a minimum.

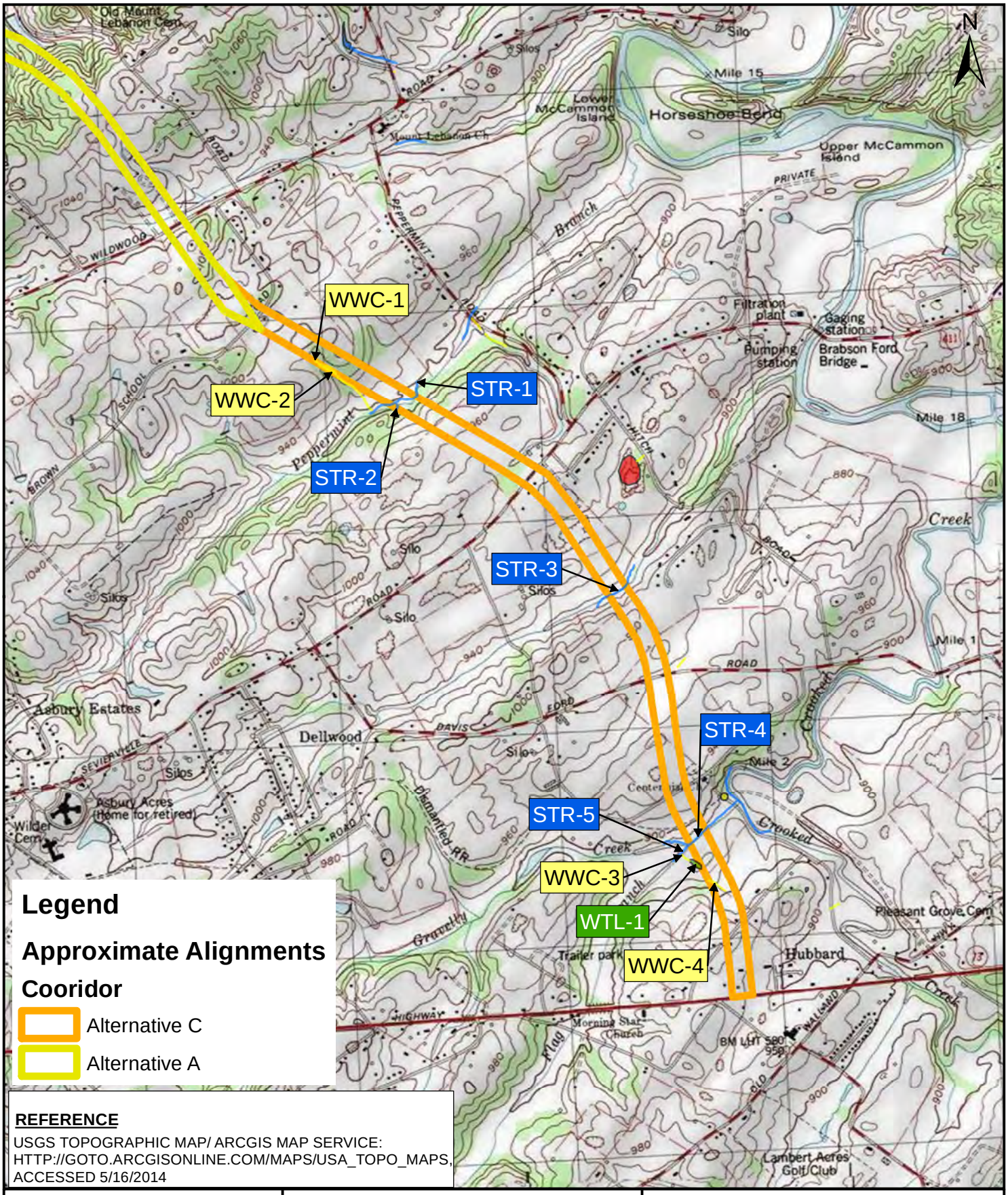
One wetland was identified within or near each alternative. It is estimated that approximately 0.027 acres of wetland are located within the proposed ROW and will be impacted (See Table 2). These wetlands may be directly impacted by the project.

TDOT will evaluate the potential for avoiding the wetland area or minimize the overall impact where complete avoidance is not possible.

There are records for eight state listed species within a four mile radius of the proposed alignment (see Table 3). 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 any of the listed aquatic organisms that may occur downstream of project construction, and potential habitat reduction to the ground dwelling animals.

Construction of the alignment will undoubtedly result in some short-term and long-term impacts to both terrestrial and aquatic habitats within the project limits. Disturbance of only the area within ROW needed for construction of the proposed project and implementation, along with maintenance of effective erosion and sediment control measures throughout the duration of the project, will serve to minimize at least some of these impacts. The remaining impacts may be mitigated somewhat over time once project construction is complete.

Appendix A
Resource Maps, Field Data Sheets & Photo Summary



REFERENCE

USGS TOPOGRAPHIC MAP/ ARCGIS MAP SERVICE: HTTP://GOTO.ARCGISONLINE.COM/MAPS/USA_TOPO_MAPS, ACCESSED 5/16/2014

0 500 1,000 2,000 Feet

ISSUED FOR: TDOT

ISSUED BY:

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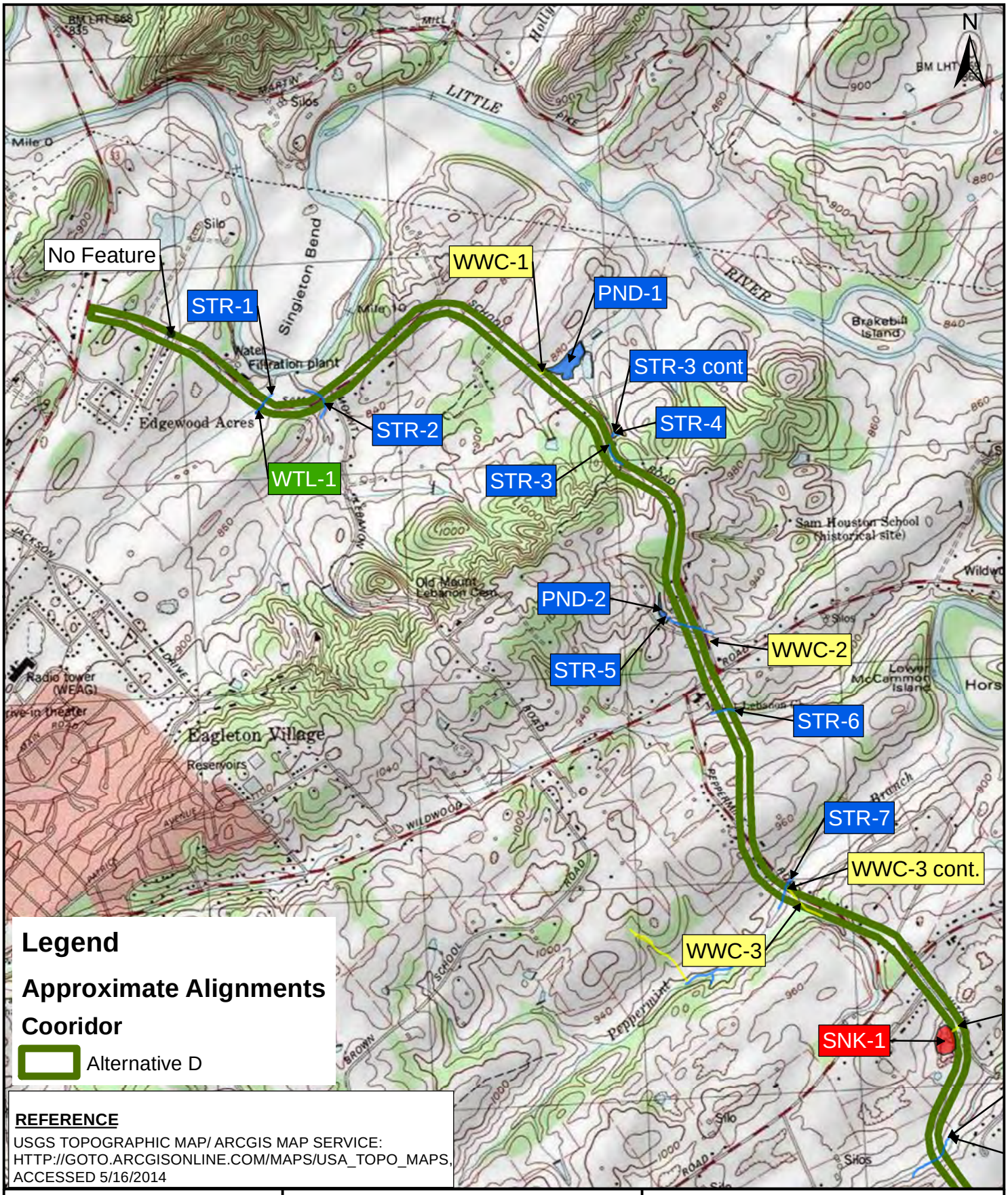
405 Duke Drive, Ste 270, Franklin, TN 37067
Columbus, OH * Cincinnati, OH * Indianapolis, IN * Nashville, TN * Chicago, IL
St. Louis, MO * Export, PA * Detriot, MI

Ecology Map (Topo)
SR-162 EXT; Pellissippi Parkway,
From SR-33 to SR-73 (US-321);
Alternative C; Blount County
PIN: 101423.00; Project#: 05097-0229-14

DWN. BY: CDH	SCALE: 1:24,000	DATE: 05-16-2014	PROJECT NO.: 141-539	FIGURE: 1
APPRVD BY: JTD * Hand signature on file				SHEET 1 OF 1



Legend

Approximate Alignments

Cooridor

Alternative D

REFERENCE

USGS TOPOGRAPHIC MAP/ ARCGIS MAP SERVICE: HTTP://GOTO.ARCGISONLINE.COM/MAPS/USA_TOPO_MAPS, ACCESSED 5/16/2014

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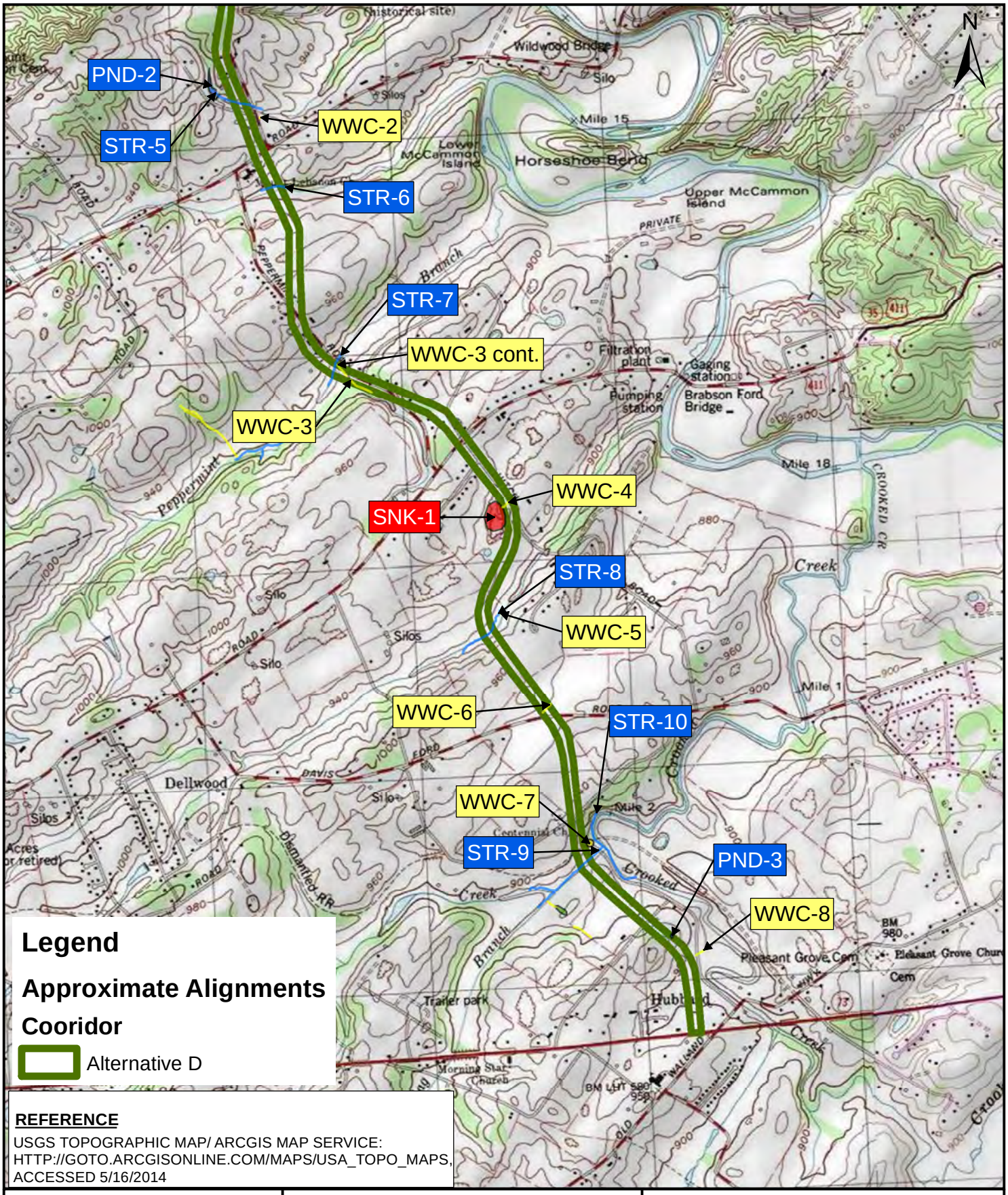
DWN. BY: CDH	SCALE: 1:24,000	DATE: 05-16-2014	PROJECT NO.: 141-539	FIGURE: 2
APPRVD BY: JTD * Hand signature on file				SHEET1 OF 2



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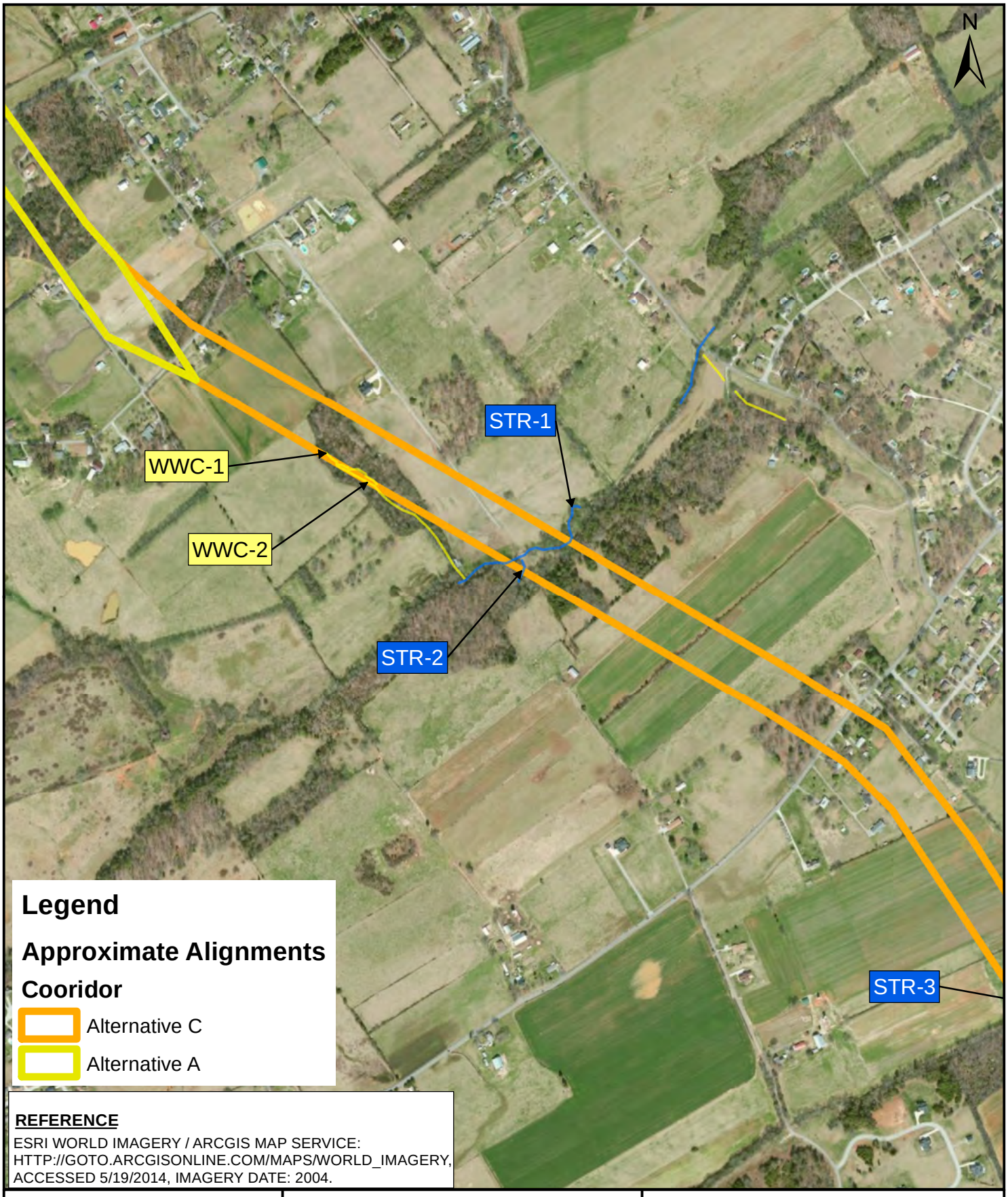
APPRVD BY: JTD * Hand signature on file				



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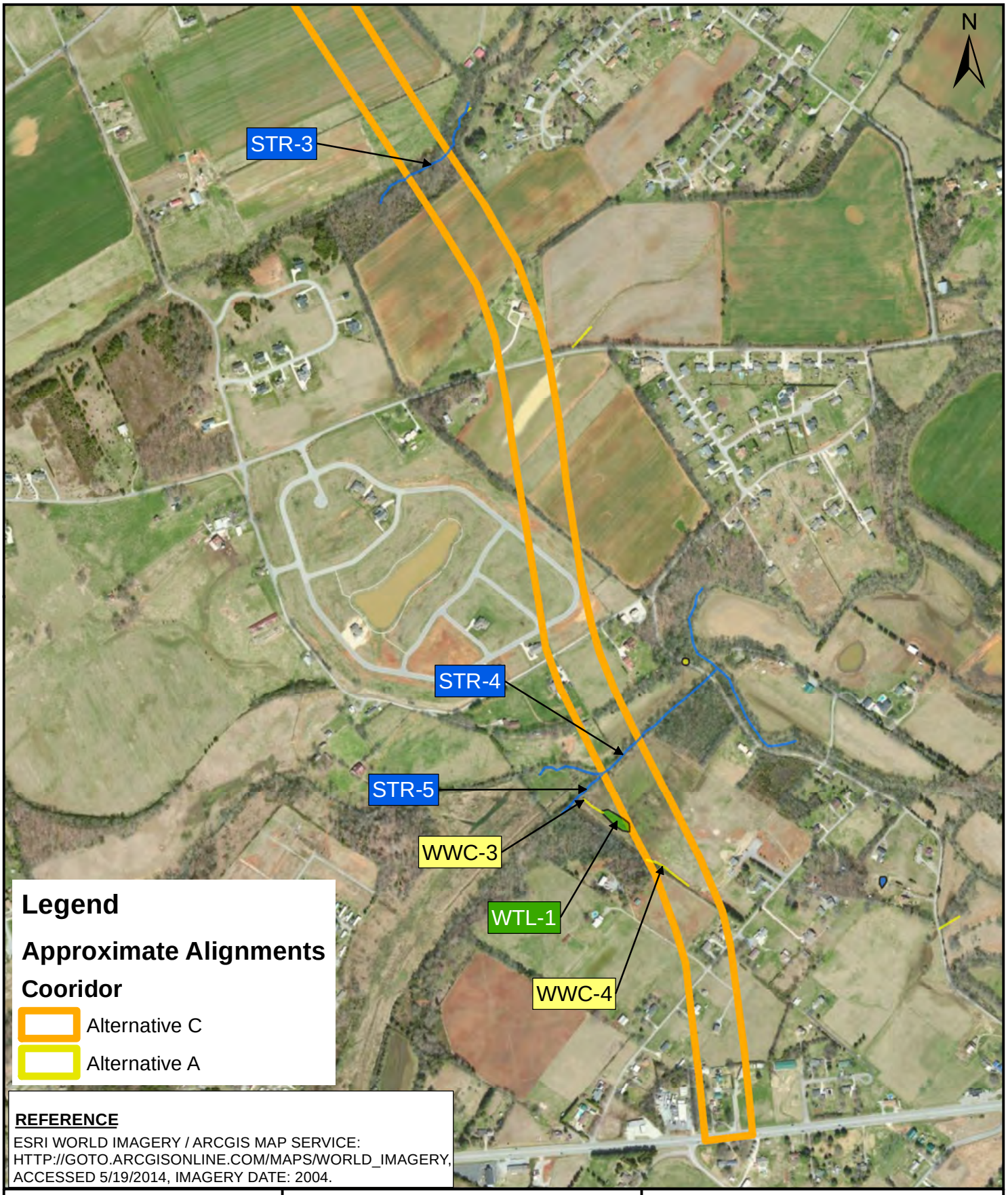
PIN: 101423.00; Project#: 05097-0229-14

DWN. BY: CDH	SCALE: 1:10,000	DATE: 05-16-2014	PROJECT NO.: 141-539	FIGURE: 3 SHEET 1 OF 2
APPRVD BY: JTD * Hand signature on file				



REFERENCE

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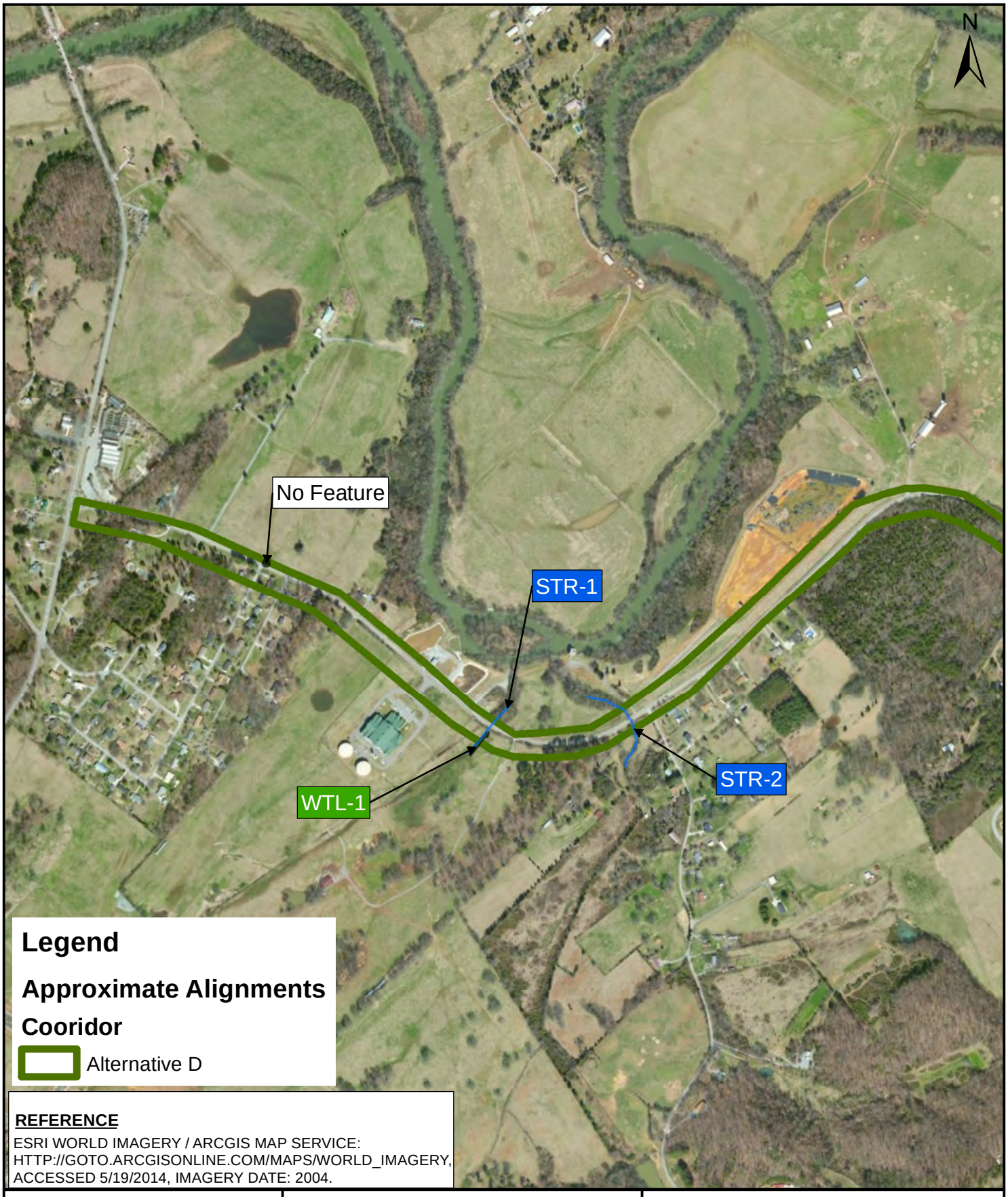
APPRVD BY: JTD * Hand signature on file				



Legend

Approximate Alignments

Cooridor

Alternative D

REFERENCE

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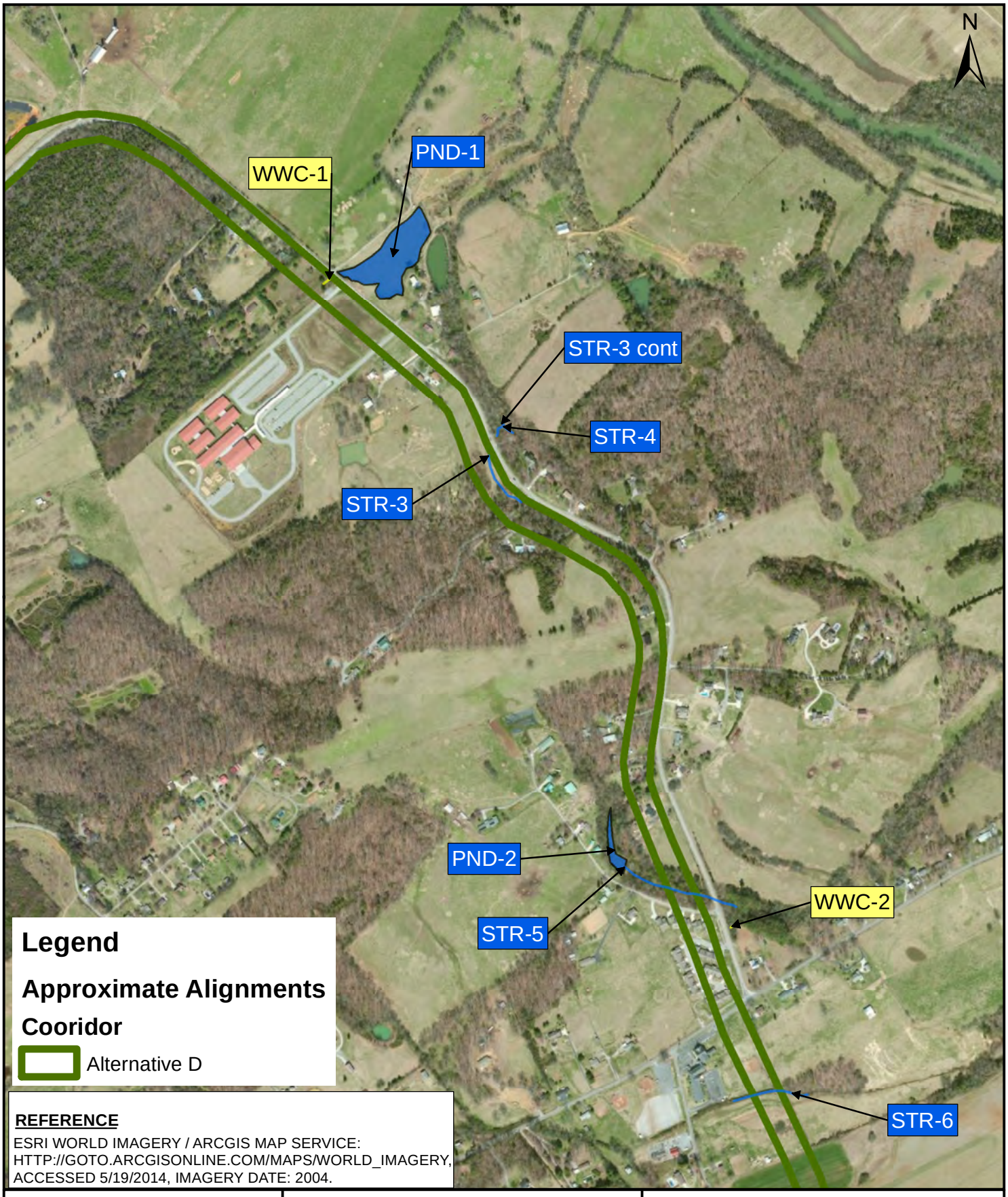
APPRVD BY: JTD * Hand signature on file				



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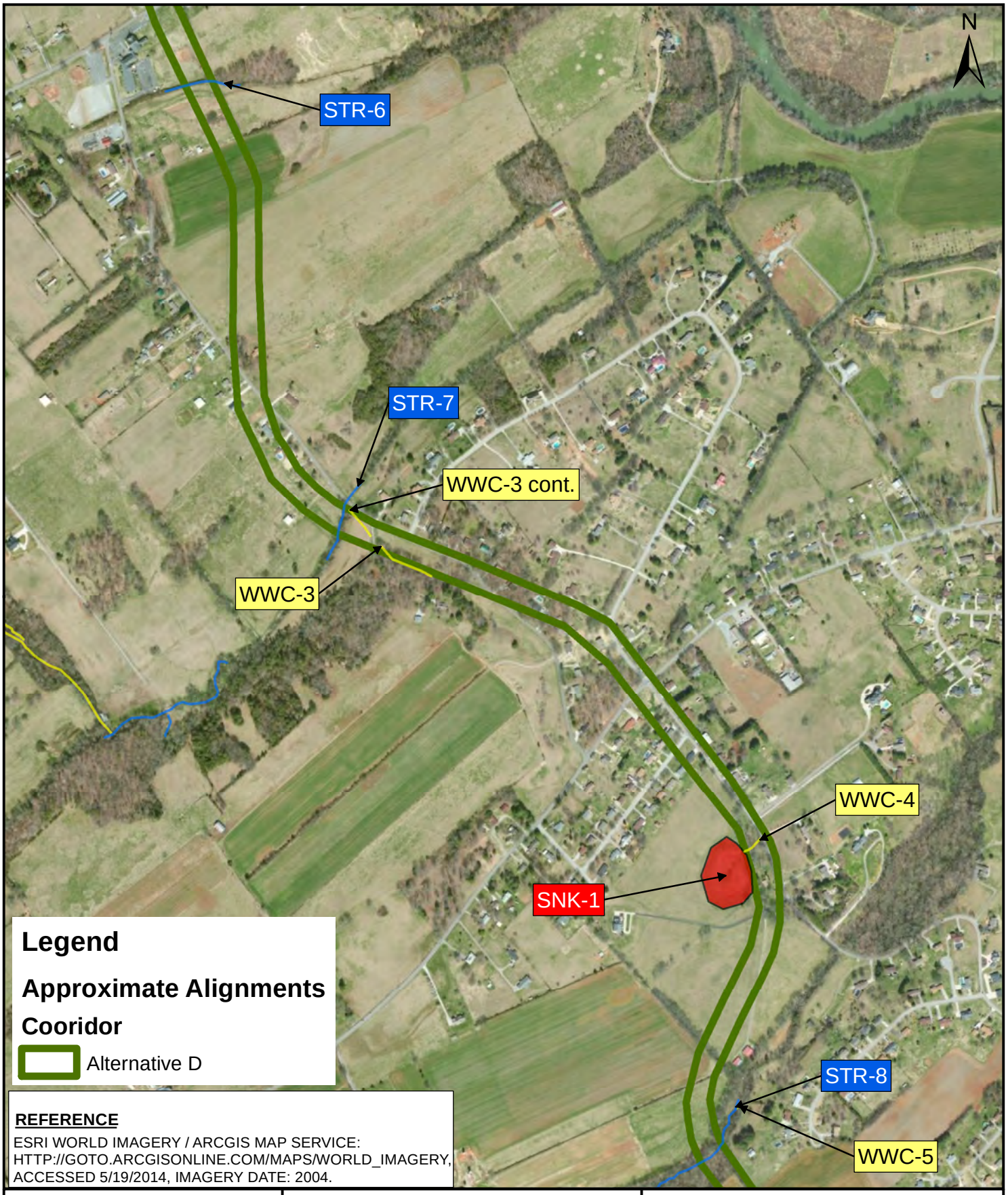
SCALE: 1:10,000
DATE: 05-16-2014
PROJECT NO.: 141-539
FIGURE: 4
SHEET 2 OF 4



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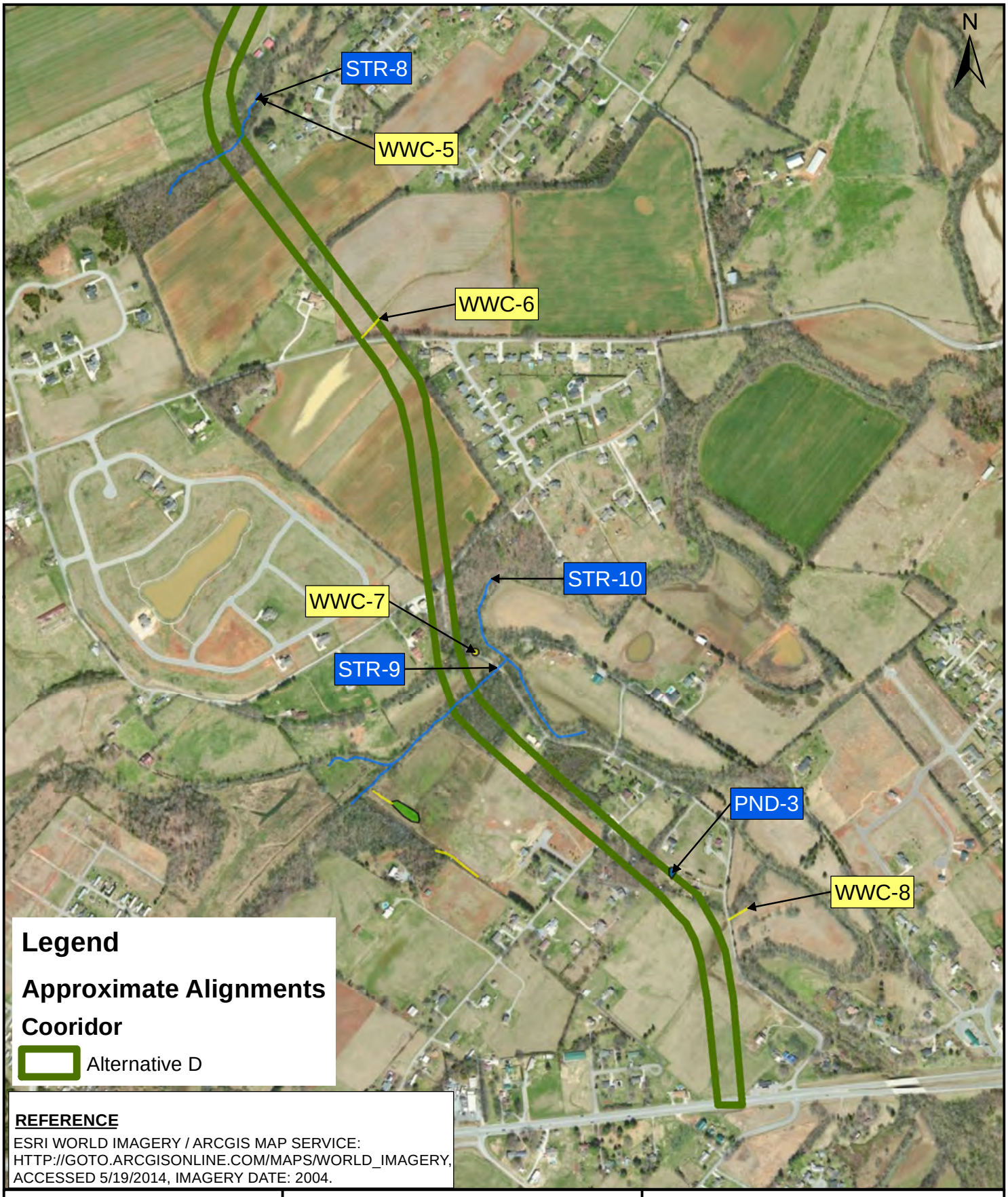
DWN. BY: CDH	SCALE: 1:10,000	DATE: 05-16-2014	PROJECT NO.: 141-539	FIGURE: 4 SHEET 3 OF 4
APPRVD BY: JTD * Hand signature on file				



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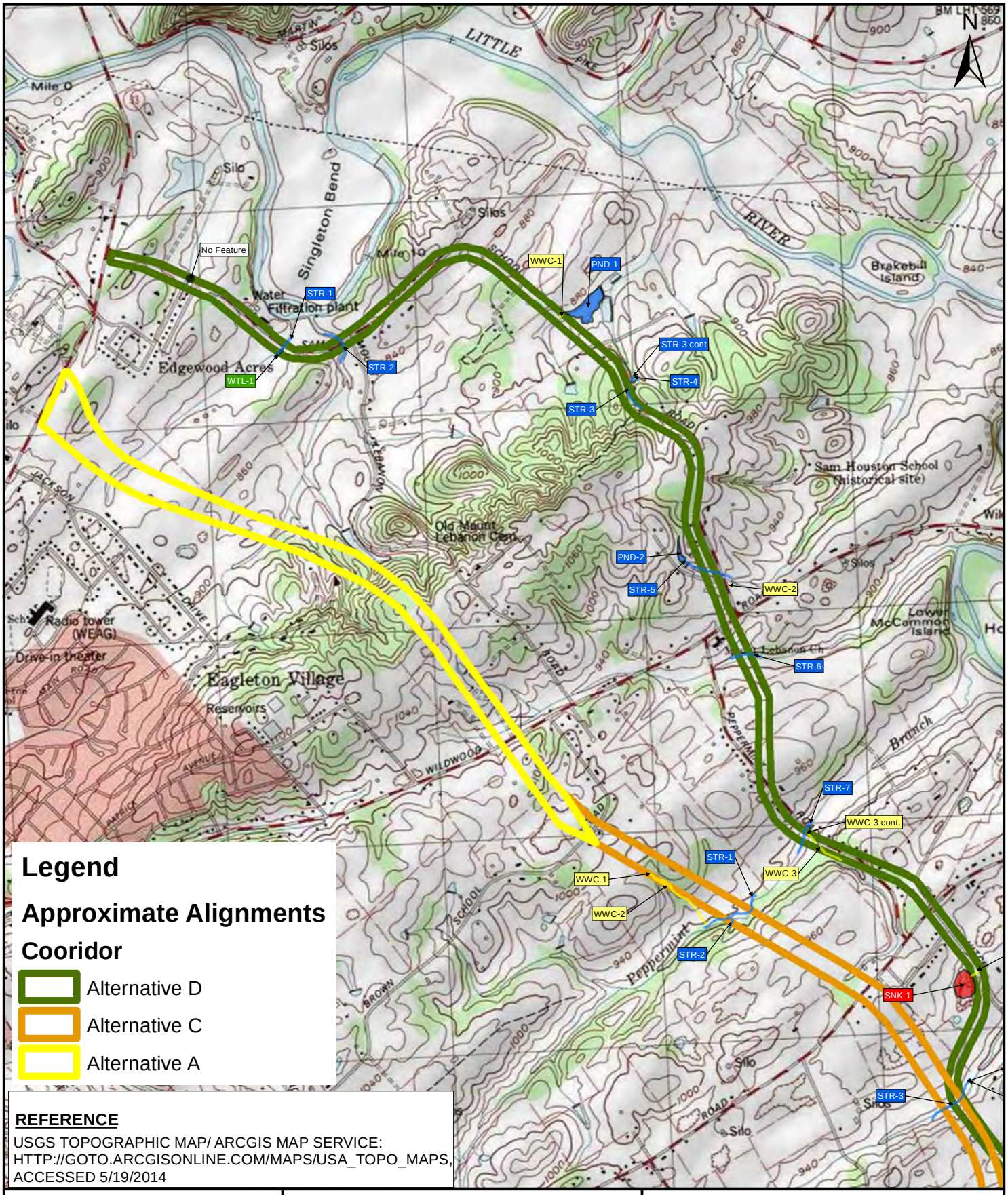
APPRVD BY: JTD * Hand signature on file				



Legend

Approximate Alignments Cooridor

- Alternative D
- Alternative C
- Alternative A

REFERENCE

USGS TOPOGRAPHIC MAP/ ARCGIS MAP SERVICE: HTTP://GOTO.ARCGISONLINE.COM/MAPS/USA_TOPO_MAPS, ACCESSED 5/19/2014

0 500 1,000 2,000 Feet

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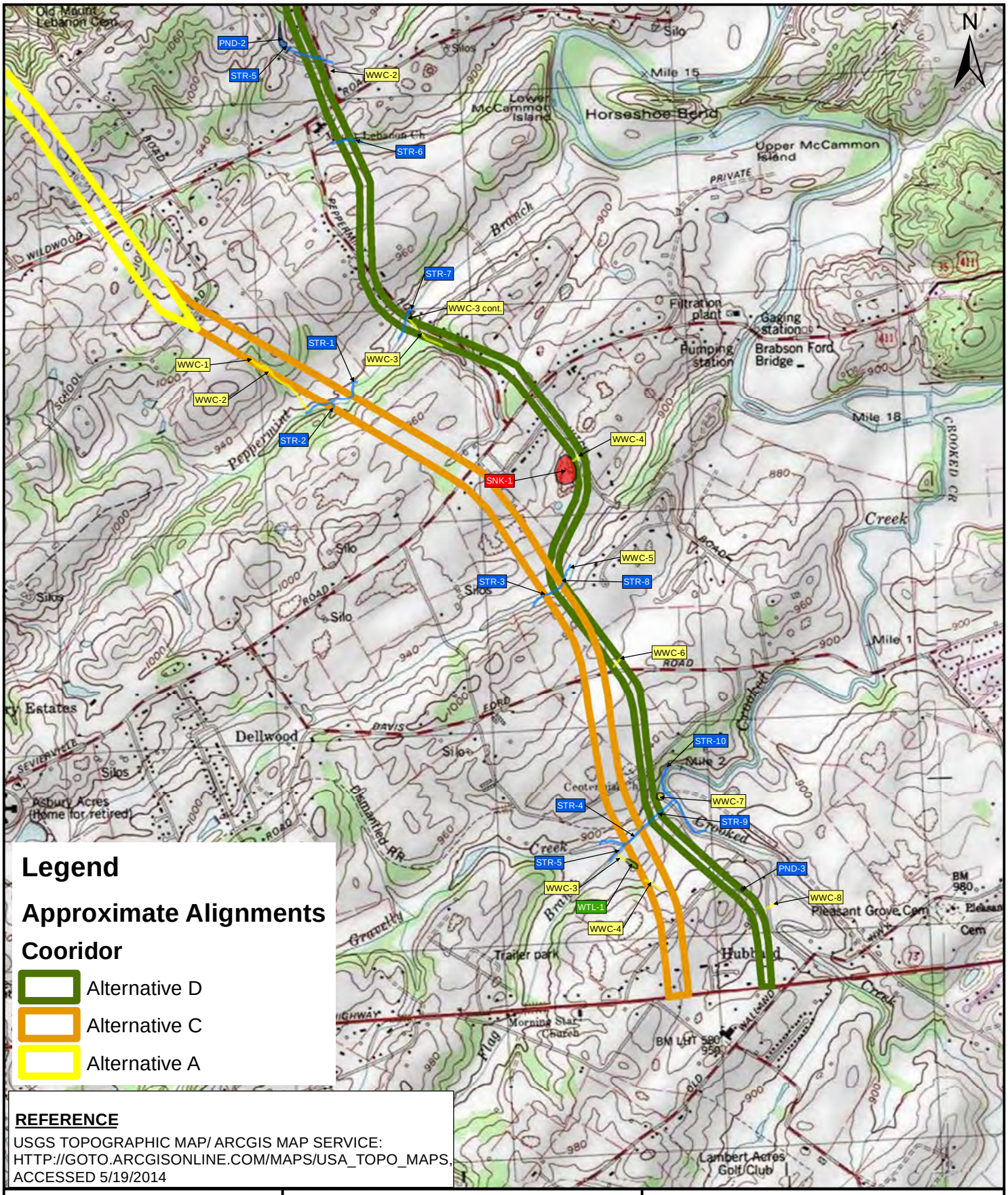
PIN: 101423.00; Project#: 05097-0229-14

DWN. BY: CDH	SCALE: 1:24,000	DATE: 05-19-2014	PROJECT NO.: 141-539	FIGURE: 5 SHEET 1 OF 2
APPRVD BY: JTD * Hand signature on file				


N
PND-2
STR-5
WWC-2
STR-6
STR-7
WWC-3 cont.
STR-1
WWC-3
WWC-1
WWC-2
STR-2
WWC-4
SNK-1
WWC-5
STR-3
STR-8
WWC-6
STR-10
WWC-7
STR-4
STR-9
STR-5
WWC-3
WTL-1
WWC-4
PND-3
WWC-8
Mile 15
Horseshoe Bend
Lower McCammon Island
Upper McCammon Island
Filtration plant
Gaging station
Pumping station
Brabson Ford Bridge
Mile 18
Mile 1
Mile 2
Dellwood
Trailer park
Pleasant Grove Cem
Morning Star Church
Lambert Acres Golf Club
Legend
Approximate Alignments
Cooridor
Alternative D
Alternative C
Alternative A
REFERENCE
USGS TOPOGRAPHIC MAP/ ARCGIS MAP SERVICE: HTTP://GOTO.ARCGISONLINE.COM/MAPS/USA_TOPO_MAPS, ACCESSED 5/19/2014
0 500 1,000 2,000 Feet
ISSUED FOR: TDOT
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CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
405 Duke Drive, Ste 270, Franklin, TN 37067
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From SR-33 to SR-73 (US-321);
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PIN: 101423.00; Project#: 05097-0229-14
DWN. BY: CDH
APPRVD BY: JTD * Hand signature on file
SCALE: 1:24,000
DATE: 05-19-2014
PROJECT NO.: 141-539
FIGURE: 5
SHEET 2 OF 2

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative D; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/06/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	STR-1 (Unnamed tributary to Little River)
3-Latitude/Longitude	N35.80762608, W83.92830559
4-Potential impact	Crossing/encapsulation/fill
5-Feature description:	
what is it	Intermittent stream
blue-line on topo? (y/n)	Y
defined channel (y/n)	Y
straight or meandering	Meandering
channel bottom width	8’
top of bank width	10’
bank height and slope ratio	1’; 2:1
avg. gradient of stream (%)	<2%
substratum	Silt, gravel
riffle/run/pool	0/0/100
width of buffer zone	LB: 100’ RB: 100’
water flow	No – pools only
water depth	3”
water width	8’
general water quality	Poor
OHWM indicators	Clear line on bank, scouring
groundwater connection	Unknown
bank stability: LB, RB	Both: moderately stable
dominant species: LB, RB	Both: hackberry, privet, black willow
overhead canopy (%)	90%
benthos	Isopods
fish	No
algae or other aquatic life	Filamentous green algae
habitat assessment score	N/A
photo number (s)	1 d/s, 2 u/s
rainfall information	No rain in previous 5 days
6- HUC code & name (12-digit)	060102010110, Little River-Roddy Branch
7-Confirmed by:	Not required
8-Mitigation	No _____ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No __X__ Yes_____: Habitat_____ Siltation_____
11-Assessed	No __X__ Yes_____
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	This stream drains through WTL-1 and into the Little River just outside the proposed ROW. Cattle impacts are evident in the stream.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative D; Blount County Map Label: WTL-1

P.E. and PIN: PIN: 101423.00; Project#: 05097-0229-14 Date: 5/06/2014 Station: N/A

Investigator(s): J. Garcia/C. Hertwig HUC 12 (code and name): 060102010110, Little River-Roddy Branch

Landform (hillslope, terrace, etc.): Swale Local relief (concave, convex, none): Concave Slope (%): _____

Subregion (LRR or MLRA): LRR Lat: N35.80722969 Long: W83.92868707 Datum: WGS 84

Soil Map Unit Name: Prader silt loam (Melvin) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No _____ Hydric Soil Present? Yes ✓ No _____ Wetland Hydrology Present? Yes ✓ No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Remarks: Photos: 3, 4 Buffer (ft.): 0 Approximate Size (ac.): 0.06 Portion Affected (permanent) (ac.): 0.025 Portion Affected (temporary) (ac.): Unknown	Confirmation (by, date): Not required Mitigation (to be included in design): _____ Notes: Cut/fill lines are not shown on the provided corridor.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ✓ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ✓ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Map Label: WTL-1

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix nigra			OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		

Herb Stratum (Plot size:)			
1. Juncus effusus			FACW
2. Schedonorus phoenix			FAC
3. Eleocharis palustris			OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		

Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Map Label: WTL-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-18"	10YR 5/2	80%	7.5YR 5/6	20%	C	M	Silty clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative D; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/06/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	STR-2 (Unnamed tributary to Little River)
3-Latitude/Longitude	N35.80706121, W83.92533599
4-Potential impact	Crossing/encapsulation/fill
5-Feature description:	
what is it	Perennial stream
blue-line on topo? (y/n)	Y
defined channel (y/n)	Y
straight or meandering	Meandering
channel bottom width	6’
top of bank width	10’
bank height and slope ratio	3’; 2:1
avg. gradient of stream (%)	<2%
substratum	Silt, gravel, cobble
riffle/run/pool	40/40/20
width of buffer zone	LB: 30’ RB: 30’
water flow	Yes
water depth	2-4”
water width	6’
general water quality	Good
OHWM indicators	Clear line on bank, scouring
groundwater connection	Unknown
bank stability: LB, RB	Both: moderately unstable
dominant species: LB, RB	Both: hackberry, privet, black willow, Japanese honeysuckle
overhead canopy (%)	95%
benthos	Ephemeroptera, plecoptera, trichoptera, snails
fish	None seen
algae or other aquatic life	Filamentous green algae
habitat assessment score	133
photo number (s)	5 u/s, 6 d/s, 7 d/s, 8 u/s
rainfall information	No rain in previous 5 days
6- HUC code & name (12-digit)	060102010110, Little River-Roddy Branch
7-Confirmed by:	Not required
8-Mitigation	No_____ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No __X__ Yes _____: Habitat_____ Siltation_____
11-Assessed	No _____ Yes __X__ (Threatened)
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	This stream drains to the Little River and is listed as threatened on the TDEC database.

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative D; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/06/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	WWC-1
3-Latitude/Longitude	N35.80855964, W83.91403423
4-Potential impact	Crossing/encapsulation/fill
5-Feature description:	
what is it	Wet weather conveyance
blue-line on topo? (y/n)	Y
defined channel (y/n)	Y
straight or meandering	Straight
channel bottom width	1’
top of bank width	3’
bank height and slope ratio	6”; 3:1
avg. gradient of stream (%)	<2%
substratum	Silt, vegetation
riffle/run/pool	N/A
width of buffer zone	LB: 0 RB: 0
water flow	No
water depth	N/A
water width	N/A
general water quality	N/A
OHWM indicators	Bent vegetation
groundwater connection	Unknown
bank stability: LB, RB	Both: stable
dominant species: LB, RB	Both: boxelder, Carex sp., black willow, fescue
overhead canopy (%)	0
benthos	No
fish	No
algae or other aquatic life	No
habitat assessment score	N/A
photo number (s)	10 u/g, 11d/g
rainfall information	No rain in previous 5 days
6- HUC code & name (12-digit)	060102010110, Little River-Roddy Branch
7-Confirmed by:	Needs confirmation
8-Mitigation	No _____ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No __X__ Yes_____: Habitat_____ Siltation_____
11-Assessed	No __X__ Yes_____
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	This channel is a blue line on the USGS topo map. Vegetation was observed growing in the middle of the channel. This channel did not display the necessary features to be considered a stream. Consult TDEC for confirmation.

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative D; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/06/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	PND-1
3-Latitude/Longitude	N35.80895413, W83.91258378
4-Potential impact	Runoff
5-Feature description:	
what is it	Pond
blue-line on topo? (y/n)	N
defined channel (y/n)	N
straight or meandering	N/A
channel bottom width	N/A
top of bank width	N/A
bank height and slope ratio	N/A
avg. gradient of stream (%)	N/A
substratum	Unknown
riffle/run/pool	N/A
width of buffer zone	0
water flow	No
water depth	~5’
water width	500’ x 200’
general water quality	Good
OHWM indicators	None
groundwater connection	Unknown
bank stability: LB, RB	stable
dominant species: LB, RB	Black willow, fescue, cattail, spike rush, soft rush, privet
overhead canopy (%)	0
benthos	Not sampled
fish	Yes
algae or other aquatic life	None seen
habitat assessment score	N/A
photo number (s)	9
rainfall information	No rain in previous 5 days
6- HUC code & name (12-digit)	060102010110, Little River-Roddy Branch
7-Confirmed by:	Not required
8-Mitigation	No __X__ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No __X__ Yes_____: Habitat_____ Siltation_____
11-Assessed	No __X__ Yes_____
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	This is a large pond that is located just outside of ROW.

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative D; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/06/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	STR-3 (Unnamed tributary to Little River)
3-Latitude/Longitude	N35.80492083, W83.91040158
4-Potential impact	Crossing/encapsulation/fill
5-Feature description:	
what is it	Intermittent stream
blue-line on topo? (y/n)	Y
defined channel (y/n)	Y
straight or meandering	Meandering
channel bottom width	3’
top of bank width	6’
bank height and slope ratio	1’; 2:1
avg. gradient of stream (%)	<2%
substratum	Silt, some gravel
riffle/run/pool	10/50/40
width of buffer zone	LB: 30’ RB: 30’
water flow	Yes
water depth	2”
water width	2’
general water quality	Good
OHWM indicators	Clear line on bank, bent vegetation
groundwater connection	Unknown
bank stability: LB, RB	Both: stable
dominant species: LB, RB	Both: cattail, black willow, fescue, privet
overhead canopy (%)	40%
benthos	Isopods, amphipods
fish	No
algae or other aquatic life	Filamentous green algae
habitat assessment score	105
photo number (s)	12 u/s, 13 d/s, 14 @ culvert, 15 d/s, 16 u/s
rainfall information	No rain in previous 5 days
6- HUC code & name (12-digit)	060102010110, Little River-Roddy Branch
7-Confirmed by:	Not required
8-Mitigation	No_____ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No __X__ Yes_____: Habitat_____ Siltation_____
11-Assessed	No __X__ Yes_____
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	This stream begins in a forested area near a driveway and drains off ROW to the northeast. This stream drains to the Little River.

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative D; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/06/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	STR-4 (Unnamed tributary to Little River)
3-Latitude/Longitude	N35.80587239, W83.91018933
4-Potential impact	Runoff
5-Feature description:	
what is it	Intermittent stream
blue-line on topo? (y/n)	N
defined channel (y/n)	Y
straight or meandering	Straight
channel bottom width	2’
top of bank width	4’
bank height and slope ratio	2’; 2:1
avg. gradient of stream (%)	3%
substratum	Silt, gravel
riffle/run/pool	10/70/30
width of buffer zone	LB: 100’ RB: 50’
water flow	Yes
water depth	1”
water width	2’
general water quality	Good
OHWM indicators	Clear line on bank, Bent vegetation
groundwater connection	Unknown
bank stability: LB, RB	Both: moderately unstable
dominant species: LB, RB	Both: cattail, fescue, black willow, privet
overhead canopy (%)	95%
benthos	Isopods, amphipods
fish	No
algae or other aquatic life	Filamentous green algae
habitat assessment score	121
photo number (s)	17 d/s, 18 u/s
rainfall information	No rain in previous 5 days
6- HUC code & name (12-digit)	060102010110, Little River-Roddy Branch
7-Confirmed by:	Not required
8-Mitigation	No __X__ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No __X__ Yes_____: Habitat_____ Siltation_____
11-Assessed	No __X__ Yes_____
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	This stream flows into STR-3 off ROW.

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative D; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/06/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	PND-2
3-Latitude/Longitude	N35.79845301, W83.90808658
4-Potential impact	Runoff
5-Feature description:	
what is it	Pond
blue-line on topo? (y/n)	N
defined channel (y/n)	N
straight or meandering	N/A
channel bottom width	N/A
top of bank width	N/A
bank height and slope ratio	N/A
avg. gradient of stream (%)	N/A
substratum	Unknown
riffle/run/pool	N/A
width of buffer zone	>100’
water flow	No
water depth	~4’
water width	300’ x 60’
general water quality	Poor
OHWM indicators	None
groundwater connection	Unknown
bank stability: LB, RB	Stable
dominant species: LB, RB	Pine, black locust, hackberry, privet, boxelder
overhead canopy (%)	60%
benthos	Not sampled
fish	None seen
algae or other aquatic life	None seen
habitat assessment score	N/A
photo number (s)	19
rainfall information	No rain in previous 5 days
6- HUC code & name (12-digit)	060102010107, Little River Nails Creek
7-Confirmed by:	Not required
8-Mitigation	No __X__ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No __X__ Yes_____: Habitat_____ Siltation_____
11-Assessed	No __X__ Yes ____
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	STR-5 flows through this pond off ROW.

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative D; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/06/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	STR-5 (Unnamed tributary to Little River)
3-Latitude/Longitude	N35.79770508, W83.90670539
4-Potential impact	Crossing/encapsulation/fill
5-Feature description:	
what is it	Intermittent stream
blue-line on topo? (y/n)	Y
defined channel (y/n)	Y
straight or meandering	Meandering
channel bottom width	2-3’
top of bank width	4-6’
bank height and slope ratio	1’; 2:1
avg. gradient of stream (%)	2%
substratum	Silt, gravel
riffle/run/pool	30/40/30
width of buffer zone	LB: >100’ RB: 50’
water flow	Yes
water depth	2”
water width	2-3’
general water quality	Fair
OHWM indicators	Clear line on bank, wrack lines
groundwater connection	Unknown
bank stability: LB, RB	Both: moderately stable
dominant species: LB, RB	Both: privet, hackberry, black walnut
overhead canopy (%)	90%
benthos	Water penny
fish	No
algae or other aquatic life	Frog/salamander eggs
habitat assessment score	117
photo number (s)	20 u/s, 21 d/s
rainfall information	No rain in previous 5 days
6- HUC code & name (12-digit)	060102010107, Little River Nails Creek
7-Confirmed by:	Not required
8-Mitigation	No _____ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No __X__ Yes_____: Habitat_____ Siltation_____
11-Assessed	No _____ Yes __X__ (Threatened)
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	This stream flows through PND-2 and eventually drains to the Little River off ROW.

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative D; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/06/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	WWC-2
3-Latitude/Longitude	N35.79706418, W83.90560153
4-Potential impact	Runoff
5-Feature description:	
what is it	Wet weather conveyance
blue-line on topo? (y/n)	N
defined channel (y/n)	Y – poorly
straight or meandering	Meandering
channel bottom width	1’
top of bank width	2’
bank height and slope ratio	6”; 2:1
avg. gradient of stream (%)	<2%
substratum	Silt, gravel, vegetation
riffle/run/pool	N/A
width of buffer zone	LB: >100’ RB: 50’
water flow	No
water depth	N/A
water width	N/A
general water quality	N/A
OHWM indicators	Wrack lines
groundwater connection	No
bank stability: LB, RB	Both: stable
dominant species: LB, RB	Both: hackberry, privet, boxelder
overhead canopy (%)	100%
benthos	No
fish	No
algae or other aquatic life	No
habitat assessment score	N/A
photo number (s)	22 d/g, 23 u/g
rainfall information	No rain in previous 5 days
6- HUC code & name (12-digit)	060102010107, Little River Nails Creek
7-Confirmed by:	Not required
8-Mitigation	No __X__ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No __X__ Yes_____: Habitat_____ Siltation_____
11-Assessed	No __X__ Yes_____
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	This conveyance drains to STR-5 off ROW.

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative D; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/06/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	STR-6 (Unnamed tributary to Little River)
3-Latitude/Longitude	N35.7941347, W83.90447451
4-Potential impact	Crossing/encapsulation/fill
5-Feature description:	
what is it	Intermittent stream
blue-line on topo? (y/n)	Y
defined channel (y/n)	Y
straight or meandering	Meandering
channel bottom width	3’
top of bank width	6-8’
bank height and slope ratio	2-3’; 1:1
avg. gradient of stream (%)	<2%
substratum	Silt, gravel
riffle/run/pool	N/A
width of buffer zone	LB: 5’ RB: 5’
water flow	No
water depth	N/A
water width	N/A
general water quality	N/A
OHWM indicators	Wrack lines, clear line on bank
groundwater connection	Unknown
bank stability: LB, RB	Both: eroded
dominant species: LB, RB	Both: privet, hackberry, white oak, American elm
overhead canopy (%)	90%
benthos	No
fish	No
algae or other aquatic life	No
habitat assessment score	N/A
photo number (s)	24 d/s, 25 u/s
rainfall information	No rain in previous 5 days
6- HUC code & name (12-digit)	060102010107, Little River Nails Creek
7-Confirmed by:	Not required
8-Mitigation	No _____ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No __X__ Yes_____: Habitat_____ Siltation_____
11-Assessed	No __X__ Yes_____
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	This stream crosses the proposed alignment and drains into the Little River off ROW. Hydrologic determination score of 20.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Blount Co.	Named Waterbody: STR-6	Date/Time: 5/6/14
Assessors/Affiliation: J. Garcia, CEC, INC.		Project ID :
Site Name/Description: SR-162 EXT, Pellissippi Pkwy		
Site Location: N/E of Maryville		
USGS quad:	HUC (12 digit): 060102010107	Lat/Long: 35.794739°N 83.904745°W
Previous Rainfall (7-days) :		
Precipitation this Season vs. Normal : very wet wet (average) dry drought unknown Source of recent & seasonal precip data :		
Watershed Size :	Photos: (Y) or N (circle) Number : photo summary	
Soil Type(s) / Geology :		Source:
Surrounding Land Use : Residential, Agricultural		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : Severe Moderate (Slight) Absent		

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	✓	WWC
2. Defined bed and bank absent, dominated by upland vegetation / grass	✓	WWC
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions		WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall		WWC
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase		Stream
6. Presence of fish (except *Gambusia*)		Stream
7. Presence of naturally occurring ground water table connection		Stream
8. Flowing water in channel and 7 days since last precipitation in local watershed		Stream
9. Evidence watercourse has been used as a supply of drinking water		Stream

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = Stream

Secondary Indicator Score (if applicable) = 20

Justification / Notes : Feature is a "blue-line" on the topographical map. Likely an Intermittent stream.

SIT 6

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 13)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	(3)
2. Sinuous channel	0	1	(2)	3
3. In-channel structure: riffle-pool sequences	0	1	2	3
4. Sorting of soil textures or other substrate	0	1	2	3
5. Active/relic floodplain	(0)	1	2	3
6. Depositional bars or benches	0	(1)	2	3
7. Braided channel	(0)	1	2	3
8. Recent alluvial deposits	0	(0.5)	1	1.5
9. Natural levees	(0)	1	2	3
10. Headcuts	0	1	(2)	3
11. Grade controls	0	0.5	(1)	1.5
12. Natural valley or drainageway	0	(0.5)	1	1.5
13. At least second order channel on existing USGS or NRCS map	No = 0		Yes = 3	

B. **Hydrology** (Subtotal = 3)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	(0)	1	2	3
15. Water in channel and >48 hours since sig. rain	(0)	1	2	3
16. Leaf litter in channel (January – September)	1.5	(1)	0.5	0
17. Sediment on plants or on debris	0	0.5	(1)	1.5
18. Organic debris lines or piles (wrack lines)	0	0.5	(1)	1.5
19. Hydric soils in stream bed or sides of channel	No = 0		Yes = 1.5	

C. **Biology** (Subtotal = 4)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	3	(2)	1	0
21. Rooted plants in channel [1]	3	(2)	1	0
22. Crayfish in stream (exclude in floodplain)	(0)	0.5	1	1.5
23. Bivalves/mussels	(0)	1	2	3
24. Amphibians	(0)	0.5	1	1.5
25. Macrobenthos (record type & abundance)	(0)	1	2	3
26. Filamentous algae; periphyton	(0)	1	2	3
27. Iron oxidizing bacteria/fungus	(0)	0.5	1	1.5
28. Wetland plants in channel [2]	(0)	0.5	1	2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 20

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative D; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/06/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	STR-7 (Peppermint Branch)
3-Latitude/Longitude	N35.786738, W83.90187304
4-Potential impact	Crossing/encapsulation/fill
5-Feature description:	
what is it	Perennial stream
blue-line on topo? (y/n)	Y
defined channel (y/n)	Y
straight or meandering	Straight
channel bottom width	6’
top of bank width	8-10’
bank height and slope ratio	3’; 2:1
avg. gradient of stream (%)	2%
substratum	Silt, gravel, cobble
riffle/run/pool	30/40/30
width of buffer zone	LB: 0 RB: 0
water flow	Yes
water depth	4-6”
water width	6’
general water quality	Poor
OHWM indicators	Wrack lines, scouring
groundwater connection	Unknown
bank stability: LB, RB	Both: undercut/eroded
dominant species: LB, RB	Both: fescue, privet, hackberry
overhead canopy (%)	0-70%
benthos	Ephemeroptera, trichoptera
fish	None seen
algae or other aquatic life	Filamentous green algae
habitat assessment score	123
photo number (s)	26 d/s, 27 u/s
rainfall information	No rain in previous 5 days
6- HUC code & name (12-digit)	060102010107, Little River Nails Creek
7-Confirmed by:	Not required
8-Mitigation	No _____ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No _____ Yes __X__: Habitat_____ Siltation __X__
11-Assessed	No _____ Yes __X__ (Not supporting)
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	This stream is on the TDEC 303d list for siltation impairment. STR-7 crosses the proposed alignment and drains to the Little River off ROW.

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative D; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/06/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	WWC-3
3-Latitude/Longitude	N35.78633755, W83.90163037
4-Potential impact	Crossing/encapsulation/fill
5-Feature description:	
what is it	Wet weather conveyance
blue-line on topo? (y/n)	Y
defined channel (y/n)	Y – poorly
straight or meandering	Straight
channel bottom width	d/g: 1'; u/g: 1-3'
top of bank width	d/g: 4'; u/g: 15'
bank height and slope ratio	d/g: 3"; 4:1; u/g: 3-4'; 2:1
avg. gradient of stream (%)	<2%
substratum	Silt, vegetation
riffle/run/pool	N/A
width of buffer zone	LB: 0-100' RB: 0
water flow	No
water depth	N/A
water width	N/A
general water quality	N/A
OHWM indicators	None
groundwater connection	Unknown
bank stability: LB, RB	Both: stable
dominant species: LB, RB	Both: fescue, hackberry, Virginia creeper, microstegium, black walnut
overhead canopy (%)	0-90%
benthos	No
fish	No
algae or other aquatic life	No
habitat assessment score	N/A
photo number (s)	28 u/g, 29 d/g, 30 u/g, 31 d/g
rainfall information	No rain in previous 5 days
6- HUC code & name (12-digit)	060102010107, Little River Nails Creek
7-Confirmed by:	Needs confirmation
8-Mitigation	No_____ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No __X__ Yes_____: Habitat_____ Siltation_____
11-Assessed	No __X__ Yes_____
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	This channel is a blue line on the USGS topo map. There were no signs of recent flow and vegetation was growing in the middle of the channel. Down gradient, near STR-7, this channel is very poorly defined and at times shows no sign of a defined bed or bank. This could be a case where water is flowing underground (sinking stream). Consult TDEC for confirmation.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative C; Blount County Map Label: WTL-1

P.E. and PIN: PIN: 101423.00; Project#: 05097-0229-14 Date: 5/07/2014 Station: N/A

Investigator(s): J. Garcia/C. Hertwig HUC 12 (code and name): 060102010106, Little River Middle Prong

Landform (hillslope, terrace, etc.): Lowland Local relief (concave, convex, none): Concave Slope (%): _____

Subregion (LRR or MLRA): LRR Lat: N35.76334256 Long: W83.89088476 Datum: WGS 84

Soil Map Unit Name: Melvin silt loam NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No _____ Hydric Soil Present? Yes ✓ No _____ Wetland Hydrology Present? Yes ✓ No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Remarks: Photos: 63 Buffer (ft.): 0 Approximate Size (ac.): 0.26 Portion Affected (permanent) (ac.): 0.002 Portion Affected (temporary) (ac.): Unknown	Confirmation (by, date): Not required Mitigation (to be included in design): _____ Notes: Cut/fill lines are not shown on the provided corridor.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ✓ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ✓ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

This wetland extends into the forested area (southwest) which is outside the proposed ROW.

VEGETATION (Four Strata) – Use scientific names of plants.

Map Label: WTL-1

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Herb Stratum (Plot size:)			
1. Carex sp.			FACW
2. Schedonorus phoenix			FAC
3. Eleocharis palustris			OBL
4. Ranunculus abortivus			FACW
5. Scirpus atrovirens			OBL
6. Alisma subcordatum			OBL
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Map Label: WTL-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-10"	10YR 4/2	80%	7.5YR 4/6	20%	C	M	Silty clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

Ecology Field Data Sheet: **Other Resource Features**
(Caves/Rock Houses; Sinkholes; Specialized Habitats; Other)

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative D; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/06/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label	SNK-1
3- Lat/Long	N35.78000076, W83.89388115
4-Potential impact	Runoff
5-Feature name	
6-Feature description:	Large depression
what is it	Sinkhole
portion affected	<0.10 acres
approximate size	~2.5 acres
photo number	32
other	
7- HUC code & name (8 & 12-digit)	060102010106, Little River Middle Prong
8-Determination: TDOT/ consultant	CEC, Inc.
9-Determination: Confirmed? By?	Not required
10-Mitigation: to be included in design	No
11-Notes	This sink hole is very large. No throat observed.

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative D; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/06/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	WWC-4
3-Latitude/Longitude	N35.78049426, W83.89330938
4-Potential impact	Fill/runoff
5-Feature description:	
what is it	Wet weather conveyance
blue-line on topo? (y/n)	N
defined channel (y/n)	Y – poorly
straight or meandering	Straight
channel bottom width	6”
top of bank width	1.5’
bank height and slope ratio	3”; 2:1
avg. gradient of stream (%)	3%
substratum	Soil, vegetation
riffle/run/pool	N/A
width of buffer zone	LB: 0 RB: 0
water flow	No
water depth	N/A
water width	N/A
general water quality	N/A
OHWM indicators	None
groundwater connection	No
bank stability: LB, RB	Both: stable
dominant species: LB, RB	Both: fescue, hickory, hackberry
overhead canopy (%)	80%
benthos	No
fish	No
algae or other aquatic life	No
habitat assessment score	N/A
photo number (s)	33 d/g, 34 u/g
rainfall information	No rain in previous 5 days
6- HUC code & name (12-digit)	060102010106, Little River Middle Prong
7-Confirmed by:	Not required
8-Mitigation	No __X__ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No __X__ Yes_____: Habitat_____ Siltation_____
11-Assessed	No __X__ Yes_____
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	This conveyance drains into SNK-1.

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative D; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/07/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	WWC-5
3-Latitude/Longitude	N35.7759043, W83.89376801
4-Potential impact	Runoff
5-Feature description:	
what is it	Wet weather conveyance
blue-line on topo? (y/n)	N
defined channel (y/n)	Y
straight or meandering	Straight
channel bottom width	3’
top of bank width	6-8’
bank height and slope ratio	3-4’; 2:1
avg. gradient of stream (%)	<2%
Substratum	Silt, gravel, vegetation
riffle/run/pool	N/A
width of buffer zone	LB: 50’ RB: 50’
water flow	No
water depth	N/A
water width	N/A
general water quality	N/A
OHWM indicators	Sorting
groundwater connection	No
bank stability: LB, RB	Both: moderately stable
dominant species: LB, RB	Both: privet, American elm, poison ivy, hackberry, multiflora rose, Japanese honeysuckle
overhead canopy (%)	90%
benthos	No
fish	No
algae or other aquatic life	No
habitat assessment score	N/A
photo number (s)	35 d/g, 36 u/g
rainfall information	No rain in previous 5 days
6- HUC code & name (12-digit)	060102010106, Little River Middle Prong
7-Confirmed by:	Not required
8-Mitigation	No __X__ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No __X__ Yes_____: Habitat_____ Siltation_____
11-Assessed	No __X__ Yes_____
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	This conveyance begins at a headcut and drains into STR-8.

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative D; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/07/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	STR-8 (Unnamed tributary to Little River)
3-Latitude/Longitude	N35.77526799, W83.89408752
4-Potential impact	Crossing/encapsulation/fill
5-Feature description:	
what is it	Intermittent stream
blue-line on topo? (y/n)	Y
defined channel (y/n)	Y
straight or meandering	Meandering
channel bottom width	8’
top of bank width	20’
bank height and slope ratio	5-6’; 2:1
avg. gradient of stream (%)	<2%
substratum	Silt, gravel, cobble, boulder
riffle/run/pool	N/A
width of buffer zone	LB: 50’ RB: 20’
water flow	No
water depth	N/A
water width	N/A
general water quality	N/A
OHWM indicators	Clear line on bank, sorting, wrack lines
groundwater connection	Unknown
bank stability: LB, RB	Both: eroded
dominant species: LB, RB	Both: privet, hackberry, sycamore, Osage orange, black walnut
overhead canopy (%)	90%
benthos	No
fish	No
algae or other aquatic life	No
habitat assessment score	N/A
photo number (s)	37 d/s, 38 u/s
rainfall information	No rain in previous 5 days
6- HUC code & name (12-digit)	060102010106, Little River Middle Prong
7-Confirmed by:	Not required
8-Mitigation	No_____ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No __X__ Yes_____: Habitat_____ Siltation_____
11-Assessed	No __X__ Yes_____
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	This stream crosses the proposed alignment and drains into the Little River off ROW. Hydrologic determination score of 27.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Blount Co	Named Waterbody: STR-8	Date/Time: 5/7/14
Assessors/Affiliation: J Garcia, CEC, Inc		Project ID :
Site Name/Description: SR-162 Ext, Pellissippi Pkwy		
Site Location: NE of Maryville, TN		
USGS quad: —	HUC (12 digit): 060102010106	Lat/Long: 35.77526799 N 83.87408752 W
Previous Rainfall (7-days) :		
Precipitation this Season vs. Normal : very wet wet (average) dry drought unknown Source of recent & seasonal precip data :		
Watershed Size : —	Photos: (Y) or N (circle) Number : Photo summary 37437	
Soil Type(s) / Geology : —		Source:
Surrounding Land Use : Agricultural, residential		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : Severe Moderate Slight (Absent)		

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	✓	WWC
2. Defined bed and bank absent, dominated by upland vegetation / grass	✓	WWC
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	✓	WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	✓	WWC
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	✓	Stream
6. Presence of fish (except *Gambusia*)	✓	Stream
7. Presence of naturally occurring ground water table connection	✓	Stream
8. Flowing water in channel and 7 days since last precipitation in local watershed	✓	Stream
9. Evidence watercourse has been used as a supply of drinking water	✓	Stream

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = Stream

Secondary Indicator Score (if applicable) = 27

Justification / Notes :

STR-8 is the same stream as STR-3 on Alternative C.

Secondary Field Indicator Evaluation

SR 8

A. **Geomorphology** (Subtotal = 19)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	(3)
2. Sinuous channel	0	1	(2)	3
3. In-channel structure: riffle-pool sequences	0	1	(2)	3
4. Sorting of soil textures or other substrate	0	1	2	(3)
5. Active/relic floodplain	0	(1)	2	3
6. Depositional bars or benches	0	1	(2)	3
7. Braided channel	(0)	1	2	3
8. Recent alluvial deposits	0	0.5	1	(1.5)
9. Natural levees	(0)	1	2	3
10. Headcuts	0	1	(2)	3
11. Grade controls	0	0.5	1	(1.5)
12. Natural valley or drainageway	0	0.5	(1)	1.5
13. At least second order channel on existing USGS or NRCS map	No = (0)		Yes = 3	

B. **Hydrology** (Subtotal = 2)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	(0)	1	2	3
15. Water in channel and >48 hours since sig. rain	(0)	1	2	3
16. Leaf litter in channel (January – September)	1.5	1	(0.5)	0
17. Sediment on plants or on debris	0	(0.5)	1	1.5
18. Organic debris lines or piles (wrack lines)	0	0.5	(1)	1.5
19. Hydric soils in stream bed or sides of channel	No = (0)		Yes = 1.5	

C. **Biology** (Subtotal = 6)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	3	(2)	1	0
21. Rooted plants in channel [1]	(3)	2	1	0
22. Crayfish in stream (exclude in floodplain)	(0)	0.5	1	1.5
23. Bivalves/mussels	0	(1)	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel [2]	0	0.5	1	2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 27

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative D; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/07/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	WWC-6
3-Latitude/Longitude	N35.77186967, W83.8914195
4-Potential impact	Crossing/encapsulation/fill
5-Feature description:	
what is it	Wet weather conveyance
blue-line on topo? (y/n)	N
defined channel (y/n)	Y
straight or meandering	Straight
channel bottom width	2’
top of bank width	6’
bank height and slope ratio	1’; 3:1
avg. gradient of stream (%)	2%
substratum	Silt, vegetation
riffle/run/pool	N/A
width of buffer zone	LB: 0 RB: 0
water flow	No
water depth	N/A
water width	N/A
general water quality	N/A
OHWM indicators	None
groundwater connection	No
bank stability: LB, RB	Both: stable
dominant species: LB, RB	Both: fescue, winter wheat
overhead canopy (%)	0
benthos	No
fish	No
algae or other aquatic life	No
habitat assessment score	N/A
photo number (s)	39 u/g, 40 d/g
rainfall information	No rain in previous 5 days
6- HUC code & name (12-digit)	060102010106, Little River Middle Prong
7-Confirmed by:	Not required
8-Mitigation	No __X__ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No __X__ Yes_____: Habitat_____ Siltation_____
11-Assessed	No __X__ Yes_____
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	This conveyance is a field drainage that carries storm water off the surrounding agriculture field.

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative D; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/07/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	WWC-7
3-Latitude/Longitude	N35.7661253, W83.88932574
4-Potential impact	Runoff
5-Feature description:	
what is it	Wet weather conveyance
blue-line on topo? (y/n)	N
defined channel (y/n)	Y
straight or meandering	Meandering
channel bottom width	2-3’
top of bank width	4-6’
bank height and slope ratio	1’; 2:1
avg. gradient of stream (%)	1%
substratum	Silt, gravel, vegetation
riffle/run/pool	N/A
width of buffer zone	LB: 100’ RB: 100’
water flow	No
water depth	N/A
water width	N/A
general water quality	N/A
OHWM indicators	None
groundwater connection	No
bank stability: LB, RB	Both: moderately stable
dominant species: LB, RB	Both: privet, boxelder, multiflora rose, hackberry, Japanese honeysuckle
overhead canopy (%)	90%
benthos	No
fish	No
algae or other aquatic life	No
habitat assessment score	N/A
photo number (s)	41 d/g, 42 u/g
rainfall information	No rain in previous 5 days
6- HUC code & name (12-digit)	060102010106, Little River Middle Prong
7-Confirmed by:	Not required
8-Mitigation	No __X__ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No __X__ Yes_____: Habitat_____ Siltation_____
11-Assessed	No __X__ Yes_____
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	This is a short conveyance that drains storm water into STR-10 (Crooked Creek).

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative D; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/07/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	STR-9 (Gravelly Creek)
3-Latitude/Longitude	N35.76586658, W83.88879956
4-Potential impact	Crossing/encapsulation/fill
5-Feature description:	
what is it	Perennial stream
blue-line on topo? (y/n)	Y
defined channel (y/n)	Y
straight or meandering	Straight
channel bottom width	20’
top of bank width	25’
bank height and slope ratio	4’; 1:1
avg. gradient of stream (%)	1%
substratum	Silt, gravel, cobble, boulder
riffle/run/pool	10/45/45
width of buffer zone	LB: 10’ RB: 100’
water flow	Yes
water depth	1’
water width	20’
general water quality	Fair
OHWM indicators	Sorting, scouring
groundwater connection	Unknown
bank stability: LB, RB	Both: eroded
dominant species: LB, RB	Both: hackberry, boxelder, privet, black walnut, Virginia creeper, poison ivy
overhead canopy (%)	90%
benthos	Ephemeroptera, plecoptera, trichoptera
fish	Yes
algae or other aquatic life	None seen
habitat assessment score	117
photo number (s)	43 d/s, 44 u/s
rainfall information	No rain in previous 5 days
6- HUC code & name (12-digit)	060102010106, Little River Middle Prong
7-Confirmed by:	Not required
8-Mitigation	No _____ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No _____ Yes __X__: Habitat_____ Siltation __X__
11-Assessed	No _____ Yes __X__ (Not supporting)
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	STR-9 (Gravelly Creek) crosses the proposed alignment and drains into STR-10 (Crooked Creek) just outside ROW.

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative D; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/07/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	STR-10 (Crooked Creek)
3-Latitude/Longitude	N35.76599191, W83.88874282
4-Potential impact	Runoff
5-Feature description:	
what is it	Perennial stream
blue-line on topo? (y/n)	Y
defined channel (y/n)	Y
straight or meandering	Meandering
channel bottom width	30’
top of bank width	35’
bank height and slope ratio	4’; 1:1
avg. gradient of stream (%)	<2%
substratum	Silt, gravel, bedrock, cobble
riffle/run/pool	30/40/30
width of buffer zone	LB: 50’ RB: 50’
water flow	Yes
water depth	6”
water width	30’
general water quality	Poor
OHWM indicators	Clear line on bank, wrack lines
groundwater connection	Unknown
bank stability: LB, RB	Both: undercut
dominant species: LB, RB	Both: hackberry, boxelder, sycamore, privet, multiflora rose
overhead canopy (%)	70%
benthos	Ephemeroptera, plecoptera, trichoptera
fish	Yes
algae or other aquatic life	Filamentous green algae
habitat assessment score	148
photo number (s)	45 u/s, 46 d/s
rainfall information	No rain in previous 5 days
6- HUC code & name (12-digit)	060102010106, Little River Middle Prong
7-Confirmed by:	Not required
8-Mitigation	No _____ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No _____ Yes __X__: Habitat __X__ Siltation_____
11-Assessed	No _____ Yes __X__ (Not supporting)
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	STR-10 (Crooked Creek) flows south to north just outside the proposed ROW before draining into the Little River.

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative D; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/07/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	PND-3
3-Latitude/Longitude	N35.76218208, W83.88518202
4-Potential impact	Fill/runoff
5-Feature description:	
what is it	Pond
blue-line on topo? (y/n)	N
defined channel (y/n)	N
straight or meandering	N/A
channel bottom width	N/A
top of bank width	N/A
bank height and slope ratio	N/A
avg. gradient of stream (%)	N/A
substratum	Silt, muck
riffle/run/pool	N/A
width of buffer zone	LB: 0 RB: 0
water flow	No
water depth	~3’
water width	50’ x 50’
general water quality	Poor
OHWM indicators	None
groundwater connection	Unknown
bank stability: LB, RB	Both: stable
dominant species: LB, RB	Both: white pine, bald cypress, goldenrod, bluestem, weeping willow
overhead canopy (%)	10%
benthos	Not sampled
fish	None seen
algae or other aquatic life	Filamentous green algae
habitat assessment score	N/A
photo number (s)	47
rainfall information	No rain in previous 5 days
6- HUC code & name (12-digit)	060102010106, Little River Middle Prong
7-Confirmed by:	Not required
8-Mitigation	No __X__ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No __X__ Yes_____: Habitat_____ Siltation_____
11-Assessed	No __X__ Yes_____
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative D; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/07/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	WWC-8
3-Latitude/Longitude	N35.76143277, W83.88376632
4-Potential impact	Runoff
5-Feature description:	
what is it	Wet weather conveyance
blue-line on topo? (y/n)	N
defined channel (y/n)	Y
straight or meandering	Straight
channel bottom width	1’
top of bank width	4’
bank height and slope ratio	1’; 3:1
avg. gradient of stream (%)	1%
substratum	Silt, gravel, vegetation
riffle/run/pool	N/A
width of buffer zone	LB: 20’ RB: 20’
water flow	No
water depth	N/A
water width	N/A
general water quality	N/A
OHWM indicators	None
groundwater connection	No
bank stability: LB, RB	Both: stable
dominant species: LB, RB	Both: boxelder, fescue, Virginia creeper, Japanese honeysuckle, privet
overhead canopy (%)	100%
benthos	No
fish	No
algae or other aquatic life	No
habitat assessment score	N/A
photo number (s)	48 d/g
rainfall information	No rain in previous 5 days
6- HUC code & name (12-digit)	060102010106, Little River Middle Prong
7-Confirmed by:	Not required
8-Mitigation	No __X__ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No __X__ Yes_____: Habitat_____ Siltation_____
11-Assessed	No __X__ Yes_____
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative C; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/07/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	WWC-1
3-Latitude/Longitude	N35.78467971, W83.90951683
4-Potential impact	Fill/runoff
5-Feature description:	
what is it	Wet weather conveyance
blue-line on topo? (y/n)	N
defined channel (y/n)	Y
straight or meandering	Meandering
channel bottom width	1’
top of bank width	3’
bank height and slope ratio	1’; 2:1
avg. gradient of stream (%)	2%
substratum	Silt, vegetation, leaf litter
riffle/run/pool	N/A
width of buffer zone	LB: >100’ RB: 50’
water flow	No
water depth	N/A
water width	N/A
general water quality	N/A
OHWM indicators	None
groundwater connection	No
bank stability: LB, RB	Both: stable
dominant species: LB, RB	Both: privet, hackberry, moss, briar
overhead canopy (%)	95%
benthos	No
fish	No
algae or other aquatic life	No
habitat assessment score	N/A
photo number (s)	49 d/g, 50 u/g
rainfall information	No rain in previous 6 days
6- HUC code & name (12-digit)	060102010107, Little River Nails Creek
7-Confirmed by:	Not required
8-Mitigation	No __X__ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No __X__ Yes_____: Habitat_____ Siltation_____
11-Assessed	No __X__ Yes_____
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	WWC-1 is located in a forested area and is draining storm water to WWC-2.

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative C; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/07/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	WWC-2
3-Latitude/Longitude	N35.78391114, W83.90829976
4-Potential impact	Fill/runoff
5-Feature description:	
what is it	Wet weather conveyance
blue-line on topo? (y/n)	N
defined channel (y/n)	Y
straight or meandering	Meandering
channel bottom width	3’
top of bank width	10’
bank height and slope ratio	3’; 1:1
avg. gradient of stream (%)	2%
substratum	Silt, vegetation, leaf litter
riffle/run/pool	N/A
width of buffer zone	LB: >100’ RB: >100’
water flow	No
water depth	N/A
water width	N/A
general water quality	N/A
OHWM indicators	Scouring
groundwater connection	No
bank stability: LB, RB	Both: eroded
dominant species: LB, RB	Both: tulip poplar, red oak, holly, hickory
overhead canopy (%)	95%
benthos	No
fish	No
algae or other aquatic life	No
habitat assessment score	N/A
photo number (s)	51 u/g, 52 d/g
rainfall information	No rain in previous 6 days
6- HUC code & name (12-digit)	060102010107, Little River Nails Creek
7-Confirmed by:	Not required
8-Mitigation	No __X__ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No __X__ Yes_____: Habitat_____ Siltation_____
11-Assessed	No __X__ Yes_____
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	This conveyance runs just outside the proposed ROW and is draining storm water into STR-1 (Peppermint Branch).

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative C; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/07/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	STR-1 (Peppermint Branch)
3-Latitude/Longitude	N35.78303418, W83.90595703
4-Potential impact	Crossing/encapsulation/fill
5-Feature description:	
what is it	Perennial stream
blue-line on topo? (y/n)	Y
defined channel (y/n)	Y
straight or meandering	Meandering
channel bottom width	4’
top of bank width	12’
bank height and slope ratio	4’; 1:1
avg. gradient of stream (%)	2%
substratum	Silt, gravel, cobble
riffle/run/pool	40/40/20
width of buffer zone	LB: 0 RB: 100’
water flow	Yes
water depth	3”
water width	4’
general water quality	Fair
OHWM indicators	Clear line on bank, Sorting
groundwater connection	Unknown
bank stability: LB, RB	Both: eroded
dominant species: LB, RB	Both: tulip poplar, fescue, redbud, hackberry, privet
overhead canopy (%)	70%
benthos	Ephemroptera, trichoptera
fish	None seen
algae or other aquatic life	None seen
habitat assessment score	102
photo number (s)	53 u/s, 54 d/s
rainfall information	No rain in previous 6 days
6- HUC code & name (12-digit)	060102010107, Little River Nails Creek
7-Confirmed by:	Not required
8-Mitigation	No_____ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No _____ Yes __X__: Habitat_____ Siltation __X__
11-Assessed	No _____ Yes __X__ (Not supporting)
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	This stream crosses the proposed alignment and eventually drains into the Little River off ROW.

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative C; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/07/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	STR-2 (Unnamed tributary to Peppermint Branch)
3-Latitude/Longitude	N35.78283476, W83.90584282
4-Potential impact	Fill/runoff
5-Feature description:	
what is it	Perennial stream
blue-line on topo? (y/n)	Y
defined channel (y/n)	Y
straight or meandering	Meandering
channel bottom width	3’
top of bank width	4’
bank height and slope ratio	1’; 1:1
avg. gradient of stream (%)	2%
substratum	Silt, vegetation, gravel
riffle/run/pool	45/45/10
width of buffer zone	LB: >100’ RB: 0
water flow	Yes
water depth	1”
water width	3’
general water quality	Good
OHWM indicators	Scouring, clear line on bank
groundwater connection	Unknown
bank stability: LB, RB	Both: eroded
dominant species: LB, RB	LB: privet, multiflora rose, hackberry; RB: fescue
overhead canopy (%)	20%
benthos	None seen
fish	None seen
algae or other aquatic life	None seen
habitat assessment score	96
photo number (s)	55 u/s, 56 d/s
rainfall information	No rain in previous 6 days
6- HUC code & name (12-digit)	060102010107, Little River Nails Creek
7-Confirmed by:	Not required
8-Mitigation	No_____ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No __X__ Yes_____: Habitat_____ Siltation_____
11-Assessed	No __X__ Yes_____
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	This stream drains into STR-1 (Peppermint Branch) just outside the proposed ROW.

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative C; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/07/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	STR-3 (Unnamed tributary to Little River)
3-Latitude/Longitude	N35.77526235, W83.89413778
4-Potential impact	Crossing/encapsulation/fill
5-Feature description:	
what is it	Intermittent stream
blue-line on topo? (y/n)	Y
defined channel (y/n)	Y
straight or meandering	Meandering
channel bottom width	8’
top of bank width	20’
bank height and slope ratio	5’; 1:1
avg. gradient of stream (%)	2%
substratum	Silt, gravel, cobble, boulder
riffle/run/pool	N/A
width of buffer zone	LB: 20’ RB: 20’
water flow	No
water depth	N/A
water width	N/A
general water quality	N/A
OHWM indicators	Clear line on bank, scouring
groundwater connection	Unknown
bank stability: LB, RB	Both: eroded
dominant species: LB, RB	Both: hackberry, privet, sycamore
overhead canopy (%)	95%
benthos	No
fish	No
algae or other aquatic life	No
habitat assessment score	N/A
photo number (s)	57 u/s, 58 d/s
rainfall information	No rain in previous 6 days
6- HUC code & name (12-digit)	060102010106, Little River Middle Prong
7-Confirmed by:	Not required
8-Mitigation	No_____ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No __X__ Yes_____: Habitat_____ Siltation_____
11-Assessed	No __X__ Yes_____
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	This stream crosses the proposed alignment and eventually drains into the Little River off ROW. Hydrologic determination score of 27.

STR 3

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Blount Co	Named Waterbody: STR-3 (c)	Date/Time: 5/7/14
Assessors/Affiliation: J. Garcia CEC, Inc		Project ID :
Site Name/Description: SR-162 Ext Bellisippi Pkwy		
Site Location: NE of Maryville TN		
USGS quad: —	HUC (12 digit):	Lat/Long:
Previous Rainfall (7-days) :		
Precipitation this Season vs. Normal : very wet wet (average) dry drought unknown Source of recent & seasonal precip data :		
Watershed Size :	Photos: Y or N (circle) Number : S7, S8	
Soil Type(s) / Geology : —		Source:
Surrounding Land Use :		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : Severe Moderate Slight Absent		

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	/	WWC
2. Defined bed and bank absent, dominated by upland vegetation / grass	/	WWC
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	/	WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	/	WWC
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	/	Stream
6. Presence of fish (except *Gambusia*)	/	Stream
7. Presence of naturally occurring ground water table connection	/	Stream
8. Flowing water in channel and 7 days since last precipitation in local watershed	/	Stream
9. Evidence watercourse has been used as a supply of drinking water	/	Stream

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = Stream

Secondary Indicator Score (if applicable) = 27

Justification / Notes :

STR - 3

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 19)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	(3)
2. Sinuous channel	0	1	(2)	3
3. In-channel structure: riffle-pool sequences	0	1	(2)	3
4. Sorting of soil textures or other substrate	0	1	2	(3)
5. Active/relic floodplain	0	(1)	2	3
6. Depositional bars or benches	(0)	1	(2)	3
7. Braided channel	(0)	1	2	3
8. Recent alluvial deposits	0	0.5	1	(1.5)
9. Natural levees	(0)	1	2	3
10. Headcuts	0	1	(2)	3
11. Grade controls	0	0.5	1	(1.5)
12. Natural valley or drainageway	0	0.5	(1)	1.5
13. At least second order channel on existing USGS or NRCS map	No = (0)		Yes = 3	

B. **Hydrology** (Subtotal = 2)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	(0)	1	2	3
15. Water in channel and >48 hours since sig. rain	(0)	1	2	3
16. Leaf litter in channel (January – September)	1.5	1	(0.5)	0
17. Sediment on plants or on debris	0	(0.5)	1	1.5
18. Organic debris lines or piles (wrack lines)	0	0.5	(1)	1.5
19. Hydric soils in stream bed or sides of channel	No = (0)		Yes = 1.5	

C. **Biology** (Subtotal = 6)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	3	(2)	1	0
21. Rooted plants in channel [1]	(3)	2	1	0
22. Crayfish in stream (exclude in floodplain)	(0)	0.5	1	1.5
23. Bivalves/mussels	0	(1)	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel [2]	0	0.5	1	2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 27

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative C; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/07/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	STR-4 (Gravelly Creek)
3-Latitude/Longitude	N35.76485954, W83.89032228
4-Potential impact	Crossing/encapsulation/fill
5-Feature description:	
what is it	Perennial stream
blue-line on topo? (y/n)	Y
defined channel (y/n)	Y
straight or meandering	Meandering
channel bottom width	12’
top of bank width	20’
bank height and slope ratio	3’; 1:1
avg. gradient of stream (%)	<2%
substratum	Silt, gravel
riffle/run/pool	30/40/30
width of buffer zone	LB: 5’ RB: 20’
water flow	Yes
water depth	2-8”
water width	12’
general water quality	Fair
OHWM indicators	Scouring, wrack lines, clear line on bank
groundwater connection	Unknown
bank stability: LB, RB	Both: eroded
dominant species: LB, RB	Both: boxelder, privet, sycamore
overhead canopy (%)	90%
benthos	Ephemeroptera, trichoptera, isopod
fish	Yes
algae or other aquatic life	None seen
habitat assessment score	116
photo number (s)	59 u/s, 60 d/s
rainfall information	No rain in previous 6 days
6- HUC code & name (12-digit)	060102010106, Little River Middle Prong
7-Confirmed by:	Not required
8-Mitigation	No_____ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No _____ Yes __X__: Habitat_____ Siltation __X__
11-Assessed	No _____ Yes __X__ (Not supporting)
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	STR-4 (Gravelly Creek) crosses the proposed alignment and drains off ROW into Crooked Creek.

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternatives C and D; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/06/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	STR-5 (Flag Branch)
3-Latitude/Longitude	N35.76411882, W83.89121303
4-Potential impact	Runoff
5-Feature description:	
what is it	Perennial stream
blue-line on topo? (y/n)	Y
defined channel (y/n)	Y
straight or meandering	Meandering
channel bottom width	10’
top of bank width	18’
bank height and slope ratio	2’; 2:1
avg. gradient of stream (%)	<2%
substratum	Silt, gravel, leaf litter
riffle/run/pool	20/40/40
width of buffer zone	LB: 5’ RB: 5’
water flow	Yes
water depth	2”
water width	10’
general water quality	Good
OHWM indicators	Wrack lines, sorting
groundwater connection	Unknown
bank stability: LB, RB	Both: eroded
dominant species: LB, RB	Both: privet, boxelder, hickory, fescue
overhead canopy (%)	80%
benthos	Ephemeroptera, trichoptera
fish	Yes
algae or other aquatic life	None seen
habitat assessment score	98
photo number (s)	61 u/s, 62 d/s
rainfall information	No rain in previous 6 days
6- HUC code & name (12-digit)	060102010106, Little River Middle Prong
7-Confirmed by:	Not required
8-Mitigation	No_____ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No _____ Yes __X__: Habitat_____ Siltation __X__
11-Assessed	No _____ Yes __X__ (Not supporting)
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	STR-5 (Flag Branch) drains into STR-4 (Gravelly Creek) just before it crosses the proposed alignment.

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative C; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/07/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	WWC-3
3-Latitude/Longitude	N35.76359396, W83.89139799
4-Potential impact	Runoff
5-Feature description:	
what is it	Wet weather conveyance
blue-line on topo? (y/n)	N
defined channel (y/n)	Y
straight or meandering	Straight
channel bottom width	1’
top of bank width	3’
bank height and slope ratio	1’; 2:1
avg. gradient of stream (%)	<2%
substratum	Silt, vegetation
riffle/run/pool	N/A
width of buffer zone	LB: 0 RB: 0
water flow	No
water depth	N/A
water width	N/A
general water quality	N/A
OHWM indicators	None
groundwater connection	Yes – WTL-1
bank stability: LB, RB	Both: stable
dominant species: LB, RB	Both: fescue, spike rush, green bulrush, littleleaf buttercup
overhead canopy (%)	0
benthos	No
fish	No
algae or other aquatic life	No
habitat assessment score	N/A
photo number (s)	64 u/g, 65 d/g
rainfall information	No rain in previous 6 days
6- HUC code & name (12-digit)	060102010106, Little River Middle Prong
7-Confirmed by:	Not required
8-Mitigation	No _____ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No __X__ Yes_____: Habitat_____ Siltation_____
11-Assessed	No __X__ Yes_____
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	This channel serves to drain surface water from WTL-1 into STR-5 (Flag Branch).

Ecology Field Data Sheet: **Water Resources**

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative C; Blount County;
PIN: 101423.00; **Project#:** 05097-0229-14
Date of survey: 5/07/2014 **Biologist:** J. Garcia/C. Hertwig **Affiliation:** CEC, Inc.

1-Station: from plans	N/A
2-Map label and name	WWC-4
3-Latitude/Longitude	N35.76245878, W83.88980234
4-Potential impact	Fill/runoff
5-Feature description:	
what is it	Wet weather conveyance
blue-line on topo? (y/n)	N
defined channel (y/n)	Y
straight or meandering	Straight
channel bottom width	2-3’
top of bank width	6-8’
bank height and slope ratio	2’; 2:1
avg. gradient of stream (%)	2%
substratum	Silt/clay
riffle/run/pool	N/A
width of buffer zone	LB: 0 RB: 0
water flow	No
water depth	N/A
water width	N/A
general water quality	N/A
OHWM indicators	None
groundwater connection	No
bank stability: LB, RB	Both: eroded
dominant species: LB, RB	Both: Japanese honeysuckle, multiflora rose, fescue, grapevine, privet, wild onion
overhead canopy (%)	0
benthos	No
fish	No
algae or other aquatic life	No
habitat assessment score	N/A
photo number (s)	66 u/g, 67 d/g
rainfall information	No rain in previous 6 days
6- HUC code & name (12-digit)	060102010106, Little River Middle Prong
7-Confirmed by:	Not required
8-Mitigation	No _____ Yes_____ : (include on Form J)
9-ETW	No __X__ Yes_____
10-303 (d) List	No __X__ Yes_____: Habitat_____ Siltation_____
11-Assessed	No __X__ Yes_____
12-Notes Estimate size (acres) of lake or pond if applicable; provide any pertinent information needed to better describe feature; indicate if hydrologic determination form was completed.	

Photo 1 (3111): (Alternative D) Downstream view of STR-1.

Photo 2 (3112): (Alternative D) Upstream view of STR-1.

Photo 3 (3113): (Alternative D) Western view of WTL-1.

Photo 4 (3114): (Alternative D) Eastern view of WTL-1.

Photo 5 (3115): (Alternative D) Upstream view of STR-2 on east side of Sam Houston School Road.

Photo 6 (3116): (Alternative D) Downstream view of STR-2 on east side of Sam Houston School Road.

Photo 7 (3117): (Alternative D) Downstream view of STR-2 on west side of Sam Houston School Road.

Photo 8 (3118): (Alternative D) Upstream view of STR-2 on west side of Sam Houston School Road.

Photo 9 (3119): (Alternative D) Eastern view of PND-1.

Photo 10 (3120): (Alternative D) Up gradient view of WWC-1 looking west.

Photo 11 (3121): (Alternative D) Down gradient view of WWC-1 looking east.

Photo 12 (3122): (Alternative D) Upstream view of STR-3 looking southeast.

Photo 13 (3123): (Alternative D) Downstream view of STR-3.

Photo 14 (3124): (Alternative D) View of STR-3 culvert on the west side of Sam Houston School Road.

Photo 15 (3125): (Alternative D) Downstream view of STR-3 on the east side of Sam Houston School Road.

Photo 16 (3126): (Alternative D) Upstream view of STR-3 on the east side of Sam Houston School Road.

Photo 17 (3127): (Alternative D) Downstream view of STR-4.

Photo 18 (3128): (Alternative D) Upstream view of STR-4.

Photo 19 (3130): (Alternative D) View of PND-2 looking northwest.

Photo 20 (3131): (Alternative D) Upstream view of STR-5.

Photo 21 (3132): (Alternative D) Downstream view of STR-5.

Photo 22 (3133): (Alternative D) Down gradient view of WWC-2.

Photo 23 (3134): (Alternative D) Up gradient view of WWC-2.

Photo 24 (3135): (Alternative D) Downstream view of STR-6.

Photo 25 (3136): (Alternative D) Upstream view of STR-6.

Photo 26 (3137): (Alternative D) Downstream view of STR-7 (Peppermint Branch).

Photo 27 (3138): (Alternative D) Upstream view of STR-7 (Peppermint Branch).

Photo 28 (3139): (Alternative D) Up gradient view of WWC-3.

Photo 29 (3140): (Alternative D) Down gradient view of WWC-3.

Photo 30 (3141): (Alternative D) Up gradient view of WWC-3. View is further up gradient of the conveyance.

Photo 31 (3142): (Alternative D) Down gradient view of WWC-3. View is further up gradient of the conveyance.

Photo 32 (3143): (Alternative D) View of closed throat sink hole (SNK-1). Feature located west of Sam Houston School Road.

Photo 33 (3144): (Alternative D) Down gradient view of WWC-4.

Photo 34 (3145): (Alternative D) Up gradient view of WWC-4.

Photo 35 (3146): (Alternative D) Down gradient view of WWC-5.

Photo 36 (3147): (Alternative D) Up gradient view of WWC-5.

Photo 37 (3148): (Alternative D) Downstream view of STR-8.

Photo 38 (3149): (Alternative D) Upstream view of STR-8.

Photo 39 (3150): (Alternative D) Up gradient view of WWC-6.

Photo 40 (3151): (Alternative D) Down gradient view of WWC-6.

Photo 41 (3152): (Alternative D) Down gradient view of WWC-7.

Photo 42 (3153): (Alternative D) Up gradient view of WWC-7.

Photo 43 (3154): (Alternative D) Downstream view of STR-9 (Gravelly Creek).

Photo 44 (3155): (Alternative D) Upstream view of STR-9 (Gravelly Creek).

Photo 45 (3156): (Alternative D) Upstream view of STR-10 (Crooked Creek).

Photo 46 (3157): (Alternative D) Downstream view of STR-10 (Crooked Creek).

Photo 47 (3158): (Alternative D) View of PND-3 looking south.

Photo 48 (3159): (Alternative D) Down gradient view of WWC-8. Visibility was poor due to dense vegetation.

Photo 49 (3160): (Alternative C) Down gradient view of WWC-1.

Photo 50 (3161): (Alternative C) Up gradient view of WWC-1.

Photo 51 (3162): (Alternative C) Up gradient view of WWC-2.

Photo 52 (3163): (Alternative C) Down gradient view of WWC-2.

Photo 53 (3164): (Alternative C) Upstream view of STR-1 (Peppermint Branch).

Photo 54 (3165): (Alternative C) Downstream view of STR-1 (Peppermint Branch).

Photo 55 (3166): (Alternative C) Upstream view of STR-2.

Photo 56 (3167): (Alternative C) Downstream view of STR-2.

Photo 57 (3168): (Alternative C) Upstream view of STR-3.

Photo 58 (3169): (Alternative C) Downstream view of STR-3.

Photo 59 (3170): (Alternative C) Upstream view of STR-4 (Gravelly Creek).

Photo 60 (3171): (Alternative C) Downstream view of STR-4 (Gravelly Creek).

Photo 61 (3172): (Alternative C) Upstream view of STR-5 (Flag Branch).

Photo 62 (3173): (Alternative C) Downstream view of STR-5 (Flag Branch).

Photo 63 (3174): (Alternative C) View of WTL-1 looking south.

Photo 64 (3175): (Alternative C) Up gradient view of WWC-3.

Photo 65 (3176): (Alternative C) Down gradient view of WWC-3.

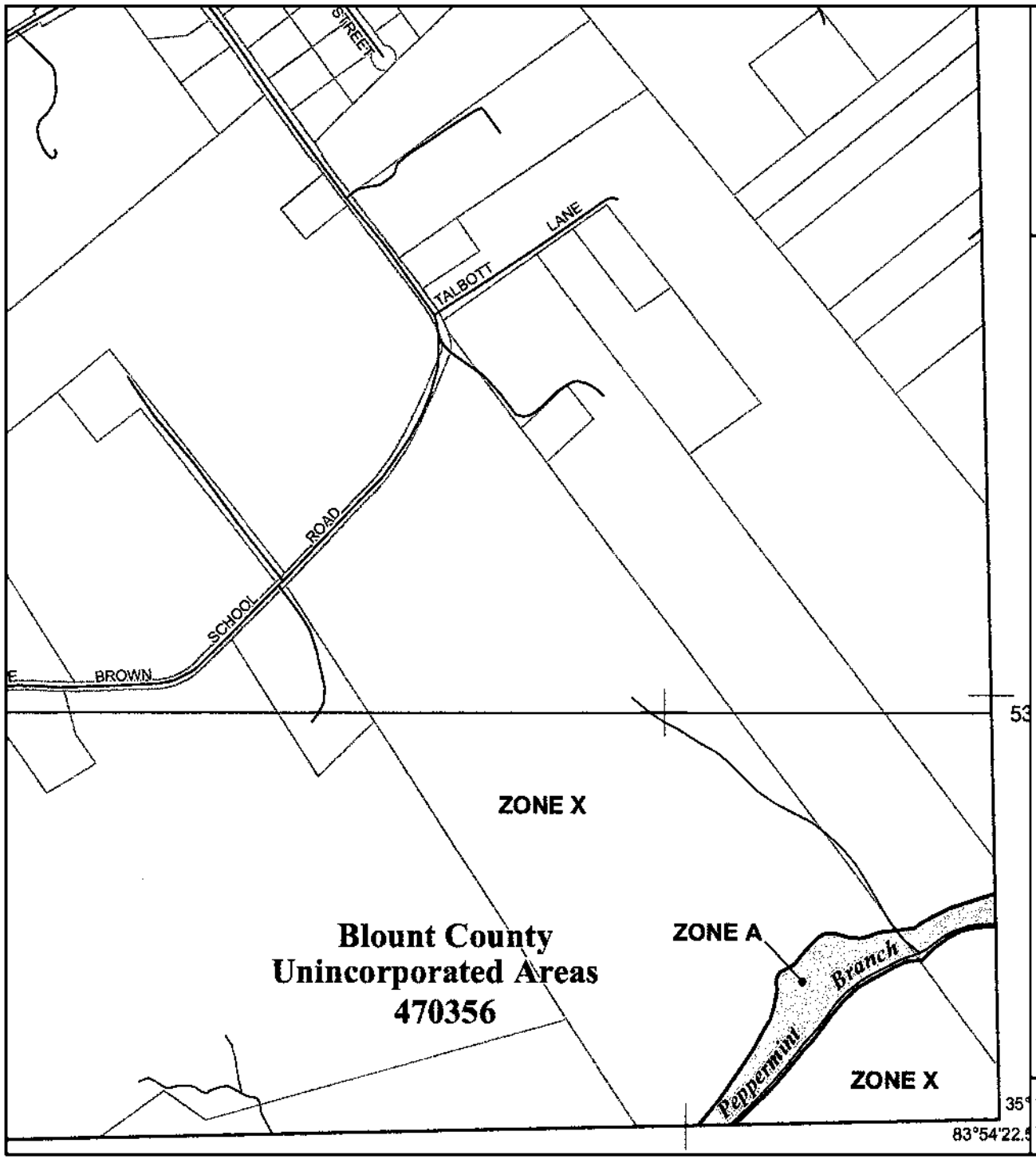
Photo 66 (3177): (Alternative C) Up gradient view of WWC-4.

Photo 67 (3178): (Alternative C) Down gradient view of WWC-4.

Appendix B
FEMA Flood Insurance Rate Map

FEMA FIRMS

Alternative C



MAP SCALE 1" = 500'

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NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0141C

FIRM

FLOOD INSURANCE RATE MAP

BLOUNT COUNTY, TENNESSEE

AND INCORPORATED AREAS

PANEL 141 OF 475

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

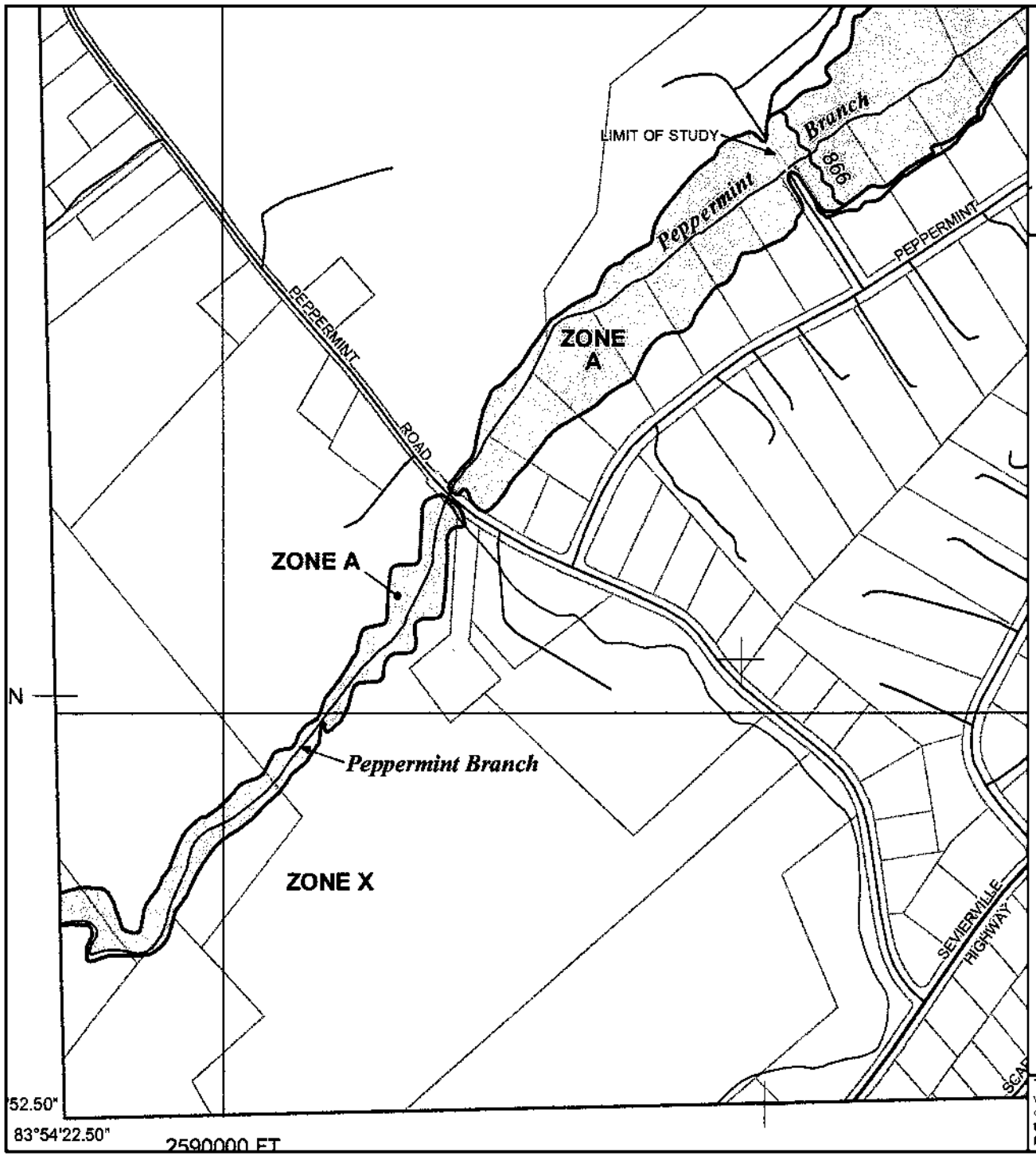
COMMUNITY	NUMBER	PANEL	SUFFIX
BLOUNT COUNTY	470356	0141	C

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
47009C0141C

EFFECTIVE DATE
SEPTEMBER 19, 2007

Federal Emergency Management Agency



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PANEL 0142C

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

BLOUNT COUNTY, TENNESSEE

AND INCORPORATED AREAS

PANEL 142 OF 475

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BLOUNT COUNTY	470358	0142	C

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47009C0142C

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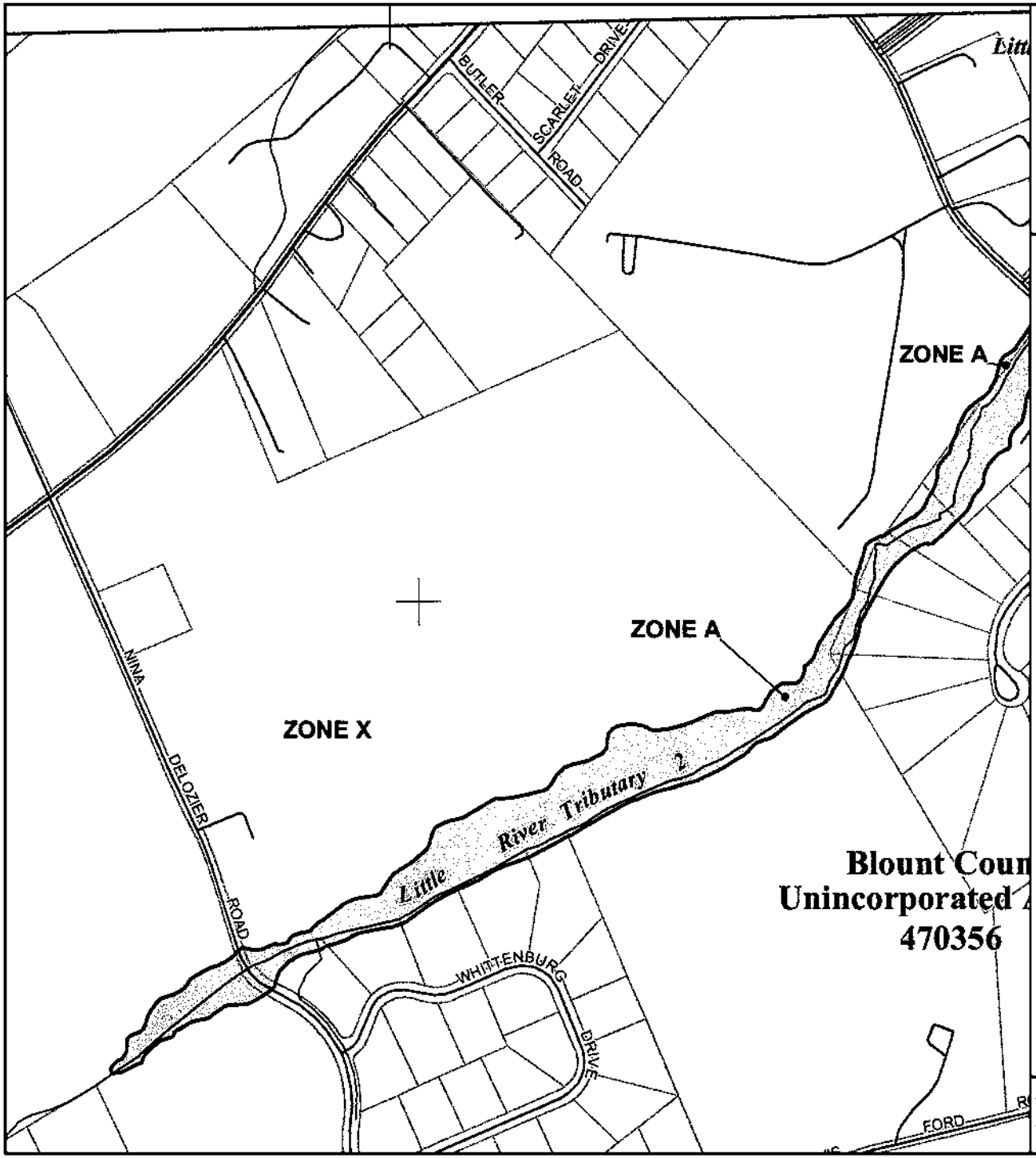

MAP SCALE 1" = 500'

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NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0144C

FIRM

FLOOD INSURANCE RATE MAP

BLOUNT COUNTY, TENNESSEE

AND INCORPORATED AREAS

PANEL 144 OF 475

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BLOUNT COUNTY	470356	0144	C

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MAP NUMBER
47009C0144C

EFFECTIVE DATE
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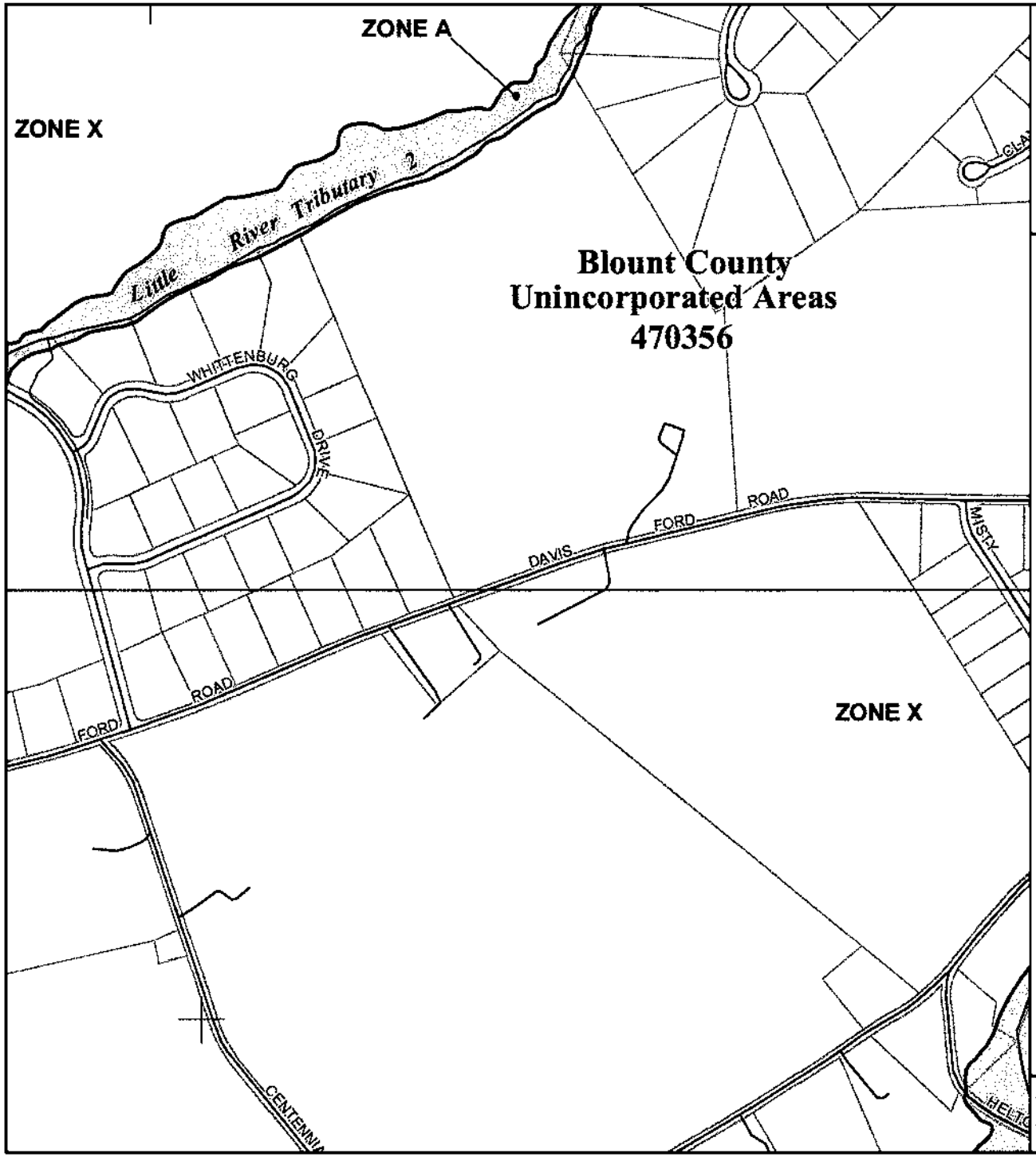

MAP SCALE 1" = 500'

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NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0144C

FIRM

FLOOD INSURANCE RATE MAP

BLOUNT COUNTY, TENNESSEE

AND INCORPORATED AREAS

PANEL 144 OF 475

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

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BLOUNT COUNTY	470356	0144	C

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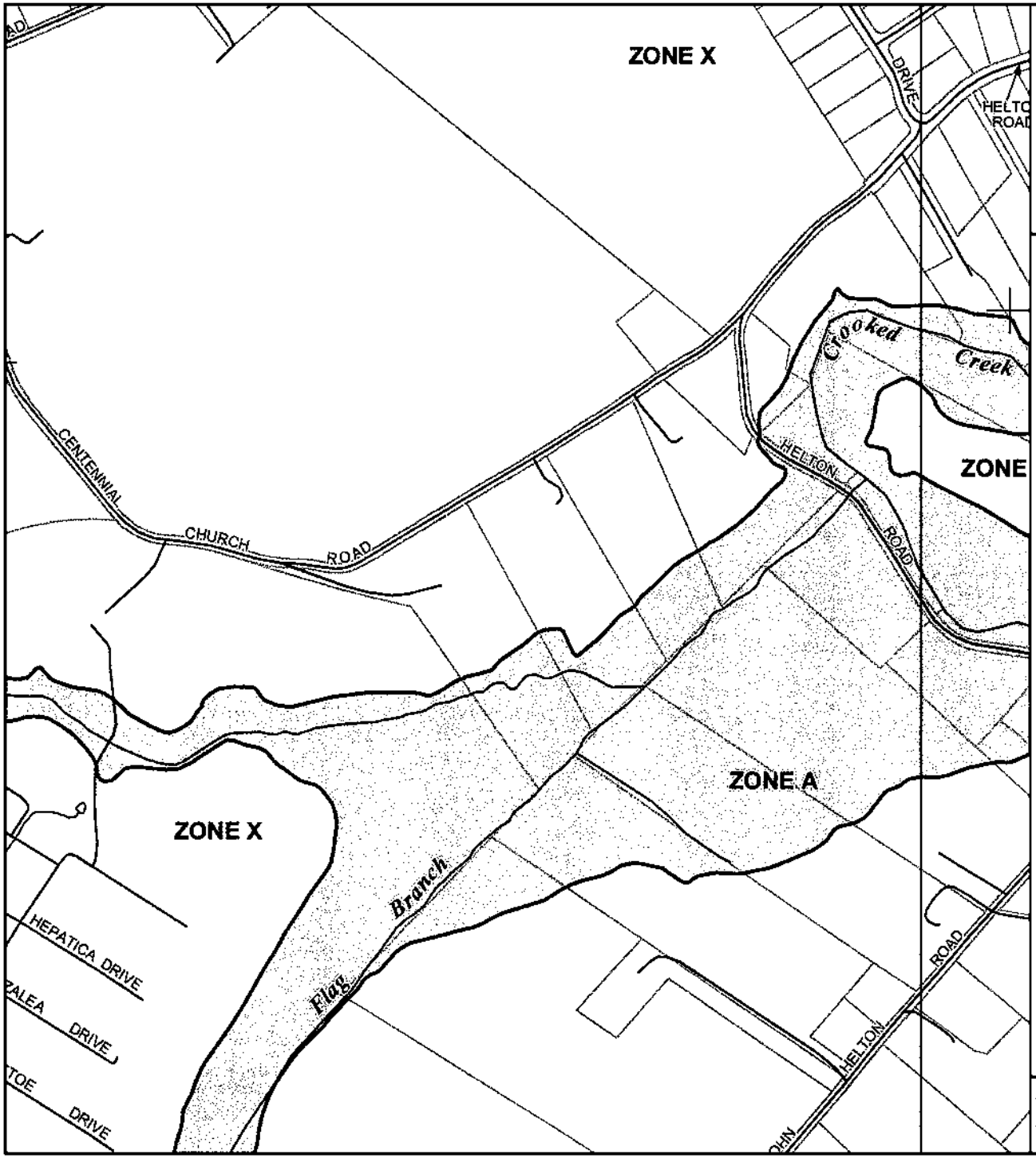

MAP SCALE 1" = 500'

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PANEL 0144C

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

BLOUNT COUNTY, TENNESSEE

AND INCORPORATED AREAS

PANEL 144 OF 475

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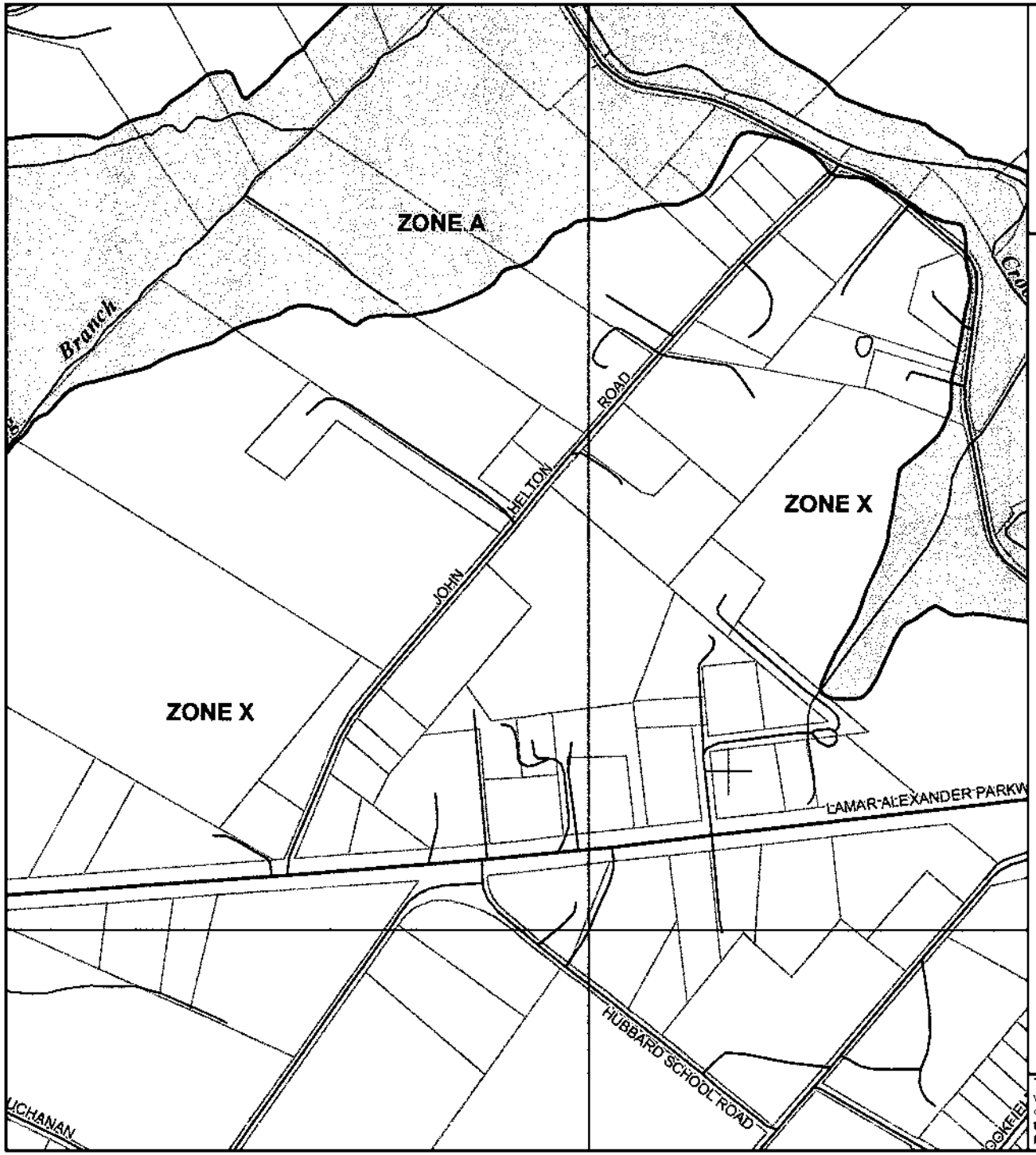
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



MAP SCALE 1" = 500'

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NATIONAL FLOOD INSURANCE PROGRAM

FIRM

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BLOUNT COUNTY, TENNESSEE

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PANEL 144 OF 475

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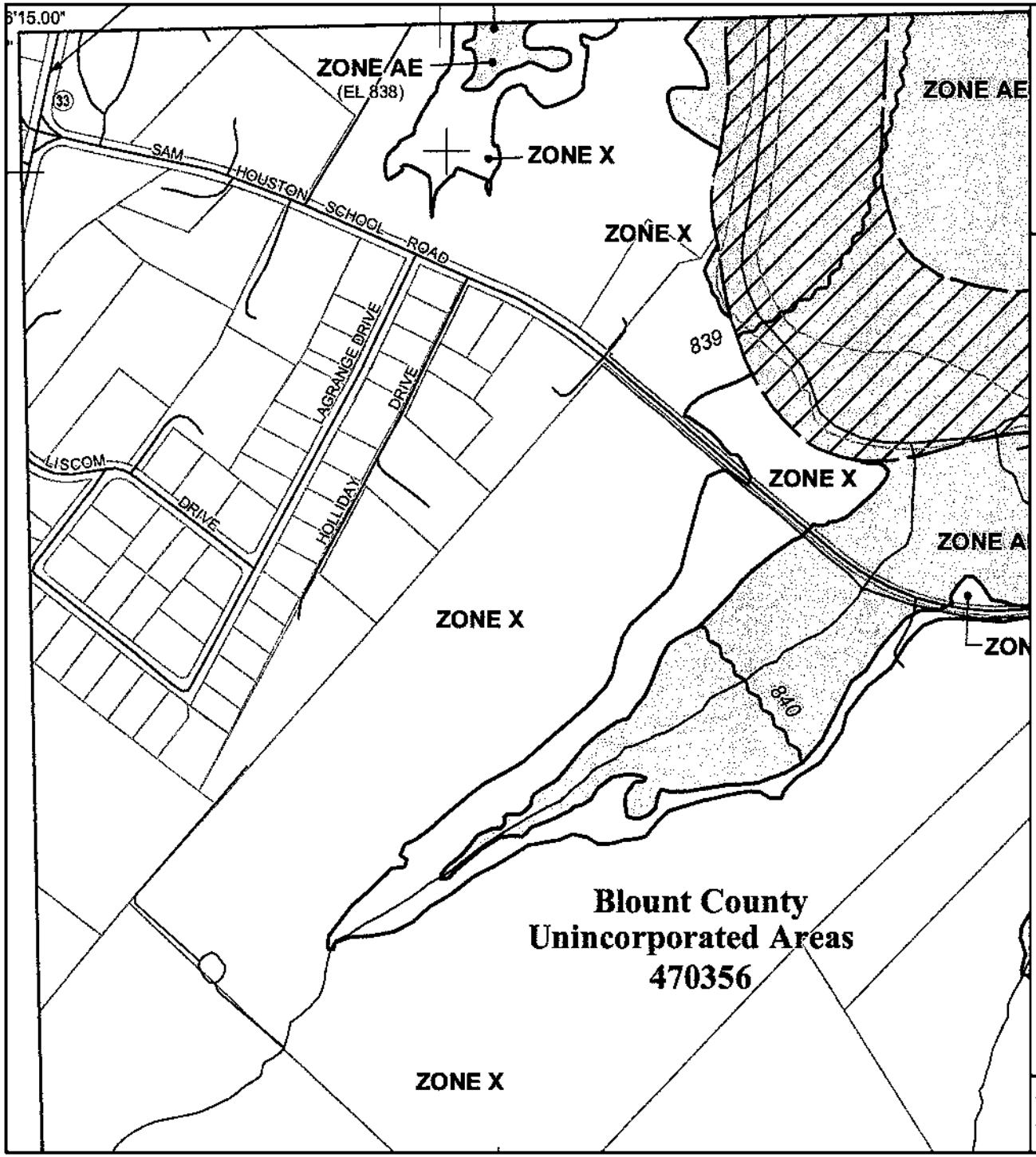
Federal Emergency Management Agency

FEMA FIRMS

Alternative D



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PANEL 0141C

FIRM

FLOOD INSURANCE RATE MAP

BLOUNT COUNTY, TENNESSEE

AND INCORPORATED AREAS

PANEL 141 OF 475

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BLOUNT COUNTY	470356	0141	C

NATIONAL FLOOD INSURANCE PROGRAM

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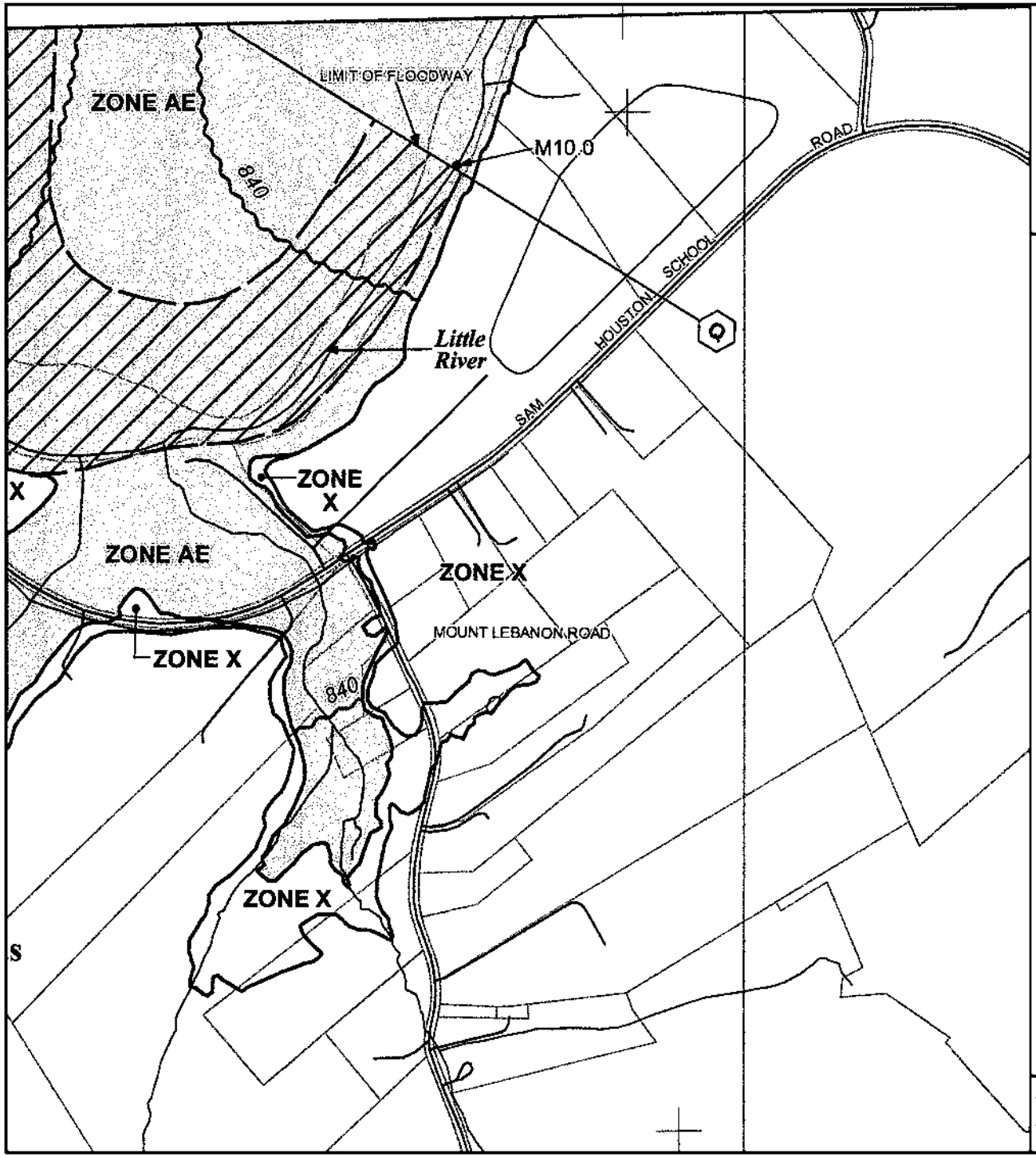

MAP SCALE 1" = 500'

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PANEL 0141C

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

BLOUNT COUNTY, TENNESSEE

AND INCORPORATED AREAS

PANEL 141 OF 475

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BLOUNT COUNTY	470356	0141	C

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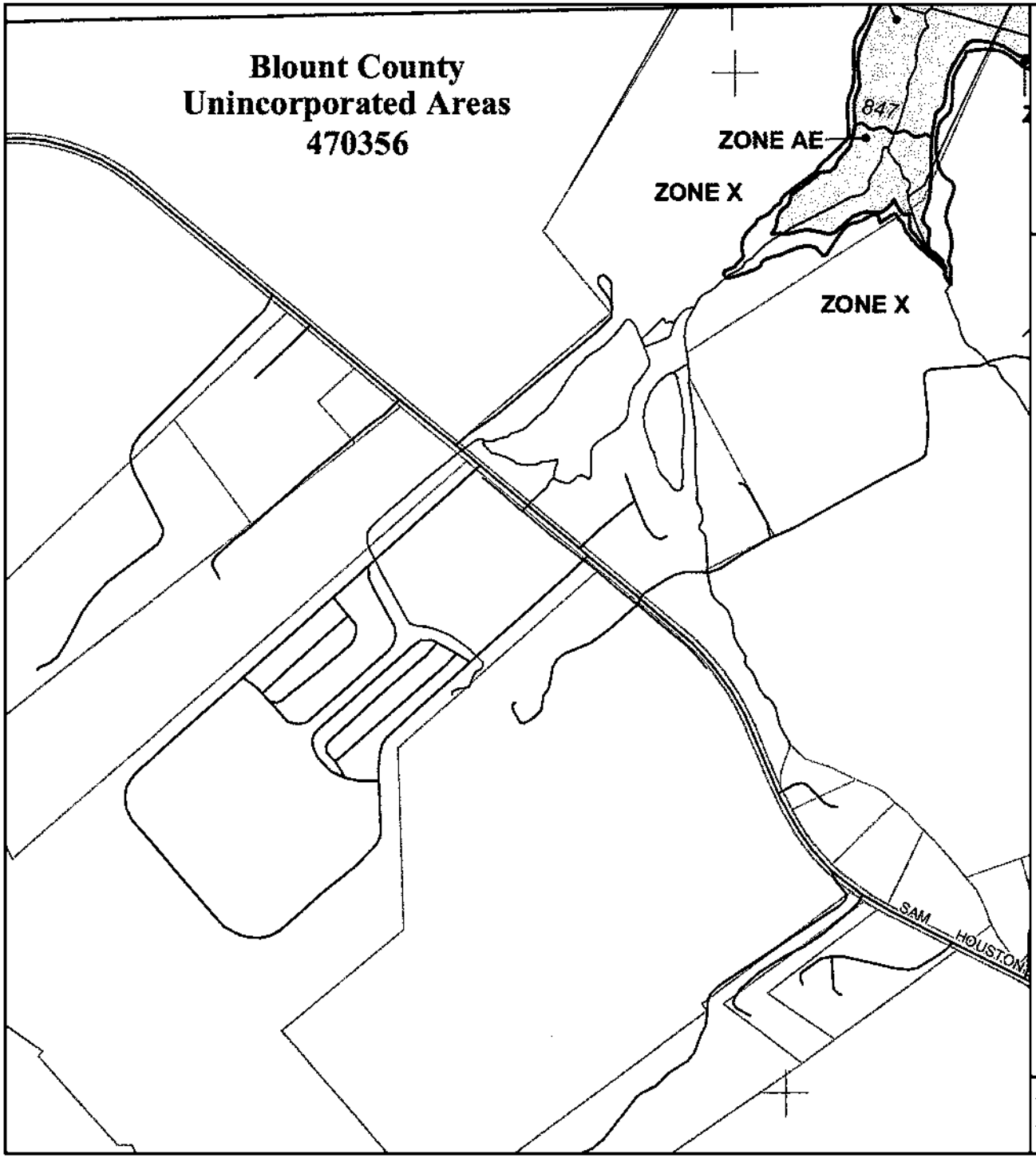

MAP SCALE 1" = 500'

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NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0141C

FIRM

FLOOD INSURANCE RATE MAP

BLOUNT COUNTY, TENNESSEE

AND INCORPORATED AREAS

PANEL 141 OF 475

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BLOUNT COUNTY	470356	0141	C

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Federal Emergency Management Agency

MAP SCALE 1" = 500'

250 0 500 1000 FEET

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0141C

FIRM

FLOOD INSURANCE RATE MAP

BLOUNT COUNTY, TENNESSEE

AND INCORPORATED AREAS

PANEL 141 OF 475

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BLOUNT COUNTY	470356	0141	C

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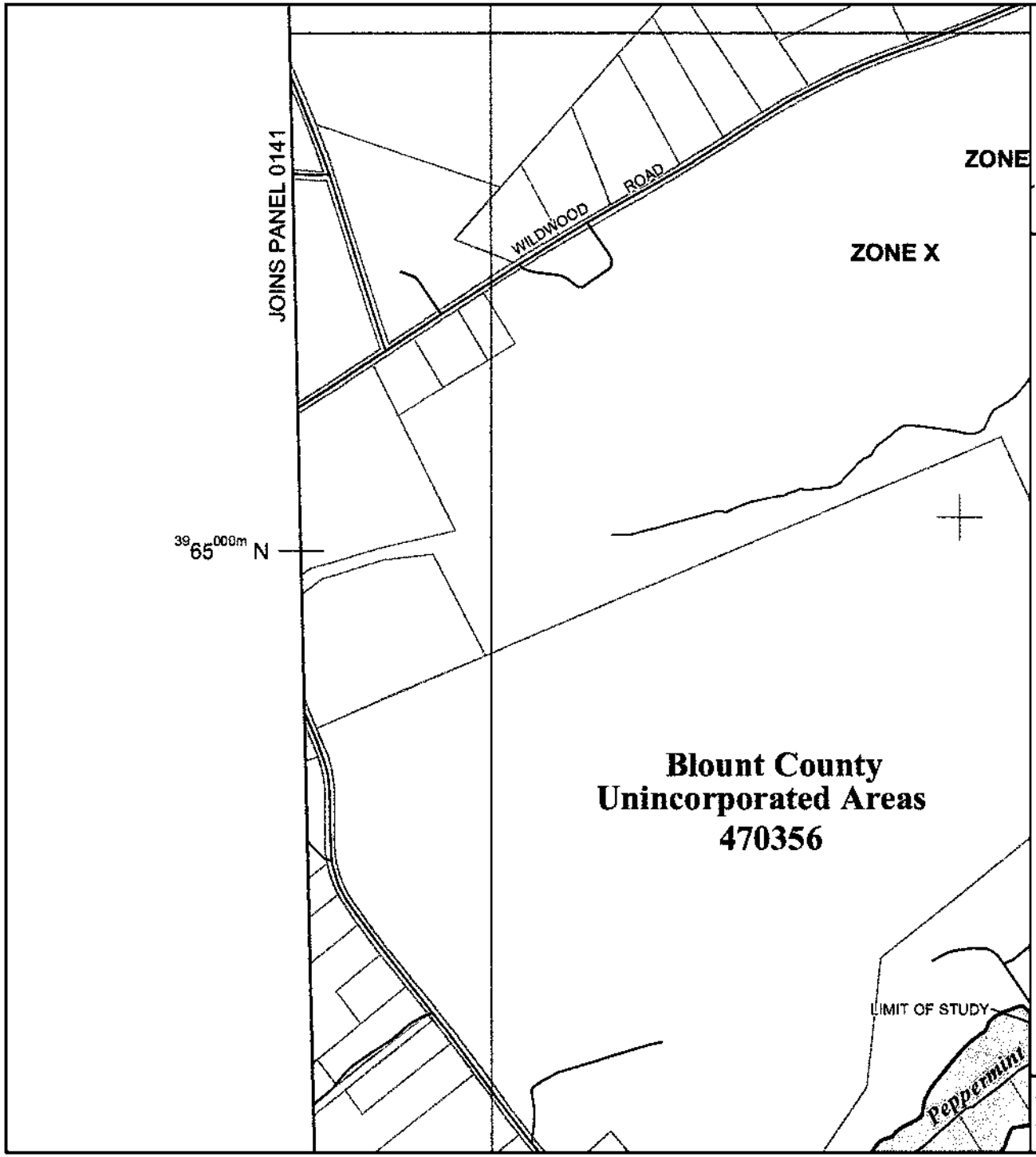

MAP SCALE 1" = 500'

250 0 500 1000 FEET

PANEL 0142C

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

BLOUNT COUNTY, TENNESSEE

AND INCORPORATED AREAS

PANEL 142 OF 475

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BLOUNT COUNTY	470356	0142	C

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EFFECTIVE DATE
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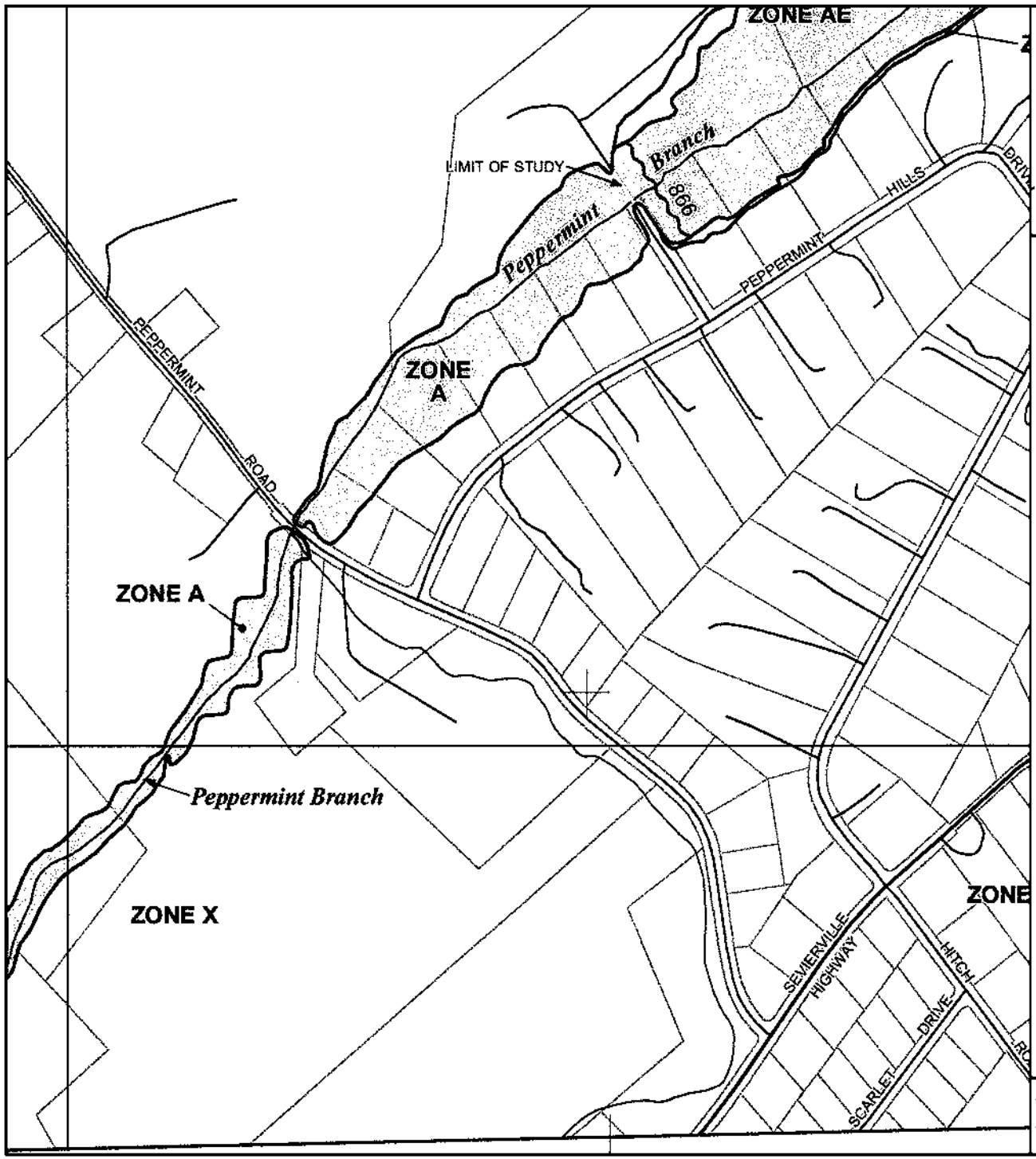
Federal Emergency Management Agency



MAP SCALE 1" = 500'

250 0 500 1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0142C

FIRM

FLOOD INSURANCE RATE MAP

BLOUNT COUNTY, TENNESSEE

AND INCORPORATED AREAS

PANEL 142 OF 475

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

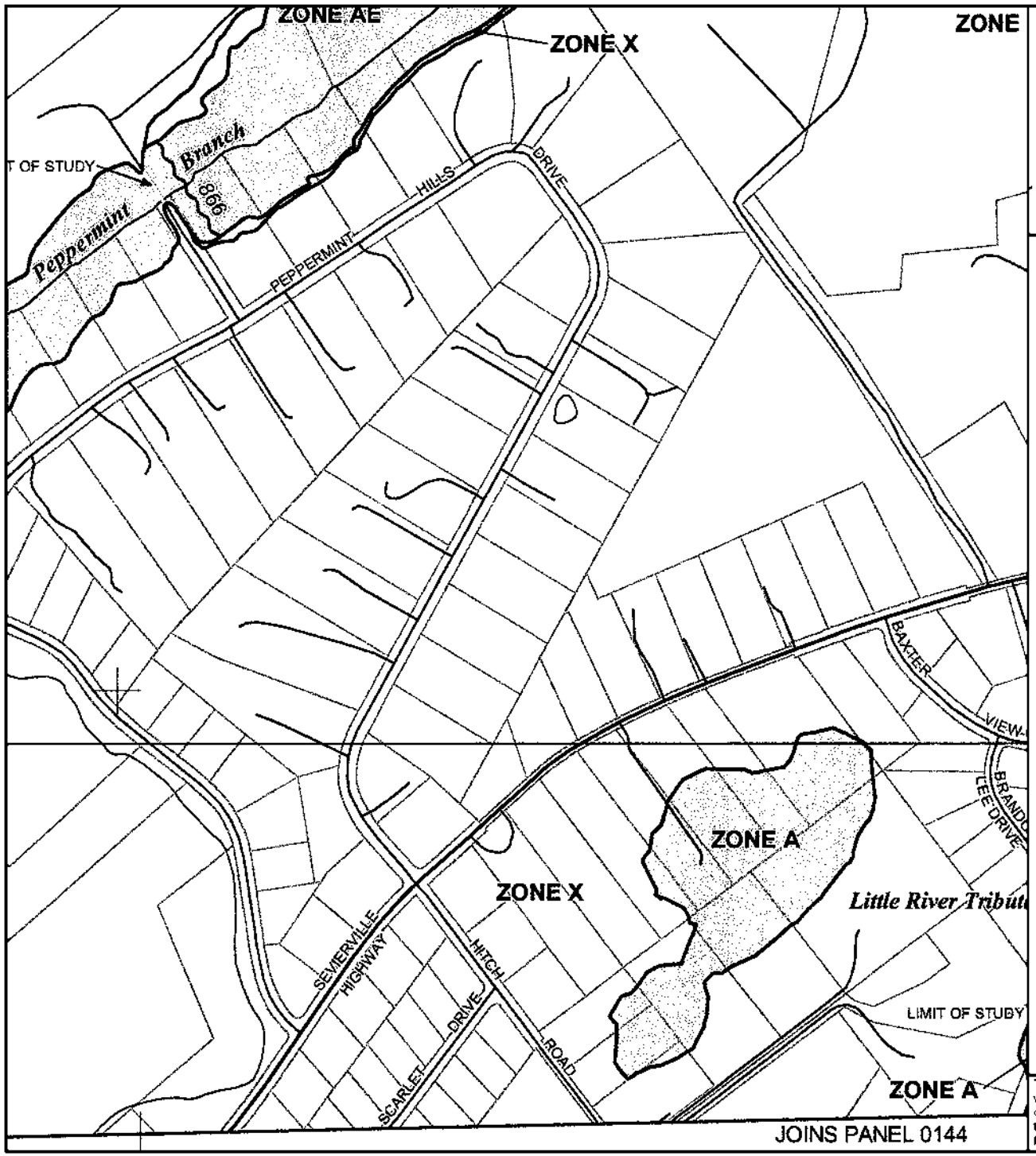
COMMUNITY	NUMBER	PANEL	SUFFIX
BLOUNT COUNTY	470358	0142	C

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
47009C0142C

EFFECTIVE DATE
SEPTEMBER 19, 2007

Federal Emergency Management Agency



MAP SCALE 1" = 500'

250 0 500 1000 FEET

PANEL 0142C

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

BLOUNT COUNTY, TENNESSEE

AND INCORPORATED AREAS

PANEL 142 OF 475

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

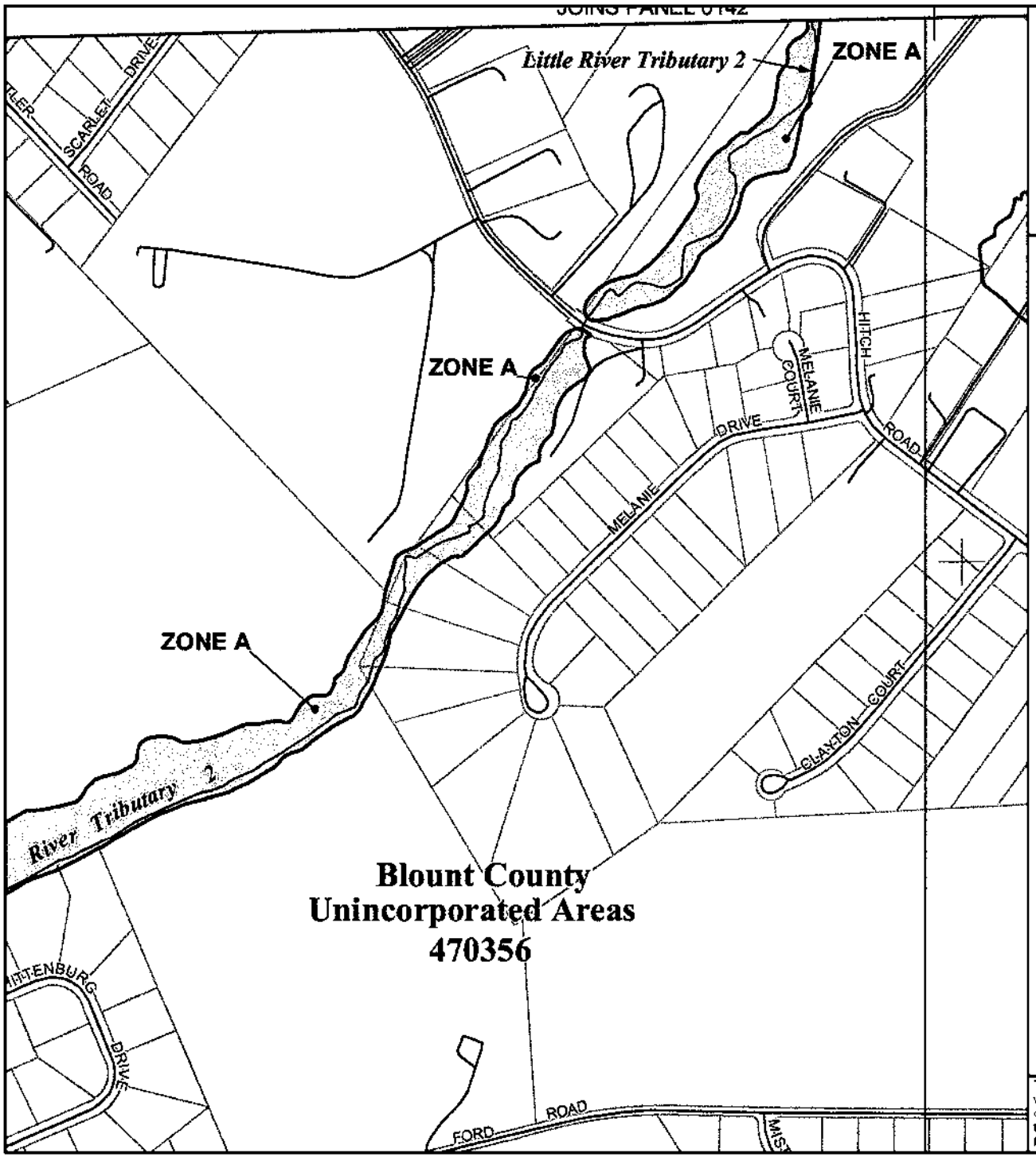
COMMUNITY	NUMBER	PANEL	SUFFIX
BLOUNT COUNTY	470358	0142	C

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
47009C0142C

EFFECTIVE DATE
SEPTEMBER 19, 2007

Federal Emergency Management Agency



MAP SCALE 1" = 500'

250 0 500 1000 FEET

N

PANEL 0144C

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

BLOUNT COUNTY, TENNESSEE

AND INCORPORATED AREAS

PANEL 144 OF 475

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

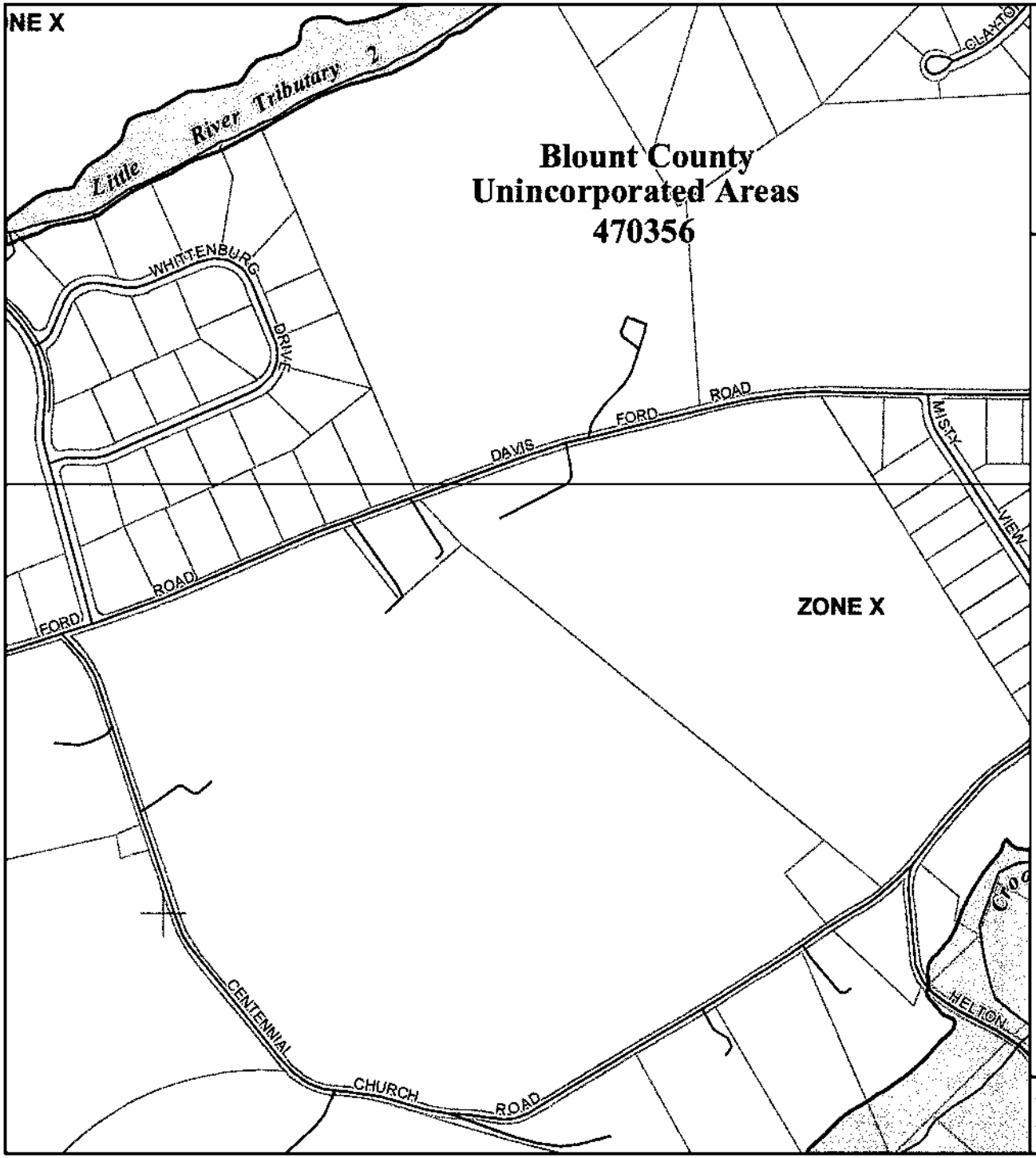
COMMUNITY	NUMBER	PANEL	SUFFIX
BLOUNT COUNTY	470356	0144	C

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
47009C0144C

EFFECTIVE DATE
SEPTEMBER 19, 2007

Federal Emergency Management Agency



MAP SCALE 1" = 500'

250 0 500 1000 FEET

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NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0144C

FIRM

FLOOD INSURANCE RATE MAP

BLOUNT COUNTY, TENNESSEE

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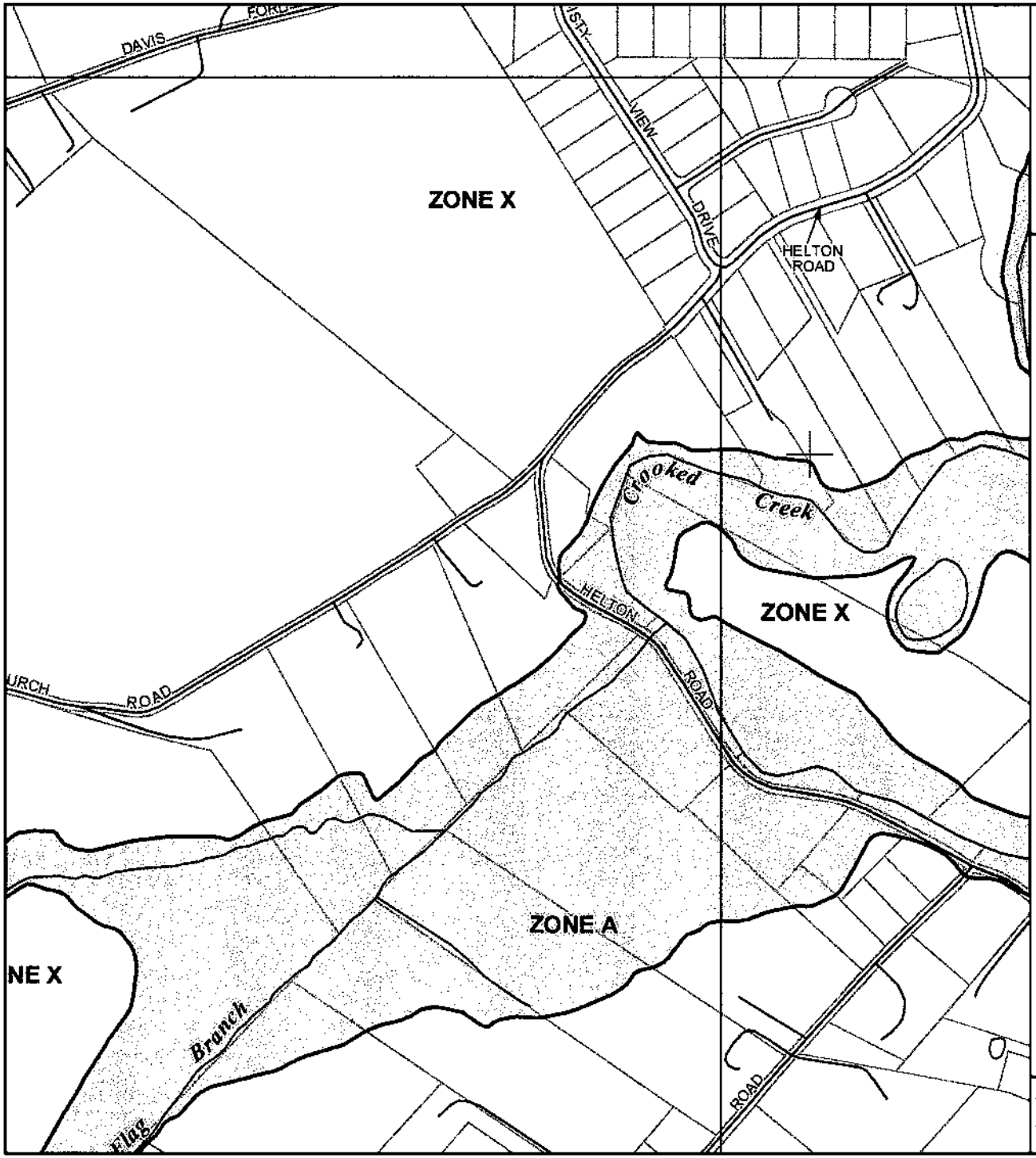

MAP SCALE 1" = 500'

250 0 500 1000 FEET

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PANEL 0144C

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

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PANEL 144 OF 475

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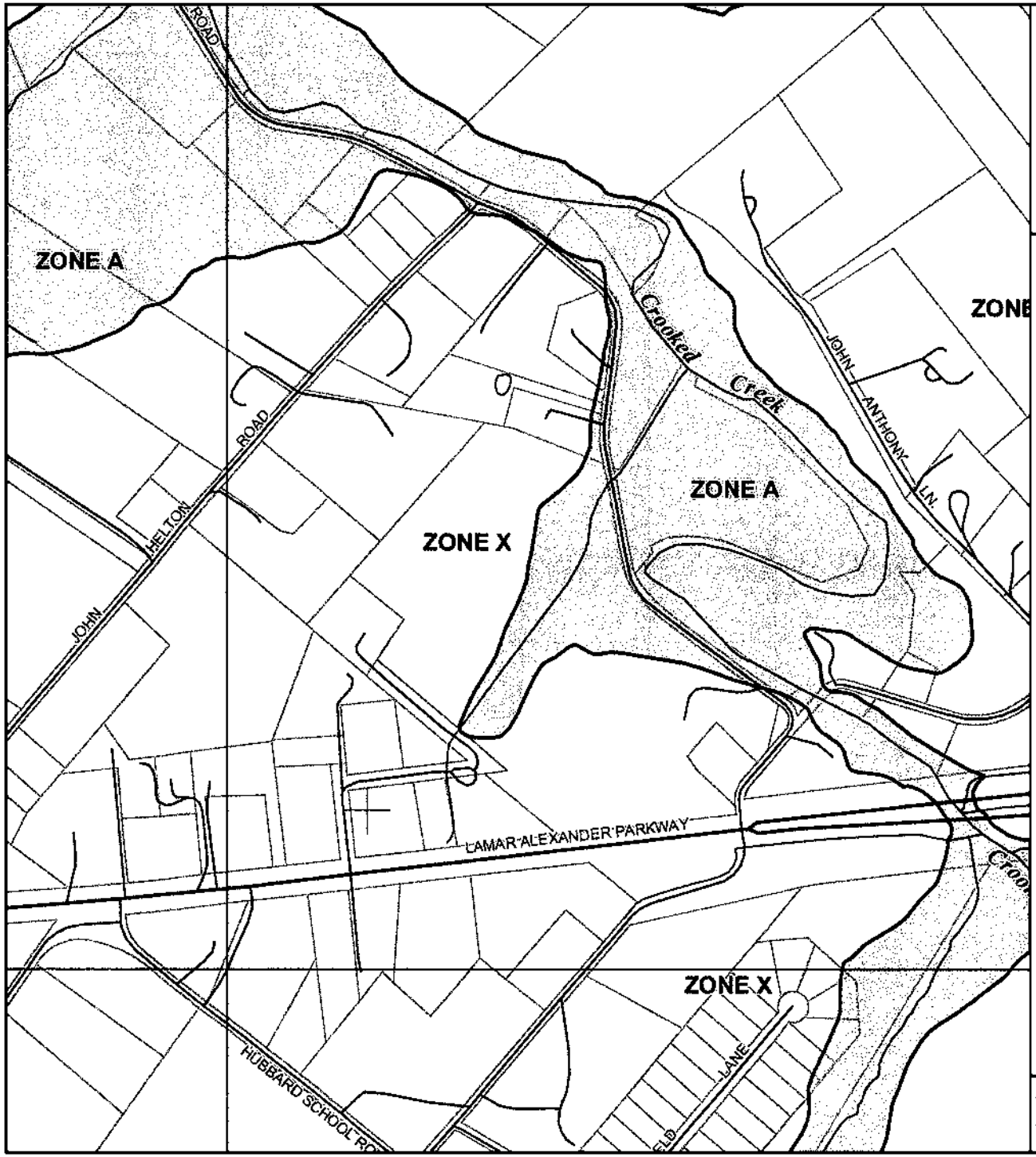

MAP SCALE 1" = 500'

250 0 500 1000 FEET

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NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0144C

FIRM

FLOOD INSURANCE RATE MAP

BLOUNT COUNTY, TENNESSEE

AND INCORPORATED AREAS

PANEL 144 OF 475

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BLOUNT COUNTY	470356	0144	C

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
47009C0144C

EFFECTIVE DATE
SEPTEMBER 19, 2007

Federal Emergency Management Agency

Appendix C
Form N &
USFWS Correspondence

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative C and D; TDOT Region I PE No. 05097-0229-14 PIN: 05097-0229-14

Date of field study: May 6-7, 2014 Date TDEC database checked: Completed by: J. Garcia

Species reported within 1 mile radius of project:

Species Scientific and common names, followed by (A) for animal or (P) for plant	Status		Species is potentially present in R-O-W because: **(A)** it is listed by TDEC within ROW **(B)** habitat is present **(C)** observed during site visit **(D)** critical habitat present within ROW	Species is considered likely NOT present in R-O-W because: **(A)** Present habitat unsuitable **(B)** Not observed during site visit **(C)** Original record questionable **(D)** Considered extinct/extirpated	Accommodations to minimize impacts: **(A)** BMPs are sufficient to protect species **(B)** Special Notes are included on project plans **(C)** Individuals will be impacted. **(D)** Accommodations not practical due to broad habitat description or mobility of species	Habitat (include blooming, breeding or other information; where found according to TDEC database; year last observed; reference)	Notes
	Fed	TN					
Fusconiaia cuneolus , Finerayed Pigtoe (A)	LE	E		A		Riffles of fords and shoals of moderate gradient streams in firm cobble and gravel substrates. Found in the middle and upper Tennessee River watershed.	
Cyrptohranchus alleganiensis, Hellbender (A)	-	D	B		A	Rocky, clear creeks and rivers with large shelter rocks.	
Etheostoma cinereum, Ashy Darter (A)	-	T		A		Small to medium upland rivers with bedrock or gravel substrate and boulders.	
Etheostoma marmorpinnum, Marbled Darter (A)	LE	E		A		Pools and moderate runs with clean pebbles, cobble and small boulders; lower Little River (Tennessee River drainage)	
Percina autantiaca, Tangerine Darter (A)	-	D		A		Large-moderate size headwater tributaries to the Tennessee River, in clear, fairly deep, rocky pools, usually below riffles.	
Percina burtoni, Blotchside Logperch (A)	-	D		A		Large creeks and small to medium rivers with low turbidity and gravel-cobble substrates. Tennessee and Cumberland River watersheds.	
Percina macrocephala, Longhead Darter	-	T		A		Clear, larger upland creeks and small to medium rivers, usually in rocky flowing pools upstream and downstream with cobbled riffles,.	

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative C and D; TDOT Region I PE No. 05097-0229-14 PIN: 05097-0229-14

Species reported within 1-mile to 4-mile radius of project:

Species Scientific and common names, followed by (A) for animal or (P) for plant	Status		Species is potentially present in R-O-W because: **(A)** it is listed by TDEC within ROW **(B)** habitat is present **(C)** observed during site visit **(D)** critical habitat present within ROW	Species is considered likely NOT present in R-O-W because: **(A)** Present habitat unsuitable **(B)** Not observed during site visit **(C)** Original record questionable **(D)** Considered extinct/extirpated	Accommodations to minimize impacts: **(A)** BMPs are sufficient to protect species **(B)** Special Notes are included on project plans **(C)** Individuals will be impacted. **(D)** Accommodations not practical due to broad habitat description or mobility of species	Habitat (include blooming, breeding or other information; where found according to TDEC database; year last observed; reference)	Notes
	Fed	TN					
Epioblasma capsaeformis, Oyster Mussel (A)	LE	E		A		Shallow riffles in moderate to swift current of small to medium rivers with coarse sand and gravel.	
Lasmigona hostonia, Tennessee Heelsplitter (A)	-	Rare, Not State listed		A		Spring runs, creeks and small rivers, in substrate of sand and mud; located in the Tennessee and Conasauga River watershed	
*Radula volut*e, A Liverwort, (P)		S	B		A	Shady moist boulders by waterfalls or streams	
Draba ramosissima, Branching Whitlow-grass (P)		S		A		Calcareous bluffs	
Panax quinquefolius, American Ginseng (P)		S-CE	B		A	Mature hardwood stand where the terrain is sloping to the north and east. Moist but well-drained and thick litter layer.	
Pycnanthemum torrei, Torrey's Mountain-mint (P)		S		A		Dry upland forests, dry rocky woodlands over mafic, ultramafic, or calcareous rocks, edges of sandstone glades, dry-mesic barrens, thickets, upland meadows, and power line rights-of-way	
Hemitremia flammea, Flame Chub (A)		D		A		Springs and spring-fed streams with lush aquatic vegetation.	
Ixobrychus exilis, Least Bittern (A)		D	B		D	Marshes with scattered bushes or other woody growth.	
Rallus elegans, King Rail (A)		D	B		D	Marshes, upland-wetland, flooded farmlands, shrub	
Tyto alba, Barn owl (A)		D	B		D	Open and partly open country, often around human habitation	

Project: SR-162 EXT; Pellissippi Parkway, From SR-33 to SR-73 (US-321); Alternative C and D; TDOT Region I PE No. 05097-0229-14 PIN: 05097-0229-14

Migratory Birds

List *significant concentrations* of migratory birds encountered within the project area (rookeries, aggregations, nesting areas, etc).

Species (Scientific and Common Name)	Approximate No. of Nests (or Individuals)	Location of Nests (or Individuals) (Include Latitude & Longitude)	Nesting Dates and Reference	Photograph #
None				

USFWS letter: Yes _X_ (attached) No ___ (explain)

Biological Assessment: Yes _X_ (response letter attached; see below) No ___

Species (scientific and common names)	USFWS conclusion[1]
Percina tanasi, Snail Darter	"Not likely to adversely affect"
Etheostoma marmorpinnum, Marbled Darter	"Not likely to adversely affect"
Etheostoma cinereum, Ashy Darter	"Not likely to adversely affect"
Percina macrocephala, Longhead Darter	"Not likely to adversely affect"
Fusconaia cuneolus, Fine-Rayed Pigtoe	"Not likely to adversely affect"
Myotis sodalist, Indiana Bat	"Not likely to adversely affect"

[1] Choose from "no effect"; "not likely to adversely affect;" or "likely to adversely affect;". If "likely to adversely affect" is chosen, indicate "no jeopardy to species and no adverse modification to habitat" or "jeopardy to species, or adverse modification to habitat" based on FWS concurrence letter

List Natural Areas, management areas, refuges, or similar sites within or adjacent to project (attach 7.5 minute topographic map with pertinent boundaries of area marked)

Area Name	Type of Area	Pertinent Notes
N/A		

List locations that contain potential Indiana bat habitat (Provide an aerial that indicates areas checked)

Location (description; lat/long or station number)	Tree Species	Photograph #
Mist net and acoustical surveys performed from July to August 2012. No Indiana bats found.		

United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, TN 38501

July 26, 2013

Ms. Leigh Ann Tribble
Federal Highway Administration
404 BNA Drive, Suite 508
Nashville, Tennessee 37217

Subject: FWS #13-I-0454. Biological Assessment Addendum for the proposed construction of the State Route 162 Extension (Pellissippi Parkway) from State Route 33 to State Route 73; P.E. 05097-0229-14, PIN #101423.00, Blount County, Tennessee.

Dear Ms. Tribble:

Thank you for your letter dated June 27, 2013, transmitting a Biological Assessment (BA) Addendum for the proposed construction of the State Route (SR) 162 Extension from SR 33 to SR 73 in Blount County, Tennessee. The Tennessee Division Office agrees with the Tennessee Department of Transportation's (TDOT) findings of "not likely to adversely affect" for the federally endangered Indiana bat (*Myotis sodalis*), marbled darter (*Etheostoma marmorpinnum*), fine-rayed pigtoe (*Fusconaia cuneolus*), and the federally threatened snail darter (*Percina tanasi*) and requests our concurrence. Personnel of the U.S. Fish and Wildlife Service have reviewed the information provided and offer the following comments.

Bat surveys were conducted along the proposed corridor in the summer of 2012 to establish whether the area is being utilized as roosting habitat by the Indiana bat. Due to negative survey results for this species, we concurred with TDOT's determination of "not likely to adversely affect" in a letter dated October 11, 2012. Unless new information otherwise indicates Indiana bat use of the area, this survey will be valid until April 1, 2015. TDOT has committed, where possible, to removal of trees with a DBH (diameter at breast height) of five inches or greater from October 15 through March 31 to further minimize potential for impacts to the Indiana bat.

Stringent best management practices (BMPs), including erosion and sediment control measures, would be implemented to protect aquatic systems. Because the proposed crossings are all tributaries to the Little River, an Exceptional Tennessee Water, TDOT has departed from the standard two-year BMP design requirement and committed to BMPs designed for a five-year storm event. Because of this commitment to stringent water quality measures, we concur with the determination of "not likely to adversely affect" for federally listed aquatic species.

The document indicates that four wetlands could be impacted by the proposed project. The Corps of Engineers and Tennessee Department of Environment and Conservation (TDEC) should be contacted regarding the presence of regulatory wetlands and the requirements of wetlands protection statutes.

In light of TDOT's commitments to improved water quality measures and negative surveys for Indiana bats within the project area, we believe that the requirements of section 7 of the Endangered Species Act of 1973, as amended, are fulfilled for all species that currently receive federal protection under the Act. Obligations under the Act must be reconsidered if (1) new information reveals impacts of the 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 you have any questions regarding our comments, please contact John Griffith of my staff at 931/525-4995 or by email at *john_griffith@fws.gov.*

Sincerely,

Brock Brigham

Acting for Mary E. Jennings
Field Supervisor

xc: Keven Brown, TDOT, Nashville, TN

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
ENVIRONMENTAL DIVISION
SUITE 900, JAMES K. POLK BUILDING
505 DEADERICK STREET
NASHVILLE, TENNESSEE 37243-1402
(615) 741-3655

JOHN C. SCHROER
COMMISSIONER

BILL HASLAM
GOVERNOR

June 21, 2013

Mrs. Leigh Ann Tribble
Environmental Program Eng.
Federal Highway Administration
Tennessee Division Office
404 BNA Dr., Suite 508
Nashville, TN 37217

Subject: Biological Assessment
SR-162EXT, from SR-33 to SR-73 (US 321)
Blount County, Tennessee
PIN: 101423.00 P.E. #05097-0229-14

Dear Mrs. Tribble:

Enclosed please find a Biological Assessment for the subject project. This Biological Assessment has been prepared pursuant to Section 7(c) of the Endangered Species Act of 1973, as amended, and addresses the following federally listed species, as well as two state listed species:

Species	Status	
	State	Federal
Snail darter – *Percina tanasi*	T	LT
Marbled darter – *Etheostoma marmorpinnum* {formerly the duskytail darter - *Etheostoma percnurum*}	E	LE
Fine-rayed pigtoe – *Fusconaia cuneolus*	E	LE
Indiana bat – *Myotis sodalis*	E	LE
Ashy darter – *Etheostoma cinereum*	T	--
Longhead darter – *Percina macrocephala*	T	--

LT – Federally threatened LE – Federally endangered T – State threatened E – State endangered

This Biological Assessment is based on information received from the U. S. Fish and Wildlife Service (Log #12-I-0454) dated June 10, 2013 responding to a May 15, 2013 Tennessee Department of Transportation (TDOT) letter requesting information. Information from the Tennessee Department of Environment and Conservation (TDEC), Division of Natural Heritage (DNH) was also used.

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

The TDOT requests that you forward this Biological Assessment to the USFWS with a request for concurrence or other opinion for the finding of is **not likely to adversely affect** for the above listed species. 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.

Thank you for your assistance in this project. Please address any questions specific to the BA to Keven Brown at (865) 594-2437.

Sincerely,

Keven Brown
Biologist, TDOT Region 1
Ecology Section

KB:kab

Copy: Mr. John Hewitt - TDOT
Mr. Ann Andrews - TDOT
Mr. Rob Todd – TWRA
Mr. Bo Baxter – TVA
Project File

BLOUNT COUNTY, TN
STATE ROUTE 162 (PELLISSIPPI PARKWAY) EXTENSION
FROM SR-33 TO SR-73 (US 321)
PIN 101423.00
PE No. 05097-0229-14

BIOLOGICAL ASSESSMENT
FOR:

SNAIL DARTER (*Percina tanasi*)
MARBLED DARTER (*Etheostoma marmorpinnum*)
{formerly the Duskytail darter – *Etheostoma percnurum*}

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

U.S. FISH AND WILDLIFE SERVICE
LOG# 12-I-0454

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

Prepared By:
Keven Brown, TDOT
June 21, 2013

I. INTRODUCTION

The Tennessee Department of Transportation (TDOT) proposes to extend SR-162 (Pellissippi Parkway) from SR-33 to SR-73 (U.S. 321) in Blount County, Tennessee (Fig. 1 & 2). 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:

Species	Status	
	State	Federal
Snail darter – *Percina tanasi*	T	LT
Duskytail darter – *Etheostoma percnurum* {Now known as the marbled darter – *Etheostoma marmorpinnum*}	E	LE
Fine-rayed pigtoe – *Fusconaia cuneolus*	E	LE
Ashy darter – *Etheostoma cinereum*	T	--
Longhead darter – *Percina macrocephala*	T	--

LT – Federally threatened LE – Federally endangered T – State threatened E – State endangered

Response from the U. S. Fish and Wildlife Service (Service) on January 12, 2000 indicated that the federally endangered Indiana bat (*Myotis sodalis*) could possibly be present in the project impact area as well. Information from the Service was updated by email on September 27, 2001 and no changes from the January 12, 2000 coordination were indicated. A biological assessment was submitted addressing the above species on November 14, 2001 with a finding of not likely to adversely affect (NLTAA). Response from the Service dated February 5, 2002 concurred with the NLTAA finding for the Indiana bat, but not the other aquatic species due to their possible presence in three of the tributaries to Little River crossed by the project. TDOT submitted additional information to the Service dated February 27, 2002 addressing their concerns. The Service responded by letter dated April 16, 2002 concurring with the NLTAA finding for the above listed aquatic species.

Since conclusion of the initial project species coordination, legal action by a local citizens group, Citizens Against Pellissippi Parkway Extension (CAPPE), necessitated that TDOT reinitiate the NEPA process. In the summer of 2012, TDOT conducted a survey of the project area to determine the possible presence of the Indiana bat, per request from the Service dated May 17, 2012. Results of this survey did not indicate that the Indiana bat was present within the project impact area. A finding of NLTAA for the Indiana bat was submitted to the Service on September 24, 2012. The USFWS concurred with the finding of NLTAA on October 11, 2012. A request for updated species information was submitted to the Service on May 22, 2013. Information from the Tennessee Department of Environment and Conservation, Division of Natural Heritage (TDEC/DNH) database was reviewed on May 22, 2013. The following federally listed species were recorded from within four miles of the project impact area:

Species	Status	
	State	Federal
Snail darter – *Percina tanasi*	T	LT
Marbled darter – *Etheostoma marmorpinnum* {formerly the duskytail darter - *Etheostoma percnurum*}	E	LE

Fine-rayed pigtoe – *Fusconaia cuneolus*	E	LE
Ashy darter – *Etheostoma cinereum*	T	--
Longhead darter – *Percina macrocephala*	T	--

LT – Federally threatened LE – Federally endangered T – State threatened E – State endangered

Response from the Service dated June 10, 2013 provided the Indiana bat (*Myotis sodalis*) for consideration. Due to the possible presence of the above species in the project impact area, informal consultation was initiated. Results of this coordination indicated that an updated biological assessment would be necessary to evaluate potential project impacts to these species.

II. 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. This will be the final segment of SR-162 connecting I-40 in Knox County, TN to SR-73 (US-321) in Blount County, TN. Construction of the proposed project is expected to take from two and a half to three years to complete, based on projects of comparable scope.

III. ACTION AREA

The proposed project is located in the northeast portion of Blount County, TN. Terrain along the project alignment is mostly rolling, but ranges from nearly level to quite hilly in some areas. Land use is varied within the project area. Agriculture uses for livestock pasture or hay production are the most common, with cultivated fields for corn, tobacco, and soybeans also present. Residential lots of varying size are prevalent throughout the project area. In addition, there are several subdivisions that either have been or are currently being developed in this portion of Blount County. Commercial development in the project area is located mostly along the main roadways and consists primarily of small businesses including gas stations, car lots, auto repair shops, antique stores, and restaurants. The Alcoa water filtration plant is located near the beginning of the project, in close proximity to Little River at approximately Little River Mile (LRM) 9.6. No caves are believed to be present in the project impact area.

Wooded sites are scattered throughout the area, ranging from only a few clustered trees to several acres in size. The wooded sites tend to be located either in upland areas too steep or rocky for cultivation or along stream drainages. The upland sites contain a variety of 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, American beech, white ash, and persimmon. Wooded sites along area streams are generally less diverse and contain boxelder, green ash, black willow, sycamore, hackberry, and black walnut. The understory in many of these wooded sites is

dominated by a heavy growth of non-native invasive species including Chinese privet, multi-flora rose, or bush honeysuckle.

Several “blue-line” streams will be crossed by the proposed project. These range in size from small, unnamed, first-order trickles to moderately sized, third-order flows. Peppermint Branch, Gravelly Creek and Flag Branch are the only three named streams that will be crossed. All of the streams that will be crossed are direct tributaries to Little River except for Gravelly Creek and Flag Branch, which flow into Crooked Creek approximately two miles upstream of its confluence with Little River. 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 hay or pasture fields. Livestock have access to a large percentage of these stream lengths which has resulted in significant impacts to both streamside vegetation and the channel substrates. Where canopy is present, it is sparse for the most part and limited to within a few feet of the top of the streambanks. Five of the drainage features depicted as “blue-lines” on the area topo maps were identified as wet weather conveyances. Most of the proposed crossings will be accomplished as close to perpendicular as possible. The proposed drainage structures that will be constructed will likely be either concrete box culverts or pipes depending on the hydraulic requirements. However, channel changes may be required on some of these streams depending on the skew at the crossing site.

At present, there are six known wetlands in the project area. These wetlands are associated mostly with the stream drainages and have been heavily impacted by livestock. They are generally small in size (< one ac.) and classified as either emergent or scrub-shrub wetland types. Vegetation present in these wetlands includes sedge, rush, cattail, black willow, ironweed, alder, elderberry, jewelweed, boneset, cardinal flower, and beggar ticks. Four of these six wetlands could possibly be impacted by project construction.

IV. SPECIES/CRITICAL HABITAT CONSIDERED

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, TN (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). The TDEC/DNH database (2013) listed records for the snail darter from the Little River at LRM 9.4, 15.9 and 17.3 in 2000. The most recent record for the snail darter in Little River was from LRM 8.5 in 2007. These records are all downstream from tributaries that will be crossed by the proposed project.

Marbled Darter – *Etheostoma marmorpinnum*
Federally Endangered
Species Description – The marbled darter (*Etheostoma marmorpinnum)* was initially included as part of the duskytail darter (*Etheostoma percnurum*) species complex which was listed as federally endangered on April 27, 1993 (USFWS 1993). However, Blanton and Jenkins (2008) described *Etheostoma marmorpinnum* as one of four distinct species from this complex. The marbled darter is presently known only from the lower portion of Little River in Blount Co., TN from SR-35 (US 411) downstream to SR-33 (Layman 1991). A single marbled darter was collected in 1947 from South Fork Holston River in Sullivan Co., TN, three years prior to completion of construction of South Holston Dam (Blanton and Jenkins 2008). This species is now believed to be extirpated from the South Fork Holston River (USFWS 1993a; Blanton and Jenkins 2008). The nine mile reach of Little River between LRM 8.5 and LRM 17.5 where *Etheostoma marmorpinnum* occurs is generally characterized by moderate gradient with riffles, runs, and long pools (Blanton and Jenkins 2008). Individuals are usually associated with pools and runs that are one to four feet in depth, have gently flowing currents, and are for the most part silt-free (Layman 1991; Etnier and Starnes 1993). There are several records from the TDEC/DNH database (2013) for the marbled darter from LRM 8.5, 9.5 and 10.0 in 2000, and LRM 17.3 in 2006. 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 (*Fusconaia cuneolus*) was listed as endangered on June 14, 1976 (USFWS 1976) and a recovery plan approved on September 19, 1984 (USFWS 1984a). 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 (2013)

indicated records for *Fusconaia cuneolus* from LRM 9.7 (2008) 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 on March 11, 1967 (32 FR 4001) under the Endangered Species Preservation Act of October 15, 1966 [80 Stat. 926; 16 U.S.C. 668aa(c)]. Critical habitat was designated on September 24, 1976 (41 FR 41914). A recovery plan for the Indiana bat was prepared in March, 1999 (USFWS 1999). 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 five (5) 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 (2013) 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). Acoustical and mist net surveys were conducted in the vicinity of the project corridor in July and August 2012, both with negative results (TDOT 2012).

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 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 (2013) indicated records for the ashy darter from LRM 13.3 (1970), 14.2 (1968), 17.3 (2006), 17.6 (1970), 19.5 (2007), and 20.2 (1988). Several of these records are 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 (2013) indicated records for *Percina macrocephala* from the Little River near LRM 8.5 (1985), 14.2 (1993), 16.0 (1974), 17.3 (2006), 19.3 (2009), 20.2 (1970), 21.6 (2008) and 22.0 (1993). Several of these records are downstream of tributaries that will be crossed by the proposed project.

V. EFFECTS ANALYSIS

Clearing, grubbing, and grading activities required for project construction will remove vegetation within most of the project limits, temporarily exposing large areas of bare soil to the elements for varying periods of time. Rain events that occur while the soil is unprotected have the potential to carrying large amounts of sediment off-site into wet-weather conveyances and streams crossed by the project and ultimately into Little River. Although not as prevalent in the project area, sustained high winds associated with storm fronts may also mobilize exposed, loose soils providing an avenue for deposit into area streams. Sediment that is allowed to leave the project has the potential to adversely affect the aquatic species preset in these streams. Excessive siltation can clog the gills of adult 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.

Several streams that are tributaries to the Little River will be crossed by the proposed project. There were no records noted for any of the aquatic species discussed in this assessment from these tributary streams. However, the project crossings are only one to two miles upstream from their respective confluences with the Little River, where all of the aquatic species discussed above are known to occur. 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 will result in direct disturbance of stream channels and substrates. 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 ft.) which will result in a loss of “day-lighted” stream channel. These encapsulated stream sections will be rendered essentially unusable for most aquatic species. These drainage structures could also act as barriers for movement of aquatic organisms both upstream and downstream. Material used to fill over the installed structures could be lost into a given drainage feature unless protective measures are taken. Although most of the potential impacts would be negative, one positive impact may be realized. On streams where no canopy in currently present, especially in open pastures or hayfields, these long structures could provide a definite cooling effect that would not otherwise be available.

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

Construction of the proposed project will connect I-40 to SR-73, providing four-lane access from Oak Ridge and Knoxville to Maryville. Both residential and commercial development have increased in the project area since the initial field studies were conducted in the late 1990’s. Large tracts of what was once farmland have been sold and developed into subdivisions or small shopping centers. This trend is expected to continue as people who work in Knoxville or Oak Ridge may prefer to live in a more scenic, rural-type setting. Development of large tracts of farmland into subdivisions or for businesses has the potential to adversely impact aquatic species in the immediate project impact area. Soil disturbance and exposure during site development and housing construction may provide a source of sediments that could enter areas streams directly affecting the fauna present as discussed above. Development of large farm tracts also removes what was in many cases an effective vegetative buffer for area streams. The amount of impervious surfaces would increase in the form of roofs, driveways, entrance/access roads, parking lots, and the four new traffic lanes from the project itself. This would in turn reduce the run-off time during storm events, possibly causing flashy, more intense, storm runoff into area streams. Pollutants carried from the developed areas, as well as off the roadways, could potentially impact area streams in a negative manner.

There are, however, some positive impacts that may result. Large agricultural fields that may have been significant sources for sediment run-off during storm events would be stabilized. A pollution source for large amounts of fertilizer, herbicides,

insecticides, or other chemicals harmful to aquatic systems would be greatly reduced, if not eliminated. Sections of stream channel that may have been heavily damaged and degraded by livestock or other agricultural practices would be protected and canopy to reestablish.

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 if any are present. This could lead to loss of vital individuals necessary for bolstering the population of this federally endangered species. There are a few areas that will be affected by project construction where suitable summer roost habitat is present. However, the overall quality is less than optimal. In addition, there are wooded tracts outside the project impact area that are much larger and contain better quality summer roost habitat that could be used by any bats that would possibly be displaced by project construction. 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 just over eight miles (8.25) 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. Recent surveys by TDOT (2012) did not indicate that the Indiana bat was present within the project area. This would greatly reduce, if not eliminate, the likelihood of the proposed project adversely affecting the Indiana bat.

VI. MEASURES TO MINIMIZE HARM

Installation and maintenance of effective erosion control Best Management Practices (BMP's) throughout the duration of the project will be essential to the prevention of adverse impacts to the aquatic species discussed in this assessment. The use of silt fence, hay bales, rock check-dams, detention ponds, slope drains, and erosion control blankets are just a few of the measures that can be used 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. Typical design for these BMP's is based on a two-year storm event. However, the drainage features that will be crossed by this project flow into Little River, which is listed as an Exceptional Tennessee Water (ETW) due to the presence of several state and federally listed aquatic species. Therefore, the Service has requested that the design for BMP's proposed for use on this project be based on a five-year storm event.

Construction of drainage structures will be accomplished "in the dry" so that minimal material is allowed to enter the streams and possibly adversely affect any of the aquatic species present. Streams will be temporarily routed through work areas using pipes or open channels with non-erodible liners until the respective structures are completed. Relocated channel sections will be properly stabilized and any loose materials removed to the practical extent possible prior to turning stream flows back into the constructed channels. Flows will then be returned to these channels with a minimum of sediment disturbance. Where stream crossings are required, these will be accomplished as close to perpendicular as feasible in order 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 during construction of the proposed project will be to restrict clearing of wooded areas, where possible, 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, where possible, should effectively minimize the likelihood of adversely affecting any Indiana bats that might be present in the project area.

The notes listed below addressing each of the above measures to minimize harm will be placed on the project construction plans. Also, any additional recommendations provided by the Service will be placed as notes on the project construction plans as needed.

1. Clearing and grubbing will be limited to the minimum amount necessary to accommodate roadway cut and fill slopes and operation of construction equipment. All disturbed areas will be stabilized, seeded, and mulched as soon as practicable to reduce the potential for soil erosion.

2. Canopy removal along any streams located within the project limits will be kept to the absolute minimum necessary to accommodate project construction.

3. Silt fence with backing will be installed along the toe of all fills and along all streambanks to minimize the potential of sediment from the project entering area streams. A minimum ten (10) foot vegetated buffer or “green belt” will be left between silt fences and the stream edges where possible.

4. Erosion and sediment control measures will be installed concurrent with clearing and grubbing activities, and will be functional prior to commencement of earthmoving activities. Measures may include, but are not limited to, silt fence with backing, clean shot rock checkdams, sandbags, sediment ponds, sediment filter bags, sediment wattles, slope drains, or other suitable methods.

5. Erosion control structures will be inspected regularly and maintained throughout the life of the project so that they are not rendered ineffective. Sediment will be removed from structures as necessary and must be removed when design capacity has been reduced by 50% to insure maximum effectiveness. Material removed from these structures will not be disposed of in any area streams or wetlands.

6. Maintenance needs for erosion and sediment control structures identified during inspections or by other means will be accomplished within twenty-four (24) hours, if possible. If maintenance prior to the next anticipated storm event is impractical, it will be accomplished as soon as practicable.

7. Waste and borrow areas will be developed in accordance with the procedures outlined in the TDOT Statewide Stormwater Management Program for Construction Projects. These sites will be located in non-wetland areas and are to be a sufficient distance from area streams and/or wetlands so that no soil material is allowed to enter them. These areas will be stabilized as soon as practicable. Appropriate erosion and sediment control measures will be used in these areas as needed to minimize soil loss.

8. Stockpiled topsoil or fill material will be treated in such a manner that is not allowed to enter any area streams or wetlands.

9. Equipment staging areas will be located a sufficient distance from streams and wetlands so that no oils, coolants, fuels, or other petroleum products are allowed to enter these features.

10. Drainage structures required at stream crossings will be constructed "in the dry". Stream flows will be diverted through work areas using flexible pipes or berms or channels lined with plastic, clean shot rock, or other non-erodible material. All water from dewatering areas will be pumped into filter bags or sediment ponds prior to release back into a stream.

11. No motorized equipment will be operated in any streams or wetlands in the project limits except as specified in the project water quality permits.

12. Where possible, tree cutting will be accomplished between October 15th and March 31st to minimize potential impacts to the Indiana bat.

13. A Stormwater Pollution Prevention Plan (SWPPP) will be prepared for the proposed project and will contain a detailed erosion and sediment control plan based on a five-year storm event as requested by the USFWS. A copy of the SWPPP will be available on-site.

14. Weekly stormwater inspections will be conducted for the proposed project as per National Pollutant Discharge Elimination System (NPDES) guidelines.

VII. CONCLUSION AND DETERMINATION OF EFFECTS

There are numerous records for the snail darter (*Percina tanasi*), marbled darter (*Etheostoma marmorpinnum*), fine-rayed pigtoe (*Fusconaia cuneolus*), ashy darter (*Etheostoma cinereum*), and longhead darter (*Percina macrocephala*) 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

listed darter species or the mussel species from these tributary streams. Project construction will result in some temporary stream disturbances to at the proposed crossing locations. However, installation and maintenance of effective erosion and siltation control measures throughout project construction will minimize impacts to these streams, which will in turn minimize potential impacts to Little River and the aquatic fauna present there. Provided the necessary BMP's for erosion and sediment control implemented and maintained throughout project construction, it is the opinion of TDOT that the proposed project is **NOT LIKELY TO ADVERSELY AFFECT** the snail darter (*Percina tanasi*), marbled darter (*Etheostoma marmorpinnum*), fine-rayed pigtoe (*Fusconaia cuneolus*), ashy darter (*Etheostoma cinereum*), or longhead darter (*Percina macrocephala*).

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 suitable trees present outside the project limits to accommodate any Indiana bats that might use this area. Recent surveys by TDOT (2012) did not indicate that the Indiana bat was present within the project impact area. In addition, the USFWS concurred with the finding of NLTAA for the Indiana bat for the proposed project on October 11, 2012. Therefore, based on the information provided in this BA it is still the opinion of TDOT that the proposed project is **NOT LIKELY TO ADVERSELY AFFECT** the Indiana bat.

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IX. LIST OF CONTACTS MADE AND PREPARERS

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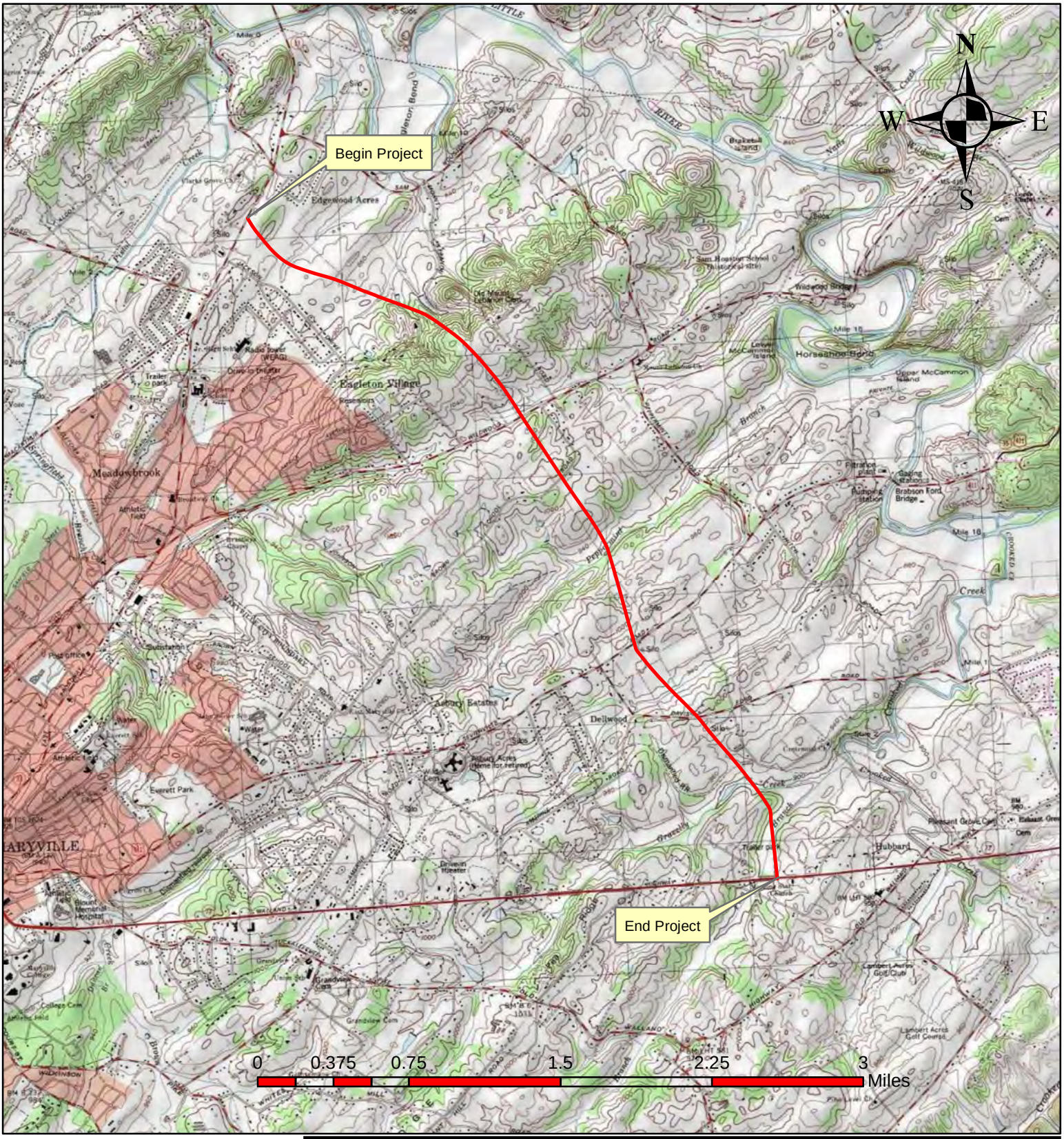
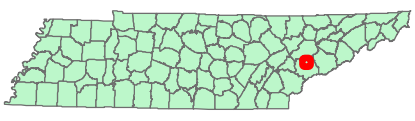




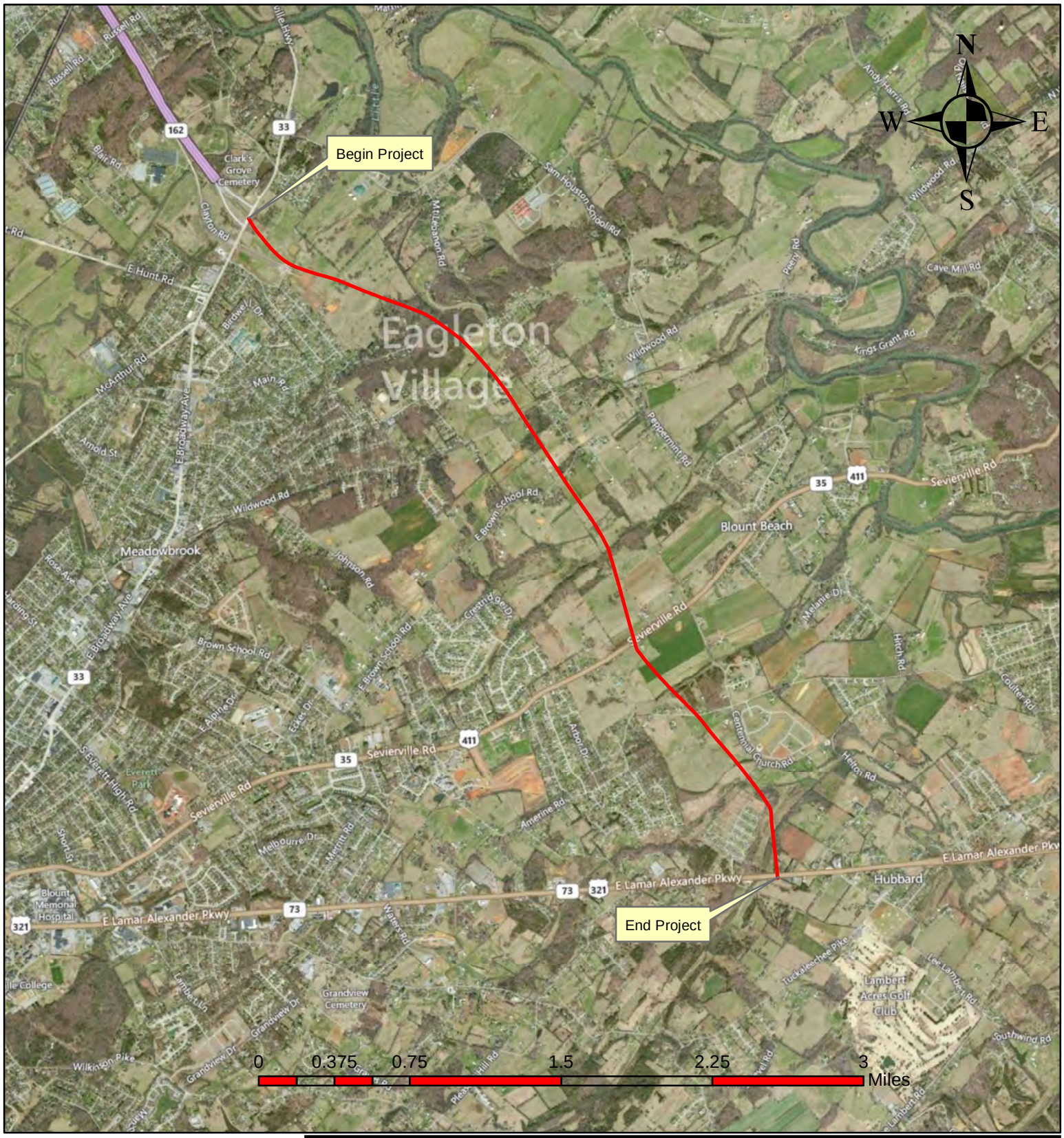
Project Location Map - topo
SR-162EXT, Pellissippi Pkwy, from SR-33 to SR-73
Blount County, TN

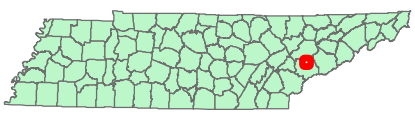
Maryville 147-SW and Wildwood 147-SE

6-4-13

PIN 101423.00 PE #05097-0229-14

TDOT





Project Location Map - aerial
SR-162EXT, Pellissippi Pkwy, from SR-33 to SR-73
Blount County, TN

Maryville 147-SW and Wildwood 147-SE

6-4-13

PIN 101423.00 PE #05097-0229-14

United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, TN 38501

June 10, 2013

Ms. JonnaLeigh Stack
Tennessee Department of Transportation
Environmental Planning and Permits Division
Suite 900, James K. Polk Building
505 Deaderick Street
Nashville, Tennessee 37243-0334

Subject: FWS# 12-I-0454. Proposed alignment shift for the State Route 162 (Pellissippi Parkway Extension) from State Route 33 (Old Knoxville Highway) to State Route 73 (U.S. Highway 321/Lamar Alexander Parkway), Blount County, Tennessee.

Dear Ms. Stack:

The Tennessee Department of Transportation (TDOT) prepared a Draft Environmental Impact Statement (DEIS) for the extension of State Route (SR) 162 (Pellissippi Parkway) from SR 33 (Old Knoxville Highway) to SR 73 (U.S. Highway 321/Lamar Alexander Parkway) in Blount County, Tennessee. This project has completed Tennessee Environmental Streamlining Agreement review and was most recently coordinated with our office for potential impacts to the federally endangered Indiana bat (*Myotis sodalis*). Personnel of the U.S. Fish and Wildlife Service have reviewed the subject proposal and offer the following comments.

In previous correspondence, our office provided four federally listed species that may be impacted by this project. These species include the federally endangered Indiana bat, duskytail darter (*Etheostoma percnurum*), fine-rayed pigtoe (*Fusconaia cuneolus*), and the federally threatened snail darter (*Percina tanasi*). In sections 3.14.3.2 and 3.14.3.3 of the *Preliminary Draft Environmental Impact Statement*, TDOT committed to implementation of a winter tree cutting timeframe restriction to avoid direct impacts to the Indiana bat. For aquatic species protection, TDOT would implement stringent best management practices (BMPs), including erosion and siltation control measures.

Joint mist netting and acoustical studies were performed from July 30 through August 1, 2012, at three sites determined to contain suitable habitat for the Indiana bat. The acoustical study resulted in the recording of 2,021 bat calls, of which none were identified as Indiana bats. The mist netting efforts resulted in the capture of three bats, representing two non-listed species. We

concurred with TDOT's finding of "not likely to adversely affect" for this species at that time based on probable absence from the project area. Unless new information otherwise indicates Indiana bat use of the area, this survey will be valid until April 1, 2015.

The Preferred Alternative is proposed to be shifted near the southern terminus due to the presence of an environmentally sensitive site. Upon review of the ecological resource survey results, we prefer the East Avoidance Alternative because it would have fewer stream and wetland impacts (1,541 linear feet of stream impacts and 6.40 acres of wetland impacts) when compared to the West Avoidance Alternative (2,315 linear feet of stream impacts and 7.96 acres of wetland impacts).

It is our understanding that BMPs for Exceptional Tennessee Waters (ETWs) are designed to withstand a five-year rain event and that streams without this designation normally receive protection for up to a two-year rain event. While the Little River is designated as an ETW, the tributaries that would be impacted by the project are not. Construction would likely take years to complete and would almost certainly experience a two-year rain event or greater during that time period. Due to proximity of the stream crossings to listed species occurrences in the Little River, we request that TDOT commit to implementing a 5-year design for water quality BMPs on all project area stream crossings.

If you have any questions regarding our comments, please contact John Griffith of my staff at 931/528-6481 (ext. 228) or by email at *john_griffith@fws.gov*.

Sincerely,

Brad Bingham

Acting for Mary E. Jennings
Field Supervisor

United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, TN 38501

October 11, 2012

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

Subject: FWS #12-CPA-0855. Proposed construction of the State Route 162 Extension (Pellissippi Parkway) from State Route 33 to State Route 73; P.E. 05097-0229-14, PIN #101423.00, Blount County, Tennessee.

Dear Mr. Brown:

Thank you for your letter dated September 24, 2012, transmitting acoustic and mist netting survey results for the proposed construction of the State Route 162 Extension (Pellissippi Parkway) from State Route 33 to State Route 73 in Blount County, Tennessee. Surveys were conducted along the proposed corridor to determine if the area is being utilized as summer roosting habitat by the federally endangered Indiana bat (*Myotis sodalis*). Personnel of the U.S. Fish and Wildlife Service have reviewed the information provided and offer the following comments.

Joint mist netting and acoustical studies were performed from July 30 through August 1, 2012, at three sites determined to contain suitable habitat for the Indiana bat. The acoustical study resulted in the recording of 2,021 bat calls, of which none were identified as Indiana bats. The mist netting efforts resulted in the capture of three bats, representing two non-listed species. The Tennessee Department of Transportation (TDOT) has concluded that the project is "not likely to adversely affect" the Indiana bat because the no Indiana bats were recorded during the surveys.

Due to negative survey results for the Indiana bat, we concur with TDOT's finding of "not likely to adversely affect" for this species. Unless new information otherwise indicates Indiana bat use of the area, this survey will be valid until April 1, 2015. Although it is likely that this project would have an insignificant effect on the Indiana bat, we would appreciate consideration given to the removal of trees with a DBH (diameter at breast height) of five inches or greater from October 15 through March 31 to further minimize potential for harm to the Indiana bat. Based on the best information available at this time, we believe that the requirements of section 7 of the Endangered Species Act of 1973, as amended, are fulfilled. Obligations under the Act must be reconsidered if (1) new

information reveals impacts of the 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 you have any questions regarding our comments, please contact John Griffith of my staff at 931/525-4995 or by email at *john_griffith@fws.gov*.

Sincerely,

Mary E. Jennings
Field Supervisor

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
ENVIRONMENTAL DIVISION
SUITE 900, JAMES K. POLK BUILDING
505 DEADERICK STREET
NASHVILLE, TENNESSEE 37243-1402
(615) 741-3655

JOHN C. SCHROER
COMMISSIONER

BILL HASLAM
GOVERNOR

September 24, 2012

Ms. Mary Jennings
US Dept. of Interior
Fish and Wildlife Service
446 Neal St.
Cookeville, TN 38501

Subject: INDIANA BAT: Section 7 Clearance
SR-162 EXT, Pellissippi Pkwy., from SR-33 to SR-73
Blount County, TN
PIN: 101423.00 PE #05097-0229-14

Dear Ms. Jennings:

Due to recent concerns regarding the federally listed endangered Indiana bat (*Myotis sodalis*), a mist net and Anabat survey were conducted on the subject project from July 30 to August 1, 2012 to determine the possible presence of the Indiana bat in the project area. The attached reports summarize the survey findings. Based on the information provided in these reports, it is the opinion of TDOT that the proposed project is **not likely to adversely affect** the federally listed endangered Indiana bat (*Myotis sodalis*). The TDOT respectfully request your concurrence or other finding for this determination.

The above coordination and request for endangered species information is in compliance with the U.S. Fish and Wildlife Coordination Act of 1958, and the Endangered Species Act of 1973, as amended. Thank you for your assistance with this project. If you have any questions or need additional information, please do not hesitate to contact me at (865) 594-2437.

Sincerely,

Keven Brown
Biologist, TDOT Region 1
Ecology Section

Xc: Mr. John Hewitt – TDOT Permits
Ms. Ann Andrews – TDOT Planning
Rob Todd – TWRA
Bo Baxter - TVA
Project File

TENNESSEE WILDLIFE RESOURCES AGENCY

ELLINGTON AGRICULTURAL CENTER
P. O. BOX 40747
NASHVILLE, TENNESSEE 37204

May 15, 2006

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

Re: Comments on Initial Coordination – Proposed Pellissippi Parkway Extension (State Route 162) from State Route 33 to US 321 (State Route 73) in Blount County.

Dear Mr. Bush:

The Tennessee Wildlife Resource Agency has received and reviewed the information your office provided to us regarding the proposed project listed above. We thank you for your invitation to participate with TDOT and FHWA in the development of the EIS for the subject project. Our current concerns are potential environmental impacts associated with potential stream and wetland impacts that may occur do to the construction of this project. Several Federal and State listed species inhabit the Little River Watershed. We encourage continued consultation with our agency in future phases of this project to further reduce impacts to fish and wildlife resources.

We thank you for the opportunity to comment during the initial coordination process and look forward to working with TDOT personnel in the future to reduce potential impacts to fish and wildlife resources associated with this project.

Sincerely,

Robert M. Todd

Robert M. Todd
Fish and Wildlife Environmentalist

cc: Rob Lindbom, Region IV Habitat Biologist
Bob Nichols, Region IV Manager
USFWS, EPA, WPC

TENNESSEE WILDLIFE RESOURCES AGENCY

ELLINGTON AGRICULTURAL CENTER
P. O. BOX 40747
NASHVILLE, TENNESSEE 37204

January 22, 2008

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

Re: **Concurrence Point 1**, Pellissippi Parkway Extension from SR 33 (Old Knoxville Highway) to SR 73 (US 321/Lamar Alexander Highway) in Blount County, Tennessee

Dear Mr. Love:

The Tennessee Wildlife Resource Agency has received and reviewed the information your office provided to us regarding the proposed project listed above. Our current concerns are potential environmental impacts associated with potential stream and wetland impacts and potential impacts to rare species that may occur due to the construction of this project. We therefore request that all stream crossings and wetland crossings, with linear feet of stream impacts and acreages of wetland impacts, be illustrated and tabulated for each alternative proposed for consideration in future correspondence that will be forthcoming from your agency once alignments are proposed.

We concur on Concurrence Point 1 for the proposed Pellissippi Parkway Extension from SR 33 (Old Knoxville Highway) to SR 73 (US 321/Lamar Alexander Highway) in Blount County, Tennessee. We have completed the requested concurrence form, which is attached. We thank you for the opportunity to participate during the coordination process and look forward to working with TDOT personnel in the future to reduce potential impacts to fish and wildlife resources associated with this project.

Sincerely,

Robert M. Todd

Robert M. Todd
Fish and Wildlife Environmentalist

cc: Rob Lindbom, Region IV Habitat Biologist
Bob Nichols, Region IV Manager

Tennessee Environmental Streamlining Agreement Concurrence Form
Concurrence Point 1
Pellissippi Parkway Extension (From State Route 33 (Old Knoxville Highway) to State Route 73 (US 321/Lamar Alexander Parkway))
Blount County, Tennessee
TDOT Pin # 101423.00, TDOT Project # 05097-1226-04

The Tennessee Department of Transportation (TDOT) is preparing an *Environmental Impact Statement* (*EIS*) for the Pellissippi Parkway Extension from State Route 33 (Old Knoxville Highway) to State Route 73 (US 321/Lamar Alexander Parkway), Blount County, Tennessee. The *EIS* is being developed by TDOT to document the impacts of the subject project, in accordance with the National Environmental Policy Act (NEPA) and the *Tennessee Environmental Streamlining Agreement* (*TESA*). In accordance with *TESA*, we are requesting your review and concurrence on Concurrence Point 1, *Purpose and Need and Study Area Package*.

The *Purpose and Need and Study Area Package* was sent to you on December 20, 2007 for a 45-day review period. Once you have had the opportunity to review the above referenced document, please sign the attached form. In signing this document, you are indicating your concurrence on the alternatives to be carried forward into the environmental document for further study; and

Please sign and return this form to Tom Love at the address below by February 4, 2008.

Mr. Tom Love
TDOT
Environmental Division, Suite 900
James K. Polk Building
505 Deaderick Street
Nashville, TN 37243-0334

If you feel all provisions of Concurrence Point 1 have been satisfied, please acknowledge concurrence with the adequacy of the ***Purpose and Need and Study Area Package.***

AGENCY: Tennessee Wildlife Resources Agency

CONCURRENCE: Robert M. Todd

DATE: 1-22-2008

TENNESSEE WILDLIFE RESOURCES AGENCY

ELLINGTON AGRICULTURAL CENTER
P. O. BOX 40747
NASHVILLE, TENNESSEE 37204

June 18, 2008

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

Re: **Concurrence Point 2**, Pellissippi Parkway Extension from SR 33 (Old Knoxville Highway) to SR 73 (US 321/Lamar Alexander Highway) in Blount County, Tennessee

Dear Mr. Love:

The Tennessee Wildlife Resource Agency has received and reviewed the information your office provided to us regarding the proposed project listed above. Our current concerns are potential environmental impacts associated with potential stream and wetland impacts and potential impacts to rare species that may occur due to the construction of this project. We therefore request that all stream crossings and wetland crossings, with linear feet of stream impacts and acreages of wetland impacts, be illustrated and tabulated for each alternative proposed for consideration in future correspondence that will be forthcoming from your agency once alignments are proposed.

The Tennessee Wildlife Resources Agency provides the following advisory comment. In the document entitled "Alternatives To Be Evaluated Package" in Section 2.2 Objective or Purpose of Project on page 2, one of the objectives is to "Support community goals" and in Section 3.0 Alternatives Analysis Methodology on page 3, one of the criteria for evaluation is to "Support community goals"; it is our opinion that a listing or description of what the community goals have been determined to be and the source of community goal should be documented in forthcoming Concurrence Point 3 package for review.

We concur on Concurrence Point 2 for the proposed Pellissippi Parkway Extension from SR 33 (Old Knoxville Highway) to SR 73 (US 321/Lamar Alexander Highway) in Blount County, Tennessee. We have completed the requested concurrence form, which is attached. We thank you for the opportunity to participate during the coordination process and look forward to working with TDOT personnel in the future to reduce potential impacts to fish and wildlife resources associated with this project.

Sincerely,

Robert M. Todd

Robert M. Todd
Fish and Wildlife Environmentalist

cc: Rob Lindbom, Region IV Habitat Biologist
Bob Nichols, Region IV Manager

Tennessee Environmental Streamlining Agreement Concurrence Form
Concurrence Point 2
Pellissippi Parkway Extension (From State Route 33 (Old Knoxville Highway) to State Route 73 (US 321/Lamar Alexander Parkway))
Blount County, Tennessee
TDOT Pin # 101423.00, TDOT Project # 05097-1226-04

The Tennessee Department of Transportation (TDOT) is preparing an *Environmental Impact Statement* (*EIS*) for the Pellissippi Parkway Extension from State Route 33 (Old Knoxville Highway) to State Route 73 (US 321/Lamar Alexander Parkway), Blount County, Tennessee. The *EIS* is being developed by TDOT to document the impacts of the subject project, in accordance with the National Environmental Policy Act (NEPA) and the *Tennessee Environmental Streamlining Agreement* (*TESA*). In accordance with *TESA*, we are requesting your review and concurrence on Concurrence Point 2, *Alternatives to be Evaluated*.

The *Alternatives to be Evaluated Package* was sent to you on June 11, 2008 for a 45-day review period. Once you have had the opportunity to review the above referenced document, please sign the attached form. In signing this document, you are indicating your concurrence on the alternatives to be carried forward into the environmental document for further study; and

Please sign and return this form to Tom Love at the address below by July 28, 2008.

Mr. Tom Love
TDOT Environmental Division
Suite 900
James K. Polk Building
505 Deaderick Street
Nashville, TN 37243-0334

If you feel all provisions of Concurrence Point 2 have been satisfied, please acknowledge concurrence with the adequacy of the ***Alternatives to be Evaluated Package.***

AGENCY: TENNESSEE WILDLIFE RESOURCES AGENCY

CONCURRENCE: Robert Todd, FISH AND WILDLIFE ENVIRONMENTALIST

DATE: 6-18-2008

TENNESSEE WILDLIFE RESOURCES AGENCY

ELLINGTON AGRICULTURAL CENTER
P. O. BOX 40747
NASHVILLE, TENNESSEE 37204

December 15, 2009

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

Re: **Concurrence Point 3**, Draft Environmental Impact Statement for the Pellissippi Parkway Extension (SR 162) from SR 33 (Old Knoxville Highway) to US 321/SR 73/Lamar Alexander Parkway, Blount County, Tennessee

Dear Mr. Love:

The Tennessee Wildlife Resource Agency (TWRA) has received and reviewed the information your office provided to us regarding the proposed project listed above. Our current concerns are potential environmental impacts associated with potential stream and wetland impacts, and potential impacts to floodplains and rare species that may occur due to the construction of this project.

We concur on Concurrence Point 3 for the Pellissippi Parkway Extension (SR 162) from SR 33 (Old Knoxville Highway) to US 321/SR 73/Lamar Alexander Parkway, Blount County, Tennessee. We do provide the following advisory comments. On page 3-83, title of the second paragraph should read "Indiana Bat – State and Federally Endangered" since it is listed as endangered by both TWRA and the U.S. Fish and Wildlife Service (USFWS). On page 3-83, title of the third paragraph should read "Snail Darter – State and Federally Threatened" since it is listed as threatened by both TWRA and the USFWS. On page 3-83, title of the second paragraph should read "Duskytail Darter – State and Federally Endangered" since it is listed as endangered by both TWRA and the USFWS. On page 3-84 in Table 3-30 in the column regarding state status; the status for Indiana Bat, Snail Darter, Duskytail Darter, and the Fine-rayed pigtoe should be listed as the same as the federal status since the state status is the same as the federal status.

We have completed the requested concurrence form, which is attached. We thank you for the opportunity to participate during the coordination process and look forward to working with TDOT personnel in the future to reduce potential impacts to fish and wildlife resources associated with this project.

Tennessee Environmental Streamlining Agreement Concurrence Form
Concurrence Point 3
Pellissippi Parkway Extension (From State Route 33 (Old Knoxville Highway) to State Route 73 (US 321/Lamar Alexander Parkway))
Blount County, Tennessee
TDOT Pin # 101423.00, TDOT Project # 05097-1226-04

The Tennessee Department of Transportation (TDOT) is preparing an *Environmental Impact Statement* (*EIS*) for the Pellissippi Parkway Extension from State Route 33 (Old Knoxville Highway) to State Route 73 (US 321/Lamar Alexander Parkway), Blount County, Tennessee. The *EIS* is being developed by TDOT to document the impacts of the subject project, in accordance with the National Environmental Policy Act (NEPA) and the *Tennessee Environmental Streamlining Agreement* (*TESA*). In accordance with *TESA*, we are requesting your review and concurrence on Concurrence Point 3, *Draft Environmental Impact Statement.*

The *Preliminary Draft Environmental Impact Statement* was sent to you on November 6, 2009 for a 45-day review period. Once you have had the opportunity to review the above referenced document, please sign the attached form. In signing this document, you are indicating your concurrence on the sufficiency of the draft environmental document.

Please sign and return this form to Tom Love at the address below by December 22, 2009.

Mr. Tom Love
TDOT Environmental Division
Suite 900
James K. Polk Building
505 Deaderick Street
Nashville, TN 37243-0334

If you feel all provisions of Concurrence Point 3 have been satisfied, please acknowledge concurrence with the adequacy of the ***Preliminary Draft Environmental Impact Statement.***

AGENCY: TENNESSEE WILDLIFE RESOURCES AGENCY

CONCURRENCE: Robert Todd, FISH AND WILDLIFE ENVIRONMENTALIST

DATE: 12-15-2009

TENNESSEE WILDLIFE RESOURCES AGENCY

ELLINGTON AGRICULTURAL CENTER
P. O. BOX 40747
NASHVILLE, TENNESSEE 37204

August 9, 2010

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

Re: Request for Comments, Draft Environmental Impact Statement, Pellissippi Parkway Extension (SR 162) from SR 33 (Old Knoxville Highway) to US 321/SR 73/Lamar Alexander Parkway
Blount County, Tennessee

Dear Mr. Love:

The Tennessee Wildlife Resource Agency (TWRA) has received and reviewed the information your office provided to us regarding the proposed project listed above. We understand that the U.S. Fish and Wildlife Service no longer believes that a timeframe restriction on tree cutting properly addresses indirect and cumulative impacts to the state and federally endangered Indiana bat (*Myotis sodalist*). We suggest further coordination with the U.S. Fish and Wildlife Service and our agency on methods to further minimize impacts to the Indiana bat due to this proposed project. We look forward to working with the Tennessee Department of Transportation to further avoid, minimize, and mitigate for potential impacts to streams, wetlands, and floodplains once a preferred alternative is selected.

We thank you for the opportunity to participate during the coordination process for this proposed project.

Sincerely,

Robert M. Todd

Robert M. Todd
Fish and Wildlife Environmentalist

cc: Rob Lindbom, Region IV Habitat Biologist
John Gregory, Region IV Manager
Vincent Pontello, East Tennessee Transportation Biologist

TENNESSEE WILDLIFE RESOURCES AGENCY

ELLINGTON AGRICULTURAL CENTER
P. O. BOX 40747
NASHVILLE, TENNESSEE 37204

May 18, 2012

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

Re: **Concurrence Points 4**, Preferred Alternative and Preliminary Mitigation for Pellissippi Parkway Extension from SR 33 (Old Knoxville Highway) to SR 73 (US 321/Lamar Alexander Highway), Blount County, Tennessee

Dear Ms. Andrews:

The Tennessee Wildlife Resource Agency has received and reviewed the information your office provided to us regarding the proposed project listed above. We concur on Concurrence Point 4 regarding the preferred alternative and preliminary mitigation for the Preferred Alternative and Preliminary Mitigation for Pellissippi Parkway Extension from SR 33 (Old Knoxville Highway) to SR 73 (US 321/Lamar Alexander Highway), Blount County, Tennessee. We have completed the requested concurrence form, which is attached.

The Tennessee Wildlife Resources Agency requests that the Tennessee Department of Transportation initiate a subsurface program designed to assess surface and groundwater connectivity to area streams, which may require dye-tracing studies, and commit to the protection of these unique resources which may be inhabited by species yet to be determined. We also request that the Tennessee Department of Transportation commit to further coordination regarding methods to minimize potential impacts to terrestrial and aquatic species under our authority. It is the intention of the Tennessee Wildlife Resources Agency to perform aquatic species surveys near all proposed stream crossings in the near future in order to assess potential habitat and listed species that may or may not occur along the project corridor in order to provide site specific recommendations to minimize potential impacts to species under our authority. We request that these commitments be included in the Final Environmental Impact Statement for this proposed project.

We thank you for the opportunity to participate during the coordination process for this proposed project.

Sincerely,

Robert M. Todd

Robert M. Todd
Fish and Wildlife Environmentalist

cc: Vincent Pontello, Wildlife Biologist/East TN TDOT Liaison
Rob Lindbom, Region IV Habitat Biologist
Bart Carter, Region IV Fisheries Coordinator
Pete Wyatt, Region IV Wildlife Coordinator
John Gregory, Region IV Manager

Tennessee Environmental Streamlining Agreement
Concurrence Point #4, Concurrence Form
Pellissippi Parkway Extension, From State Route 33 (Old Knoxville Highway) to State Route 73 (US 321/Lamar Alexander Parkway), Blount County, Tennessee, TDOT Pin # 101423.00, TDOT Project #05097-1226-04

The Tennessee Department of Transportation (TDOT) is preparing an Environmental Impact Statement (EIS) for the Pellissippi Parkway Extension from State Route 33 (Old Knoxville Highway) to State Route 73 (US 321/Lamar Alexander Parkway), Blount County, Tennessee. The EIS is being developed by TDOT to document the impacts of the subject project, in accordance with the *National Environmental Policy Act (NEPA)* and the *Tennessee Environmental Streamlining Agreement* (*TESA*). In accordance with TESA, we are requesting your review and concurrence on Concurrence Point #4, Preferred Alternative and Preliminary Mitigation Package.

The Preferred Alternative and Preliminary Mitigation Package was sent to you on April 2, 2012 for a 45-day review period. Once you have had the opportunity to review the above referenced document, please sign the attached form. In signing this document, you are indicating your concurrence of the preferred alternative to be evaluated in the Final Environmental Impact Statement (FEIS) as well as preliminary mitigation measures.

Please sign and return this form to Ann Andrews at the address below by **May 18, 2012**.

Ms. Ann Andrews
TDOT Environmental Division
Suite 900, James K. Polk Building
505 Deaderick Street
Nashville, TN 37243-0334

If you feel all provisions of TESA Concurrence Point #4 have been satisfied, please acknowledge concurrence with the Preferred Alternative and Preliminary Mitigation.

AGENCY: Tennessee Wildlife Resources Agency

CONCURRENCE: Robert Todd

DATE: 5-18-2012

TENNESSEE WILDLIFE RESOURCES AGENCY

ELLINGTON AGRICULTURAL CENTER
P. O. BOX 40747
NASHVILLE, TENNESSEE 37204

June 6, 2013

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

Re: Preferred Alternative and Alignment Shifts
Pellissippi Parkway Extension (SR 162) from SR 33 to US 321 (SR 73), Blount County, TN
PIN 101423.00, Project # 05097-1226-04

Dear Ms. Stack:

The Tennessee Wildlife Resource Agency has reviewed the information that you provided regarding the proposed alignment shifts for the Pellissippi Parkway Extension project that would address the issue of a National Register eligible archaeological site that has been identified within the proposed right-of-way of the Preferred Alternative near the southern terminus of the project. The Preferred Alternative was identified in the Concurrence Point 4 Package. It appears from the illustration in Figure 1 of the information packet that all the proposed avoidance alignments would impact the same streams; therefore would affect the same species but the habitat impacts would differ. Based upon the information that I requested and that you provided, it appears that the East Avoidance Alternative (1,541 linear feet of stream impacts and 6.40 acres of wetland impacts) would have less impacts to stream and wetland resources than would the West Avoidance Alternative (2,315 linear feet of stream impacts and 7.96 acres of wetland impacts); therefore we recommend that the East Avoidance Alternative be chosen as the new Preferred Alternative since the current Preferred Alternative (which has the least stream and wetland impacts of all the alternatives) may be eliminated in order to avoid the National Register eligible archaeological site.

Thank you for the opportunity to review and comment on the modification of this proposed project.

Sincerely,

Robert M. Todd

Robert M. Todd
Fish and Wildlife Environmentalist

cc: Vincent Pontello, Wildlife Biologist/East TN TDOT Liaison
Rob Lindbom, Region IV Habitat Biologist
Bart Carter, Region IV Fisheries Coordinator
John Gregory, Region IV Manager
John Griffith, USFWS
Benjamin Brown, TDEC
Larry Long, EPA
Lisa Morris, U.S. Army Corps of Engineers, Nashville District
Leigh Ann Tribble, Federal Highway Administration

Addendum to 2009 Ecology Report

Pellissippi Parkway Extension (SR 162)

Blount County, Tennessee

TDOT PIN: 101423.00

State Project No. 05097-1226-04

Prepared By:

Parsons Brinckerhoff, Inc. 1900 Church Street, Suite 400
Nashville, Tennessee 37203

Jonathan Sell, Lead Environmental Scientist

July 2013

Table of Contents

List of Tables

List of Appendices

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 dabase
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 Purpose of Addendum

The 2009 ecology report (with minor revisions in January 2010) prepared for the Tennessee Department of Transportation (TDOT) Pellissippi Parkway Extension (SR 162) Project in Blount County, TN evaluated the potential ecological impacts of three build alternatives (DEIS Build Alternatives A, C, and D) and the No-Build Alternative that were being considered for the proposed project. After careful consideration of input from the public, local officials and regional, state and federal agencies following the circulation of the DEIS in 2010, as well as weighing the impacts of the project alternatives on the human and natural environment, in 2012, the TDOT selected Build Alternative A (see Figure 1 – Project Location Map) as its Preferred Alternative for the proposed project. Since the selection of the Preferred Alternative, two alignment shifts (East Alignment Shift and West Alignment Shift) have been proposed to avoid impacting an environmentally sensitive (archaeology) site that was discovered near the southern terminus of the Preferred Alternative. Therefore, to comply with state and federal environmental regulations and policies and to update the 2009 Ecology Report, a re-evaluation of the Preferred Alternative was conducted to assess the potential impacts to the ecological resources along the Preferred Alternative and the proposed alignment shifts. Since approval of the DEIS, Build Alternatives C and D are no longer being considered, they were not re-evaluated and are not discussed in this Addendum. Furthermore, this Addendum serves to update sections of the 2009 Ecology Report that required revision as a result of the 2013 field surveys, agency coordination, and/or other associated surveys and documentation. Sections of the 2009 Ecology Report that were not affected by this 2013 re-evaluation are not included in this Addendum.

To determine the potential impacts to the local ecology, studies were conducted along the Preferred Alternative and the proposed alignment shift options in April and May 2013 by Parsons Brinckerhoff (PB) Biologists Jonathan Sell and Andrea Benson. Studies included literature review, coordination with state and federal agencies as well as review of their on-line databases, and on-foot field reconnaissance. Particular attention was given to locating any new streams, wetlands, and specialized habitats (i.e., caves, springs, and sinkholes) along the Preferred Alternative and alignment shifts and re-evaluating the previously identified natural resources that could harbor protected species or influence water quality.

2.0 Preferred Alternative and Alignment Shifts Descriptions

The Preferred Alternative (formerly Alternative A) extends 4.38 miles from SR 33 to US 321/SR 73, as a four-lane divided roadway with three proposed interchanges (with SR 33, US 411/Sevierville Road and US 321/SR 73). The alignment begins on the east side of SR 33, opposite the existing half interchange of Pellissippi Parkway (Interstate 140) 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 Pellissippi Place Research and Technology Park, currently under development. After crossing Wildwood Road, the route continues in a generally southerly direction, crossing Brown School Road and US 411/Sevierville Road east of the Davis Ford Road intersection with US 411. The route continues across Davis Ford Road and passes along the northeastern edge of the Kensington Place mobile home community. The route intersects US 321/SR 73 just east of Flag Branch.

The proposed typical section evaluated in the DEIS for the extension of Pellissippi Parkway in the Preferred Alternative consists of two 12-foot travel lanes in each direction, 12-foot outside shoulders, and a 48-foot depressed median with 6-foot inside shoulders. The proposed right-of-way (ROW) is a minimum of 300 feet, requiring the purchase of new ROW. Depending upon the horizontal and vertical curve requirements, desired speed limits, and the slope of the existing land, actual ROW acquisition might be reduced or increased in some areas during the design phase of the project. The roadway is designed for traffic traveling at 60 miles-per-hour.

Diamond interchanges connect the new roadway with SR 33 and US 411/Sevierville Road, and the roadway is proposed to terminate with a trumpet interchange at US 321/SR 73. All other road crossings are grade-separated without access. The distance between the two proposed interchanges, with US 411/Sevierville Road and with US 321/SR 73, is about one mile. Due to this short distance, during the design phase for the Preferred Alternative, TDOT will consider the use of an auxiliary lane in each direction to assist traffic exiting and entering the proposed roadway.

Two cross routes that would have interchanges with the new roadway, SR 33 and US 411/Sevierville Road, would be improved to a five-lane urban section through the interchange area. The five-lane cross section on those two roadways would consist of two 12-foot lanes in

each direction with a 12-foot continuous center turn lane.

Alignment Shift Options

As a result of the additional technical studies after the selection of the Preferred Alternative, an environmentally sensitive site (archaeological site determined eligible for the National Register of Historic Places) has been found along the Preferred Alternative near the southern terminus of the project. TDOT is required to look to ways to avoid that site. Since the Preferred Alternative had already been analyzed and selected over the other Build Alternatives, TDOT focused on identifying potential avoidance options via minor alignment shifts in the vicinity of the sensitive portion of the eligible archaeology site, rather than major shifts of the alignment. TDOT identified and investigated two possible minor shifts in the route of the Preferred Alternative, between Davis Ford Road and US 321/SR 73 (the southern terminus of the project):

- The **east alignment shift** would move the ROW about 300 feet eastward, away from the Kensington Place mobile home community and toward the developing Sweetgrass Plantation subdivision.
- The **west alignment shift** would move the ROW about 150 feet to the west into the mobile home community.

Figure 2 – Proposed East and West Alignment Shifts illustrates the potential shifts in relation to the Preferred Alternative.

The length of each shift is about 1.4 miles. Each shift would have the same typical section as the Preferred Alternative and would terminate in the same location at US 321/SR 73.

3.0 Aquatic Ecology

In April and May 2013, field surveys were conducted to re-evaluate the aquatic ecology resources identified during the 2008 field surveys and to determine and map aquatic ecology resources that may be present within the proposed alignment shifts. To assist in locating aquatic resources, U.S. Geologic Survey (USGS) topography maps, National Wetland Inventory (NWI) maps, and county soil survey maps were reviewed prior to conducting the field surveys. The classification of aquatic resources (i.e., wetland, stream, open water, etc.) identified during the

2013 field surveys primarily followed the methods used in the 2008 field surveys and described in the 2009 Ecology Report. However, wetland locations were determined using the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region* (effective April 2012) as opposed to the 2008 surveys, which followed the *Corps of Engineers Wetlands Delineation Manual* (U.S. Army Corps of Engineers (USACE) 1987). If the limits of a previously delineated boundary (i.e., limits of a wetland and/or the Ordinary High Water Mark (OHWM) of a stream) of an aquatic resource had changed since 2008 and/or if any new aquatic resource were discovered, it was mapped in the field using a Trimble® GeoXT™ handheld global positioning system (GPS) unit. The locations of all the identified water resources are shown on Figures 3A – 3B and the hydric soils are shown in Figures 4A – 4B, which are provided in Appendix A. Photographs of the jurisdictional waters of the U.S. are provided in Appendix B.

The Preferred 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.

3.1 Non-Wetland Waters of the U.S.

Non-wetland waters of the U.S. occurring within the Preferred Alternative corridor and proposed alignments shifts include ponds (man-made and impounded), perennial streams, intermittent streams, and certain ephemeral streams (wet weather conveyances). Streams (STR) 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 an intermittent streambed if the channel intercepted the groundwater table or standing water was present. This

determination was verified through completion of the Tennessee Department of Environment and Conservation (TDEC) Hydrologic Determination Field Data Sheet (Appendix C – Field Data Sheets). Watercourses considered wet weather conveyances lacked standing or flowing water and showed evidence of flow only after a short duration of rainfall events.

During the 2013 field surveys it was discovered that some of the non-wetland waters determined to be a wet weather conveyance (WWC) in 2008 are now more representative of a wetland, intermittent stream, or a perennial stream. In addition, some streams (STR-6 and STR-7) previously characterized as intermittent are now characterized as perennial stream channels. These changes are most likely due to the fact that in 2008 precipitation was well below average for the region resulting in no water flow in watercourses that, under normal conditions, may have intermittent to continuous water flow. Furthermore, a large wetland system (result of beaver activity) now encompasses the area where WWC-3 was identified in the 2008 surveys.

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 Preferred Alternative and proposed alignments shifts are described in the following paragraphs and listed in Tables 3.1 through 3.3 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 Preferred Alternative and proposed alignment shifts. The determinations as to which are waters of the State and/or of the U.S. have not been confirmed by TDEC and the USACE. These determinations would be made during the final design phase of the Preferred Alternative. All aquatic impacts identified as project development continue would be avoided, minimized, or mitigated to the extent possible, and incorporated into the permitting.

Preferred Alternative and Proposed East and West Alignment Shifts

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 feet tall banks with minor scouring. The average wetted width and depth are 2.0 feet and 1.0 foot, 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 Preferred Alternative. 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 feet tall eroded unstable banks with sloughing present. The average wetted width and depth are 2.0 feet and 1.0 foot, respectively. STR-2 had negligible flow. The substrate consisted of organic debris with areas of exposed sand. The canopy cover was somewhat sparse at the sample point location as the riparian buffer primarily 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 Preferred Alternative. 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 Preferred Alternative. 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 Preferred Alternative. 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. This stream currently flows through a straightened channel, which is likely the result of the surrounding land-use activities. The stream has a width of 2.0 feet and a depth of 1.0 foot. At the time of the 2013 field surveys, water depth within the channel was approximately 1.0 foot and flow was slow to somewhat stagnant. This channel is represented by a solid blue line on the Maryville USGS topographic quarter quad. However, it is more representative of an intermittent stream at its intersection with the Preferred Alternative. The dominant vegetation in the buffer around STR-5 consisted of blackberry, Chinese privet, Canada goldenrod (*Solidago Canadensis*), and Japanese honeysuckle (*Lonicera japonica*). Approximately 300 linear feet of STR-5 would be permanently impacted by the Preferred Alternative. 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 0.7 miles northwest of the intersection of Peppermint Road and Sevierville Road. Based on the absence of water and lack of evidence that would suggest continuous flow at the time of the 2008 field surveys, it was reported as intermittent in the 2009 Ecology Report. However, during the 2013 field surveys conditions were more representative of a perennial stream as there was a substantial amount of water volume (1.0 feet deep) and flow appeared to be continuous. The stream channel was approximately 6.0 feet wide with 4.0 foot tall somewhat unstable banks with minor scouring and sloughing. The substrate consisted of sand, silt, and gravel. In addition, the stream is represented by a solid blue line on the Maryville USGS

topographic quarter quad, which further supports the 2013 field survey findings. 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 315 linear feet of STR-6 would be permanently impacted by the Preferred Alternative. The impact would result from channel relocation and the placement of a culvert under the proposed roadway.

STR-7 is a perennial tributary to the Little River. It is located approximately 0.3 miles northwest of the intersection of Davis Ford Road and Nina Delozier Road. This stream was also reported as intermittent in the 2009 Ecology Report due to conditions observed during the 2008 field surveys. However, like STR-6, this channel displayed characteristics of a perennial stream at the time of the 2013 field surveys. The stream channel has a width of 8.0 feet and a depth of 3.0 feet. The water surface level was near the top of the 3.0 feet tall banks and flow was somewhat moderate. The stream is also represented by a solid blue line on the Maryville USGS topographic quarter quad. 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. Approximately 378 linear feet of STR-7 would be permanently impacted by the Preferred Alternative. The impact would result from the placement of a culvert under the proposed roadway.

STR-7A – is located approximately 0.3 miles south of the intersection of Davis Ford Road and Nina Delozier Road. It was reported as a wet weather conveyance (WWC-2) to a tributary of the Little River in the 2009 Ecology Report per the findings of the 2008 field surveys. However, during the 2013 field surveys water flow was observed and the likely source was tracked to a small spring seep located to the north of an abandoned railroad bed. The discovery of the spring seep also revealed that the stream channel currently extends several hundred feet north as it previously terminated on the south side of the abandoned railroad bed.

North of the abandoned railroad bed and from its point on origin, water flows south within in a 1.0 to 2.0 foot wide channel that at times becomes less defined due to trampling from livestock.

The depth of the stream channel was approximately 1.5 feet, but varies in areas depending on the extent of the livestock impact. The substrate consisted primarily of sand and silt as well as small gravel, in some locations. South of the abandoned railroad bed, the stream channel was somewhat more defined with a width and depth of 3.0 foot and 1.0 foot, respectively. The dominant vegetation in the buffer on the north and south side of the abandoned railroad bed consisted of giant goldenrod, fescue, foxtail grass (*Alopecurus* sp.), and purpletop (*Tridens flavus*). Although this channel is not designated on the Maryville USGS topographic quarter quad as any type of resource, it should be considered an intermittent stream as the conditions observed during the 2013 field surveys indicate that there is at least an intermittent flow that, in part, is influenced by area groundwater levels. Approximately 1,015 linear feet of STR-7A would be permanently impacted by the Preferred Alternative. The Preferred Alternative with the proposed east or west alignment shift would impact approximately 767 linear feet or 1,015 linear feet, respectively, of STR-7A. The impact would result from the placement of a culvert under the proposed roadway.

STR-7B, is a warm-water perennial tributary to the Little River. It is located approximately 0.47 miles north of Morning Star Church on the south side of Gravelly Creek. In the 2008 field surveys, a wetland (WTL-5) was the only water resource identified at this location as the area was completely inundated with water. However, the 2013 field surveys observed water levels at this location had receded and a definable stream channel was also present. The stream channel originated from a hillside spring seep and continued east approximately 160 feet until it converged with STR-8. This medium-quality stream was 8.0 feet wide with 2.0 foot tall gently sloping moderately stable banks. Stream flow was slow to somewhat stagnant near the hillside spring seep. The substrate consisted of sand, silt, gravel, and cobble. There was a riparian buffer present of 25 feet on both the left and right banks of STR-7B. 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*) (on the hillside areas of the right bank), and eastern redbud (*Cercis Canadensis*). Approximately 139 linear feet of STR-7B would be permanently impacted by the Preferred Alternative with or without the proposed west alignment shift. The impact would result from channel relocation and the placement of a culvert under the proposed roadway. STR-7B would not be impacted by Preferred Alternative if the proposed east alignment shift is selected.

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, goldenrod, Chinese privet, red maple, black tupelo, poison ivy, eastern red cedar, and eastern redbud. Approximately 628 linear feet of STR-8 would be permanently impacted by the Preferred Alternative. The Preferred Alternative with the proposed east or west alignment shift would impact approximately 323 linear feet or 545 linear feet, respectively, of STR-8. 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 on the north and south side of US 321/Lamar Alexander Parkway and flows from southwest to northeast. During the 2013 field surveys it was observed that hydrological changes have occurred as a result of substantial beaver activity in this area. Due to the beaver activity, a large wetland now encompasses a portion of the STR-9 stream channel. The portion of STR-9 that flows through a Wetland-6 extents from the north side of US 321/Lamar Alexander Parkway northeast approximately 960 linear feet downstream where it returns to a stream channel on the north side of a beaver dam. The remaining STR-9 stream channel, within the Preferred Alternative and proposed alignment shifts, was 15.0 feet wide with 4.0 foot tall moderately stable banks. Stream flow was moderate over a mostly run and pool stream channel complex. The substrate consisted primarily of sand, silt, and gravel with exposed bedrock in some portions of the channel. Canopy cover over STR-9 was approximately 20 percent. A riparian buffer, north of the wetland area, of approximately 25 feet was present 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 acuminate*), chestnut oak (*Quercus prinus*), eastern red cedar, water oak, and green ash (*Fraxinus pennsylvanica*). Approximately 623 linear feet of STR-9 would be permanently impacted by the Preferred Alternative. The Preferred Alternative with the proposed east or west alignment shift would impact approximately 545

linear feet or 1,143 linear feet, respectively, of STR-9. The impact would result from channel relocation and 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 0.3 miles northeast of the intersection of Old Knoxville Highway and Jackson Drive. Since the 2008 field surveys, a four-lane road with pedestrian paths has been constructed on the southwest side of the Preferred Alternative that appears to serve as an entrance for the Pellissippi Place Research and Development Park now under construction. In addition, a large retention pond (Pond-1A) has been constructed on the northeast side of the Preferred Alternative that also appears to be associated with the Pellissippi Place development. The construction of the four lane road and retention pond has impacted much of WWC-1 to the point that it has been eliminated on the southwest side and within the Preferred Alternative corridor. On the northeast side of the Preferred Alternative, remnants of the 2.0 feet wide by 1.0 foot deep conveyance were present; however, it was not a continuous definable feature as it was observed during the 2008 field surveys. Since the construction of the four lane road has eliminated the portion of WWC-1 that was within the Preferred Alternative corridor, WWC-1 would not be impacted by the Preferred Alternative. However, WWC-1 may be impacted by sediment run-off during the construction of the mixed use development project.

Pond (PND)-1A, is a 1.2 acre man-made retention basin located approximately 0.3 miles northeast of the intersection of Old Knoxville Highway and Jackson Drive. As previously-mentioned, PND-1A had been constructed since the 2008 field surveys and is located on the northeast side of the Preferred Alternative alignment corridor. At the time of the 2013 field surveys there was no water, or live vegetation within PND-1A. However, water marks were observed that indicated the average water depth may be around 1.0 to 2.0 feet and the dominant vegetation appeared to be golden rod and fescue. PND-1A does not appear on the Maryville USGS topographic quad and based on the 2013 field surveys, it is not associated with any intermittent and/or perennial stream channel. Based on the proposed Preferred Alternative project limits, it appears approximately 0.02 acre of PND-1A would be impacted by the proposed roadway.

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. PND-1 did not have any water in it at the time of the 2013 survey. Dominant vegetation around PND-1 included American beech, Chinese privet, red maple, American winterberry (*Ilex verticillata*), 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 (*Phytolacca Americana*). PND-2 is located completely within the Preferred Alternative proposed project limits and the entire 0.4 acre pond would be impacted by the proposed roadway. The impact would result from the placement of fill material that is necessary to construct the proposed roadway.

Table 3.1 – Summary of Streams within Preferred Alternative and Proposed Alignment Shifts

Stream	Project Segment	Location	Potential Impacts				Legal Designation (confirmed/ unconfirmed)	Stream Description
			Type of Impact	Size of Impact				
				Preferred Alt.	East Shift	West Shift		
STR-1 Unnamed tributary to Little River	Preferred Alternative	Approximately 0.4 miles north of Eagleton Village	Potential culvert placement within channel	340 linear feet	N/A	N/A	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. There was no canopy cover at this section of the stream.
STR-2 Unnamed tributary to Little River	Preferred Alternative	Approximately 0.4 miles north of Eagleton Village	Potential culvert placement within channel	147 linear feet	N/A	N/A	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. The stream has sparsecanopy coverage; species include *Fagus grandifolia*, *Pinus taeda*, *Platanus occidentalis*, *Celtis occidentalis*, and *Cornus florida*.
STR-3 Unnamed tributary to Little River	Preferred Alternative	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	N/A	N/A	Perennial Stream/ Unconfirmed	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. The stream has scattered canopy coverage; species include *Fagus grandifolia*, *Ligustrum sinense*, *Cornus florida*, *Rubus* sp., *Quercus alba*, *Fraxinus americana*, *Tilia americana*, and *Smilax rotundifolia*.
STR-4 Unnamed tributary to Little River	Preferred Alternative	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 linear feet	N/A	N/A	Perennial Stream/ Unconfirmed	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. The stream has scattered canopy coverage; species include *Fagus grandifolia*, *Ligustrum sinense*, *Cornus florida*, *Rubus* sp., *Quercus alba*, *Fraxinus americana*, *Tilia americana*, and *Smilax rotundifolia*.
STR-5 Unnamed tributary to Little River	Preferred Alternative	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	N/A	N/A	Intermittent Stream/ Unconfirmed	The channel is 2.0 feet across and 1.0 foot deep. Water surface width is 2.0 feet, and water depth is 1.0 foot. Stream banks were 3.0 feet tall, incised but stable. The substrate is primarily clay. The stream has scattered canopy coverage; species include *Rubus* sp., *Ligustrum sinense*, *Solidago canadensis*, and *Lonicera japonica*.
STR-6 Peppermint Branch	Preferred Alternative	Approximately 0.7 miles northwest of the intersection of Peppermint Road and Seiverville Road	Potential culvert placement within channel	315 linear feet	N/A	N/A	Perennial Stream/ Unconfirmed	The channel is 6.0 feet across and 4.0 feet deep. Water surface width is 4.0 feet, and water depth is 1.0 foot. Banks are 2.0 – 4.0 feet tall and somewhat unstable w/ minor scouring and sloughing. The substrate is sand, silt, and gravel. The stream has full canopy coverage; species include *Nyssa sylvatica*, *Cornus florida*, *Ulmus americana*, and *Platanus occidentalis*.
STR-7 Unnamed tributary to Little River	Preferred Alternative	Approximately 0.3 miles northwest of the intersection of Davis Ford Road and Nina Delozier Road	Potential culvert placement within channel	378 linear feet	N/A	N/A	Intermittent Stream/ Unconfirmed	The channel is 8.0 feet across and 0.5 foot deep. Water surface width is 4.0 feet, and water depth is 3.0 feet. Banks are 2.0 to 3.0 feet tall and moderately stable with minor scouring and sloughing. The substrate is sand and silt. The stream has full canopy coverage; species include *Nyssa Quercus alba*, *Ligustrum sinense*, *Acer rubrum*, *Liquidambar styraciflua*, *Rubus sp.*, *Toxicodendron radicans*, *Ulmus americana*, and *Ulmus rubra*.

Table 3.1 (cont.) – Summary of Streams within Preferred Alternative and Proposed Alignment Shifts

Stream	Project Segment	Location	Potential Impacts				Legal Designation (confirmed/ unconfirmed)	Stream Description
			Type of Impact	Size of Impact				
				Preferred Alt.	East Shift	West Shift		
STR7A-Unnamed tributary to Little River	Preferred Alternative	Approximately 0.3 miles south of the intersection of Davis Ford Road and Nina Delozier Road	Potential culvert placement within channel	1,015 linear feet	767 linear feet	1,015 linear feet	Intermittent Stream/ Unconfirmed	Channel is 1.0 to 3.0 feet across and 1.0 to 2.0 foot deep. Banks were 1.5 to 2.0 foot tall with livestock impacts, in some locations. There was no canopy cover as the entire channel was located within a pasture grazed by livestock.
STR7B-Unnamed tributary to the Little River	Preferred Alternative	Approximately 0.47 miles north of Morning Star Church on the south side of Gravelly Creek.	Potential culvert placement within channel	139 linear feet	0 linear feet	139 linear feet	Perennial Stream/ Unconfirmed	The channel is 8.0 feet wide with 2.0 - foot tall gently sloping moderately stable banks. Stream flow was slow to somewhat stagnant near the hillside spring seep. The substrate consisted of sand, silt, gravel, and cobble. There was a riparian buffer present of 25 feet on both the left and right banks of STR-7B. Dominant vegetative species included *Ulmus americana, Quercus nigra, Solidago sp., Ligustrum sinense, Acer rubrum, Nyssa sylvatica, Toxicodendron radicans, Juniperus virginiana, and Cercis Canadensis*.
STR-8 Gravelly Creek	Preferred Alternative	Approximately 0.47 miles north of Morning Star Church	Potential culvert placement within channel and channel relocation	628 linear feet	323 linear feet	545 linear feet	Perennial Stream/ Unconfirmed	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 *Ulmus americana, Quercus nigra, Solidago sp., Ligustrum sinense, Acer rubrum, Nyssa sylvatica, Toxicodendron radicans, Juniperus virginiana, and Cercis Canadensis.*
STR-9 Flag Branch	Preferred Alternative	Approximately 0.23 miles north of Morning Star Church	Potential culvert or bridge placement over /within channel	623 linear feet	545 linear feet	1,143 linear feet	Perennial Stream/ Unconfirmed	The channel is 15.0 feet across and 1.5 feet deep. Water surface width is 10.0 feet, and water depth is 2.0 feet. 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 sparse canopy coverage; species include *Euonymus americanus, Ulmus rubra, Toxicodendron radicans, Quercus prinus, Juniperus virginiana, Quercus nigra, and Fraxinus pennsylvanica*.
Total impacts				4,525 linear feet	3,755 linear feet[1]	4,962 linear feet[1]		

[1] Impact total includes all streams impacted by the Preferred Alternative if the alignment shift is selected as part of the Preferred Alternative.

Table 3.2 – Summary of Wet Weather Conveyances within the Preferred Alternative and Proposed Alignment Shifts

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	Preferred Alternative	Approximately 0.3 miles northeast of the intersection of Old Knoxville Highway, and Jackson Drive	No impact. WWC-1 has been eliminated by the construction of a four lane road.	0.0 linear feet	Wet Weather Conveyance/ Unconfirmed	As of the 2013 field surveys, only remnants of this conveyance remain as it has been impacted by a four lane road and retention pond (PND-1A).

Table 3.3 – Summary of Waterbodies within Preferred Alternative and Proposed Alignment Shifts

Waterbody	Project Segment	Location	Potential Impacts		Legal Designation (confirmed/ unconfirmed)	Waterbody Description
			Type of Impact	Size of Impact		
PND-1A	Preferred Alternative	Approximately 0.3 miles northeast of the intersection of Old Knoxville Highway and Jackson Drive.	Fill	0.02 acre	Isolated Man-made retention basin/Unconfirmed	PND-1A is a 1.2 acre man-made retention basin that has been constructed since the 2008 field surveys. It is not on the Maryville USGS topographic quad and it does not appear to be connected to an intermittent and/or perennial stream. No water was present within PND-1A during the 2013 field surveys. Dominant vegetation is *Solidago gigantean* and *Festuca* sp.
PND-1	Preferred Alternative	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 acre	Freshwater Pond connected to STR-4/ Unconfirmed	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. No water was present within PND-1 during the 2013 field surveys.Dominant vegetation around PND-1 included *Fagus grandifolia*, *Ligustrum sinense*, *Acer rubrum*, *Ilex verticullata*, *Polystichum anistichoides*, and *Festuca* sp.
PND-2	Preferred Alternative	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 *Solidago gigantea*, and *Phytolacca Americana*.
Total impacts				0.42 acre		

3.1.1 Direct Impacts

The Preferred Alternative and proposed east and west alignment shifts would have 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 Preferred Alternative and proposed east and west alignment shifts would likely be filled. The Preferred Alternative would potentially affect two open waterbodies, and nine stream sites. If the proposed east alignment shift is selected the Preferred Alternative would potentially affect two open waterbodies and nine stream sites. Furthermore, if the proposed west alignment shift is selected the Preferred Alternative would potentially affect two open waterbodies and ten stream sites. Potential impacts to stream channels and wet weather conveyances not crossed by the Preferred Alternative and/or the proposed east and west alignment shifts 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 project development process, 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 3.1 through 3.3 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 3.1 through 3.3, the Preferred Alternative would potentially impact approximately 4,525 linear feet of intermittent/perennial stream channel and 0.42 acres of open waterbodies (i.e. pond). The Preferred Alternative with the proposed east or west alignments shifts would impact approximately 3,755 linear feet or 4,962 linear feet of intermittent/perennial stream channel, respectively. The 0.42 acres of impact to open water bodies would not change regardless of the selection of the proposed east or west alignment shift.

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.

3.1.2 Indirect Impacts

The Preferred Alternative and/or the proposed alignment shifts 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 network. 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 1980s 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.

3.1.3 Cumulative Impacts

The non-wetland waters of the U.S. that occur within the Preferred Alternative and/or proposed alignment shifts 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 Preferred Alternative and/or proposed alignment shifts 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.

3.1.4 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.

3.2 Wetlands

During the 2013 field surveys, all wetland areas previously delineated and mapped in 2008 that are within the Preferred Alternative were re-visited to evaluate the current condition of the wetland (WTL). Furthermore, any new areas within the Preferred Alternative and proposed alignment shifts that displayed evidence and/or presence of the three wetland parameters (hydrophytic vegetation, hydric soils, and wetland hydrology) outlined in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (*effective April 2012) were identified and delineated during the 2013 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 2013 field surveys identified two additional wetlands (WTL-5A and WTL-5B) that were not present/observed during the 2008 field surveys. In addition, it was observed that the one wetland (WTL-6) had increased substantially in size as a result of beaver activity in the area. The conditions of the other wetland areas within the Preferred Alternative have not significantly changed since the 2008 field surveys were completed. This included the observation that the wetlands encountered were primarily associated with intermittent and perennial stream corridors that traverse pastureland or abandoned livestock watering ponds, the location of these wetlands allow for frequent disturbances from livestock and other anthropogenic activities that have

severely degraded and reduced the size of the wetland habitats, and 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.

3.2.1 Affected Environment

Two wetland community types (scrub-shrub and emergent), common in disturbed landscapes, were observed within the Preferred Alternative and proposed alignment shifts. 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.

Table 3.4 further describes wetland characteristics, functions, potential impacts, and location of each wetland identified within the Preferred Alternative and proposed alignment shifts. 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 the Preferred Alternative and proposed alignment shifts.

Preferred Alternative and Proposed East and West Alignment Shifts

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, soft rush, beggarticks, broad-leaved dock (*Rumex obtusfolius*), 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 Preferred Alternative. 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. 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 Preferred Alternative. 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. Hydologic indicators included inundation, water marks and saturated soils with a low chroma. Approximately 0.3 acre of WTL-3 would be permanently impacted by the Preferred Alternative. 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. 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 Preferred Alternative.

WTL-5 is a seasonally saturated emergent wetland located adjacent to STR-7B. 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 Preferred Alternative and/or the proposed west alignment shift. The impact would result from the placement of fill into WTL-5. The proposed east alignment shift would not impact WTL-5.

WTL-5A is a seasonally saturated 0.06 acre emergent wetland seep located adjacent to the north bank STR-8. This wetland was located within a pasture used for grazing livestock approximately 0.47 miles north of US 321/Lamar Alexander Parkway. WTL-5A was not identified/observed during the 2008 field survey as it was either beyond the proposed project limits and/or it was not a wetland area at that time. It appeared that WTL-5A is frequently impacted by livestock via grazing and trampling, but does provide some minor wetland functions that include temporary surface water run-off storage, water filtration, and possible flood

attenuation. Dominant vegetation was limited to a few herbaceous plant species that included bristly buttercup (*Ranunculus hispidus*), sedges (*Carex* sp.), broad-leaved dock, and soft rush. Hydologic indicators included inundation, water marks, drainage patterns, and saturated soils with a low chroma. Based on the location of WTL-5A (along edge of project limits) and size, the entire 0.06 acre wetland would be permanently impacted by the Preferred Alternative and the proposed west alignment shift. The impact would result from the placement of fill into WTL-5A. The proposed east alignment shift would not impact WTL-5A

WTL-5B is a seasonally saturated 0.55 acre emergent wetland located adjacent to the north bank STR-8. This wetland was located just west of WTL-5A within the same pasture used for grazing livestock approximately 0.47 miles north of US 321/Lamar Alexander Parkway. WTL-5B was not identified/observed during the 2008 field survey as it was either beyond the proposed project limits and/or it was not a wetland area at that time. WTL-5B is located in an area that is represented as a blue polygon on the Maryville USGS topographic quad. However, based on the 2013 field surveys it is more representative of a wetland habitat as the area was not completely inundated and hydrophitic vegetation covered the entire area. Similar to WTL-5A, WTL-5B is frequently impacted by livestock via grazing and trampling. Wetland functions provided by WTL-5B include temporary surface water run-off storage, water filtration, wildlife habitat, and flood attenuation. Dominant vegetation was limited to a few herbaceous plant species that included bristly buttercup, sedges, broad-leaved dock, and soft rush. Hydologic indicators included inundation, water marks, drainage patterns, and saturated soils with a low chroma. Based on the location of WTL-5B it would not be impacted by the Preferred Alternative and/or the proposed east or west alignment shifts.

WTL-6 is a seasonally saturated to semi-permanently flooded beaver impounded scrub-shrub wetland located immediately north of US 321/Lamar Alexander Parkway. During the 2008 field surveys, WTL-6 was identified as a small 0.34 acre wetland that occurred within a man-made swale surrounded by a pasture partially used for grazing livestock. However, since that time beavers have moved into the area and have created multiple dams in and along STR-9. As a result of the beaver activity, WTL-6 is now a much larger wetland that encompasses an area of approximately 9.5 acres, including the area once identified as WWC-3. Based on the hydrological changes that have occurred in the area, the wetland functions provided by WTL-6

are much more substantial that includes temporary surface water run-off storage, water filtration, wildlife habitat, and flood attenuation. 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 inundation, water marks, drainage patterns, and saturated soils with a low chroma. Based on the location of WTL-6 and size, the Preferred Alternative would permanently impact approximately 4.25 acres of WTL-6. The proposed east and west alignment shifts would permanently impact approximately 6.39 acres and 7.96 acres, respectively, of WTL-6. The impact would result from the placement of fill into WTL-6.

Table 3.4 – Summary of Wetlands within Preferred Alternative and Proposed Alignment Shifts

Wetland Type	Location	Likely Project Impact on Wetland	Primary Functions of the Wetland	Wetland Size (acres) (Estimated)**				Description
				Total	Likely Eliminated or Drained			
					Preferred Alt.	East Shift	West Shift	
WTL-1 Palustrine Scrub/ Shrub, isolated	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	N/A	N/A	Small wetland area created by water run-off due to human induced topography chain. Salix nigra is the most abundant tree species. Dominant herbaceous vegetation includes *Polygonum* sp., *Juncus effusus*, and *Vernonia* sp.
WTL-2 Palustrine Emergent, contiguous	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	N/A	N/A	Small wetland area dominated by herbaceous species such as *Scirpus cyperinus*, *Typha latifolia*, *Polygonum hydropiper*, *Bidens* sp., *Vernonia* sp., and *Rubus argutus*.
WTL-3 Palustrine Emergent, contiguous	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	0.3	N/A	N/A	Small wetland area associated with STR-1 and STR-2. WTL-3 was dominated by herbaceous species such as *Scirpus cyperinus*, *Typha latifolia*, *Polygonum hydropiper*, *Bidens* sp., *Vernonia* sp., and *Rubus argutus*.
WTL-4 Palustrine Scrub/ Shrub, contiguous	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	N/A	N/A	Small wetland area associated with STR-4 and PND-1. *Salix nigra* is the most abundant tree species. . Dominant herbaceous vegetation includes *Polygonum* spp., *Typha latifolia*, *Lycopus virginicus*, *Solidago gigantean*, and *Vernonia* sp.
WTL-5 Palustrine/ Emergent, contiguous	Approximately 0.41 miles south of the intersection of Nina Delozier Road and Davis Ford Road	Fill	Temporary surface water run-off storage, some water filtration, and possible flood attenuation	0.1	0.1	0.0	0.1	Small wetland area associated with STR-7B. WTL-5 was dominated by herbaceous species such as *Lobelia cardinalis*, *Helenium autumnale*, *Polygonum punctatum*, *Eupatorium perfoliatum*, and *Impatiens capsensis*.
WTL-5A Palustrine/ Emergent, contiguous	Located within a pasture used for grazing livestock approximately 0.47 miles north of US 321/Lamar Alexander Parkway	Fill	Temporary surface water run-off storage, water filtration, and flood attenuation	0.06	0.06	0.0	0.06	Small wetland area associated with STR-8. WTL-5A was dominated by herbaceous species such as *Ranunculus hispidus*, *Carex*, and *Juncus effusus*.
WTL-5B Palustrine/ Emergent, contiguous	Located within a pasture just west of WTL-5A used for grazing livestock approximately 0.47 miles north of US 321/Lamar Alexander Parkway	No Impact; The resource is located outside of proposed right-of-way.	Temporary surface water run-off storage, water filtration, wildlife habitat, and flood attenuation	0.55	0.0	0.0	0.0	Medium sized wetland area associated with STR-8. WTL-5B was dominated by herbaceous species such as *Ranunculus hispidus*, *Carex*, and *Juncus effusus*.
WTL-6 Palustrine Scrub/ Shrub, isolated	Immediately north of US 321/Lamar Alexander Parkway at the southern terminus of the proposed project	Fill	Temporary surface water run-off storage, water filtration, wildlife habitat, and flood attenuation	9.5	4.25	6.39	7.96	Large wetland created by beaver impoundment of STR-9. Salix nigra is the most abundant tree species. Dominant herbaceous vegetation includes *Eupatorium perfoliatum*, *Juncus effusus*, *Leersia virginica*, and *Typha latifolia*.
Total impacts				11.11	5.01	6.99[1]	8.72[1]	

[1] Impact total includes all wetlands impacted by the Preferred Alternative if the alignment shift is selected as part of the Preferred Alternative.

3.2.2 Direct Impacts

The Preferred Alternative would impact six of the eight wetland sites for a total of 5.01 acres of wetland impacts. The Preferred Alternative with the proposed east alignment shift would impact four of the eight wetland sites for a total of 6.99 acres of wetland impacts. The Preferred Alternative with the proposed west alignment shift would impact six of the eight wetland sites for a total of 8.72 acres of wetland impacts. It is anticipated that these wetland acres would be filled as a result of the Preferred Alternative and/or the proposed alignment shifts. These wetland impacts are shown in Table 3.4. Efforts would be made, however, during further project design, to avoid or minimize impacts to as many of these sites as possible.

3.2.3 Indirect Impacts

The Preferred Alternative and proposed alignment shifts 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 Preferred Alternative and proposed alignment shifts. 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 Preferred Alternative and proposed alignment shifts 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 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.

3.2.4 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.

As 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 Preferred Alternative and proposed alignment shifts 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.

3.2.5 Avoidance and Minimization of Wetland Impacts

The Preferred Alternative and proposed alignment shifts 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 Preferred Alternative and proposed alignment shifts to further minimize impacts to wetlands also consider the potential impacts to the physical environments. Therefore, the Preferred Alternative and the selected proposed alignment shift (east or west) may impact a greater amount of wetland acres versus the other proposed alignment shift. The Preferred Alternative without the proposed east or west alignment shifts would impact approximately 5.01 wetland acres. The Preferred Alternative with the proposed east or west alignment shifts would impact approximately 6.99 wetland acres or 8.72 wetland acres,

respectively. However, the impacted wetland acres are 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 additional alignment shifts are 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 Preferred Alternative 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.

3.2.6 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.

4.0 Floodplains

A survey of the Preferred Alternative and proposed alignment shifts 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.

4.1 Direct Impacts

The Preferred Alternative and proposed alignment shifts would impact 100-year floodplains at various stream crossings throughout the proposed corridors (Table 4.1 – Floodplain Acres Impacted by Preferred Alternative and Proposed Alignment Shifts). The amount of floodplain acres that may be impacted at the various floodplain crossings were calculated by measuring the amount of floodplains that occur within the Preferred Alternative and/or proposed east and west alignment shift corridors (Figure 5: Floodplains). As presented in Table 4.1, a total of 8.1 acres, 7.4 acres, and 11.0 acres of the 100-year floodplain could be impacted by the Preferred Alternative and/or the proposed east or west alignment shift 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 4.1 – Floodplain Acres Impacted by the Preferred Alternative and Proposed Alignment Shifts

Resource Name	Class	Preferred Alternative (acres)	East Alignment Shift (acres)	West Alignment Shift (acres)
STR-6-Peppermint Branch	STR	0.7	0.7	0.7
STR-8-Gravelly Creek	STR	1.8	1.3	1.7
STR-9-Flag Branch	STR	5.5	5.4	8.6
Total Impact		8.1	7.4	11.0

4.2 Indirect Impacts

The Preferred Alternative and proposed alignment shifts 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 Preferred Alternative and proposed alignment shifts would be designed to control the increase and velocity of storm water run-off. The design measures may include 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

4.3 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.

5.0 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 Preferred Alternative corridor and proposed alignment shifts 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 two streams that occur within the proposed alternative corridors that are on the Tennessee 2010 303(d) list (Table 5.1 – Listed 303(d) Streams within Alternative Corridors).

Table 5.1 – Listed 303(d) Streams within Preferred Alternative and Proposed Alignment Shifts

Resource	Class	Designated ID	Support Designated Use (Y/N)	Cause	Source
Peppermint Branch	STR	6	No	Loss of biological integrity due to siltation	Discharges from MS4 area. Pasture Grazing
Flag Branch	STR	9	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

5.1 Direct and Indirect Impacts

The potential direct and indirect impacts on water quality from the Preferred Alternative and proposed alignment shifts 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.

5.2 Cumulative Impacts

The cumulative impacts on water quality resulting from the indirect effects of the Preferred Alternative and proposed alignment shifts, 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.

6.0 Exceptional Tennessee Waters

Tennessee water quality standards require the incorporation of the antidegradation policy into regulatory decisions (Chapter 1200-4-3-.06). The TDEC Division of Water Resources 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*), marbled darter (*Etheostoma*

marmorpinnum) (formerly duskytail darter), Virginia spiraea (*Spiraea virginiana*), snail darter (*Percina tanasi*), longhead darter (*Percina macrocephala*), and the ashy darter (*Etheostoma cinereum*).

The watershed (Fort Loudoun) that the Little River occurs in is 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: one 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.

6.1 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

6.2 Cumulative Impacts

The cumulative impacts on water quality resulting from the indirect effects of the Preferred Alternative and proposed alignment shifts, 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."*

7.0 Endangered and Threatened Species

In 2008, field surveys were conducted along the proposed alternative corridors to identify state and federally protected species and their habitat. Per Section 7 of the Endangered Species Act (ESA) and the Tennessee Environmental Streamlining Agreement (TESA), TDOT requested concurrence (or non-concurrence) from the US Fish and Wildlife Service (USFWS) on the effect determination that the proposed project "is not likely to adversely affect" the federally protected Indiana bat, snail darter, marbled darter, and the fine-rayed pigtoe. However, the USFWS withheld Section 7 concurrence until TDOT satisfied the USFWS's concerns regarding the protection of the aquatic species and fully addressed the potential impacts to the Indiana bat due

to the removal of suitable summer roosting habitat within the Preferred Alternative (see Appendix G for a copy of this letter).

In response to the USFWS's concerns about the Indian bat, in the summer of 2012 TDOT conducted a mist net and acoustical survey of the project area. The results are documented in the 2012 Indiana Bat Mist Net and Acoustical Survey Report (see Appendix F). The USFWS concurred with the findings of the report in a letter dated October 11, 2012, included in Appendix G.

The Preferred Alternative was re-surveyed in 2013 to re-evaluate the state and federally protected species and their habitat findings previously documented in 2009 Ecology Report. Prior to conducting the 2013 field surveys, information from USFWS, TDEC, and the Tennessee Wildlife Resource Agency (TWRA) was requested, TDEC and USFWS databases were consulted, and books and/or databases of cave records were reviewed.

During the preparation of the 2013 Ecology Report Addendum, it was noted that an update to the 2001 Biological Assessment (BA) was needed due to the document's age. The BA was prepared for the snail darter, marbled darter (formerly the duskytail darter), ashy darter, Indiana bat, longhead darter, and the fine-rayed pigtoe.

TWRA responded to TDOT's request for additional coordination on June 6, 2013. The response stated support for the eastern avoidance shift due to the reduced amount of stream and wetland impacts as compared to the western shift. The letter also stated that both alignment avoidance shifts would impact the same streams. Therefore, the same species would be impacted, but the habitat impacts would differ.

A response from the TDEC Division of Natural Heritage was received on March 1, 2013, which identified three federally protected species and two state protected species as known to occur within 1-mile of the proposed project and one federally protected species as known to occur within 4-miles of the proposed project. In addition, the TDEC Division of Natural Heritage database documented state rare species, species of concern, species deemed in need of

management, and species commercially exploited within a 1- and 5-mile radius of the proposed project.

The threatened and endangered species that potentially occur in Blount County, per the 2013 TDEC database records, are listed in Table 7.1 – Protected Species Potentially Occurring in Blount County. The federal and/or state threatened and endangered species within a one mile and four mile radius that were listed in 2008 as well as 2013 are not described in this study; refer to the 2009 Ecology Report for descriptions of the species.

Copies of all coordination letters with the USFWS, TDEC, and TWRA can be found in Appendix G.

Table 7.1 - Protected Species Potentially Occurring in Blount County

Common Name[1]	Scientific Binomial	Regulatory Status	Preferred Habitat	Project Right-of-Way
Fish Species				
Snail Darter[2]	*Percina tanasi*	Federal Threatened	Large free-flowing rivers with extensive areas of clean-swept gravel shoals.	Habitat **Not** Present
Marbled Darter (formerly Duskytail Darter)[2]	*Etheostoma marmorpinnum* (*formerly Etheostoma percnurum*)	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[2]	*Etheostoma cinereum*	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[2]	*Percina macrocephala*	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[2]	*Fusconaia cuneolus*	Federal Endangered	A lotic, riffle-dwelling species that usually inhabits ford and shoal areas of rivers with moderate gradient.	Habitat **Not** Present
Mammals				
Indiana Bat[2]	*Myotis sodalis*	Federal Endangered	**Winter months** this species hibernates in limestone caves where temperatures average 3 – 6 ° C with relative humidities of 66 to 95 percent. **Summer months** males stay in the vicinity of the hibernacula with the location of their daytime whereabouts not known Females form maternity colonies that are typically located under the loose bark or in cavities of trees.	Summer Habitat Present

[1] Note: The state threatened Tennessee cave salamander and the Appalachian bugbane are no longer listed as potentially occurring within a one- or four-mile radius.

[2] Species were listed in the 2008 TDEC database records and described in the 2009 Ecology Report.

7.1 Summary of Habitat Findings

The 2013 field surveys revealed that the overall habitat conditions had, for the most part, unchanged since the 2008 field surveys were completed. The primary difference in 2013 from 2008 was the increased water levels in some of the larger stream crossings within the Preferred Alternative. This change in water levels was most likely due to the fact that in 2008 precipitation was well below average for what is typical to the region. The other reported stream conditions in 2008 and observed in 2013 included lack of sufficient riparian buffer adjacent to stream corridors, streams impacted (i.e., trampling, grazing, etc.) by livestock, silt and sediment deposition, and other sources of water quality degradation from various nonpoint sources. 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.

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 5 miles of the proposed project. However, summer habitat for the Indiana bat does exist within proposed project corridor.

7.2 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 marbled darter, longhead darter, snail darter, ashy darter, and fine-rayed pigtoe mussel. No Indiana bat hibernaculum is known to occur within the Preferred Alternative and/or the proposed alignment shift corridors. 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).

Record reviews and background research was conducted for the 2012 Indiana bat surveys as well as for the 2013 field surveys and for the completion of the 2013 Biological Assessment. The reviews and background research included reviewing the 2008 field survey data and associated 2009 Ecology Report, reviewing past and current TDEC and USFWS databases, and reviewing any other relevant correspondences from TDEC and the USFWS. As in 2008, the 2013 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. In addition, although suitable Indiana bat summer roosting habitat is present within the Preferred Alternative, no individual Indiana bats were captured, or calls recorded during the 2012 Indiana bat mist net and acoustical surveys, respectively.

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 2013 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, marbled darter (formerly duskytail darter), fine-rayed pigtoe mussel, and the Indiana bat.

The USFWS concurred with TDOT's species determination calls for all of the federally listed species on July 25, 2013. In addition, the USFWS stated that in light of TDOT's commitments to improved water quality measurers and negative surveys for Indiana bats in the project area, that the requirements under the Section 7 of the Endangered Species Act of 1973, as amended, are fulfilled. See Appendix K for a copy of the BA as well as correspondence from USFWS.

7.3 Cumulative Impacts

Prior to the ESA, there was no legislation that gave federal protection to plant and animal species that were in danger 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 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 Preferred Alternative and area of influence is primarily agricultural and does not represent suitable habitat for any of the listed federal and state protected species with the exception of summer roosting habitat for the Indiana bat. Furthermore, the 2013 Biological Assessment resulted in a "not likely to adversely affect" determination call for the ashy darter, longhead darter, snail darter, marbled 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.

7.4 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 marbled darter, snail darter, and fine-rayed pigtoe mussel, which occur approximately one mile downstream of likely project construction, and potential summer roost 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.

8.0 Sinkholes

Prior to the September and October 2008 field surveys and subsequent 2013 field surveys, a review of the appropriate USGS topography maps was preformed to help determine potential sinkhole locations. In addition, a Preliminary Geologic Report was prepared in 2009 by the TDOT Geotechnical Engineering Section (refer to Appendix G in the 2009 Ecology Report), 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 and 2013 field surveys, several sinkhole locations were identified within the Preferred Alternative and proposed alignment shift corridors (Figures 6A – 6B – Sinkholes). During the 2008 field surveys, the sinkhole locations within the Preferred Alternative (Alternative A) and formerly proposed Alternatives 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.

During the 2013 field surveys, an opening to a potential cave site was identified near the southern terminus of the proposed project, north of US 321/Lamar Alexander Parkway that was not observed during the 2008 field surveys (see Figure 3B). However, after further investigation by TDOT, it was determined that the opening was not a cave and/or "karst" topography and it does not pose any concern to the proposed project. No other sinkholes and/or cave sites were identified during the 2013 field surveys that were not previously identified during the 2008 field surveys. The following paragraphs discuss the potential impacts to sinkhole locations as a result of the Preferred Alternative and/or the proposed alignment shifts. Since Alternatives C and D are no longer being considered, impacts to "karst" topography (i.e., sinkholes) as a result of these two alternatives are not discussed.

8.1 Direct and Indirect Impacts

The Preferred Alternative and/or the proposed alignment shift 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.

8.2 Cumulative Impacts

The cumulative impacts on sinkholes resulting from the direct and indirect impacts of the proposed Preferred Alternative and/or the proposed alignment shifts, 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 Preferred Alternative and/or the proposed alignment shift 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.

9.0 Required Permits

9.1 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, an Underground Injection Control (UIC) 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).

9.2 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.

10.0 Summary of Findings

The proposed project previously considered three alternatives that included 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, in 2008 field surveys were conducted and an ecology report (2009 Ecology

Report) was prepared that evaluated 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. However, since the completion and approval of the 2009 Ecology Report, TDOT has selected Build Alternative A as it is the Preferred Alternative for the proposed project. In addition, two minor alignment shifts (East Alignment Shift and West Alignment Shift) have been proposed to modify to the Preferred Alternative to avoid impacting an environmentally sensitive site that was discovered near the southern terminus of the Preferred Alternative. Therefore, to comply with state and federal environmental regulations and policies and to update the 2009 Ecology Report, a re-evaluation of the Preferred Alternative was conducted to assess the potential impacts to the ecological resources along the Preferred Alternative and the proposed alignment shifts. Since Build Alternatives C and D are no longer being considered, they were not re-evaluated and were not discussed in this addendum. A breakdown of impacts from the Preferred Alternative and/or proposed alignment shifts is provided in Table 10.1 - Summary of Proposed Impact Findings from Preferred Alternative and/or Proposed Alignment Shifts.

Table 10.1 – Summary of Proposed Impact Findings from Preferred Alternative and/or Proposed Alignment Shifts

Impact Type	Preferred Alternative (Alternative A) Impacts	Preferred Alternative with East Alignment Shift Impacts	Preferred Alternative with West Alignment Shift Impacts
Forested land	32 acres	34 acres	30 acres
Agricultural fields/ pastureland	147 acres	146 acres	147 acre
Residential, and Commercial	17 acres	18 acre	23 acre
Wetlands	5.01 acres	6.99 acre	8.72 acres
Perennial	2,345 linear feet	1,823 linear feet	2,782 linear feet
Intermittent streams	2,180 linear feet	1,932 linear feet	2,180 linear feet
Wet weather conveyances	0 linear feet	0 linear feet	0 linear feet
Open waterbodies (ponds)	0.42 acre	0.42 acres	0.42 acre
100-year Floodplains	8.1 acres	7.4 acres	11.0 acres

The Preferred Alternative would have the least amount of impacts to terrestrial communities such as undeveloped agricultural fields, pastureland, and forested communities, while the Preferred Alternative with the proposed east alignment shift would have the most impacts to terrestrial communities. The impacts to terrestrial communities from the Preferred Alternative with the proposed west alignment shift would be similar to the impacts from just the Preferred Alternative. The potential impact to migratory bird species and their habitat from the Preferred Alternative and/or proposed alignment shifts 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 additional impacts from the Preferred Alternative and/or the proposed alignment shifts. 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 Preferred Alternative and/or the proposed east or west alignment shift are 5.01 acres, 6.99 acres, and 8.72 acres, respectively. The total impacts to non-wetland waters of the U.S. from the Preferred Alternative would be 4,525 linear feet of perennial/intermittent stream and 0.42 acres of open waterbodies. The total impacts to non-wetland waters of the U.S. from the Preferred Alternative and/or the proposed east or west alignment shift would be 3,755 linear feet of perennial/intermittent stream (east alignment shift), 4,962 linear feet of perennial/intermittent stream (west alignment shift), and 0.42 acres of open waterbodies (east or west alignment shift).

Impacts to floodplains may occur at locations where the Preferred Alternative and/or proposed east or west alignment shift traverse the 100-year floodplain. The potential impact to the 100-year floodplain from the Preferred Alternative and/or proposed east or west alignment shift would be approximately 8.1 acres, 7.4 acres, or 11.0 acres of floodplain impacts, 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 Preferred Alternative and/or proposed east or west alignment shift. 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 marbled darter, longhead darter, ashy darter, snail darter, fine-rayed pigtoe mussel, and Indiana bat. A determination call of "not likely to adversely affect" was concluded for the ashy darter, marbled darter, longhead darter, snail darter, fine-rayed pigtoe mussel, and Indiana bat. 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 Preferred Alternative and/or proposed east or west alignment shift. The 2008 and/or 2013 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 evaluated in the DEIS. 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 ARAP from the State of Tennessee; individual or Nationwide 404 USACE permits; and, where applicable, a 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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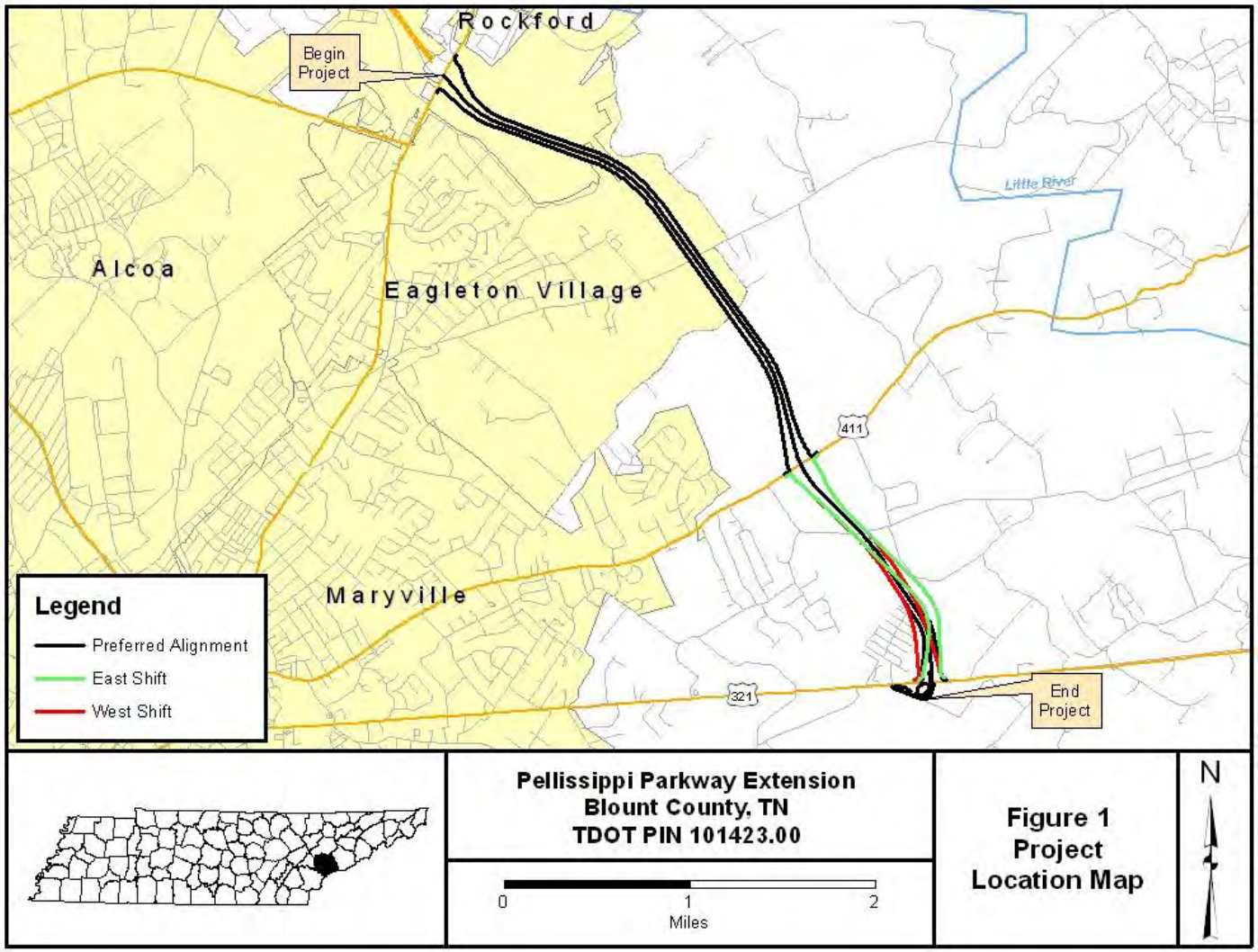
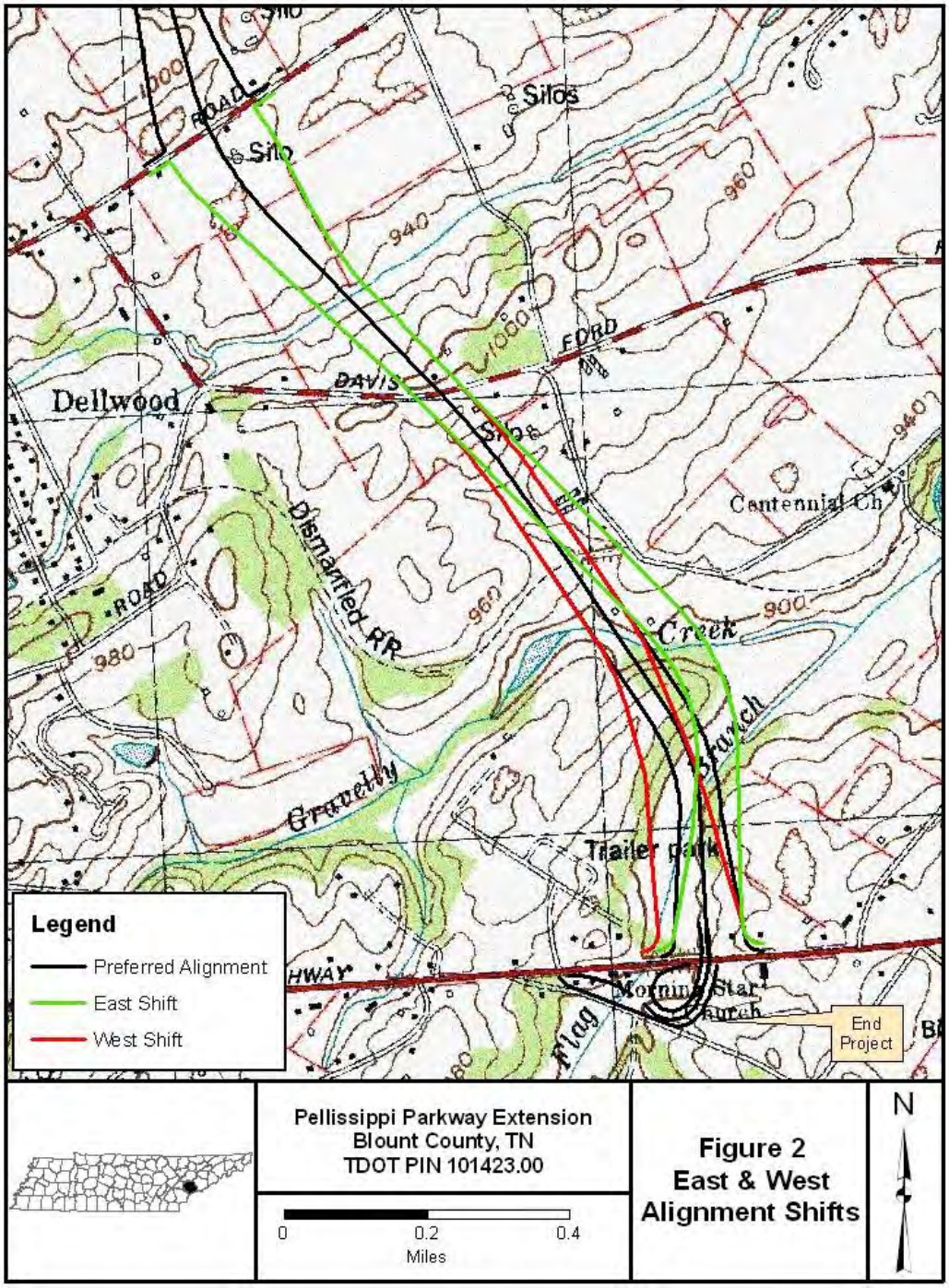
Appendix A

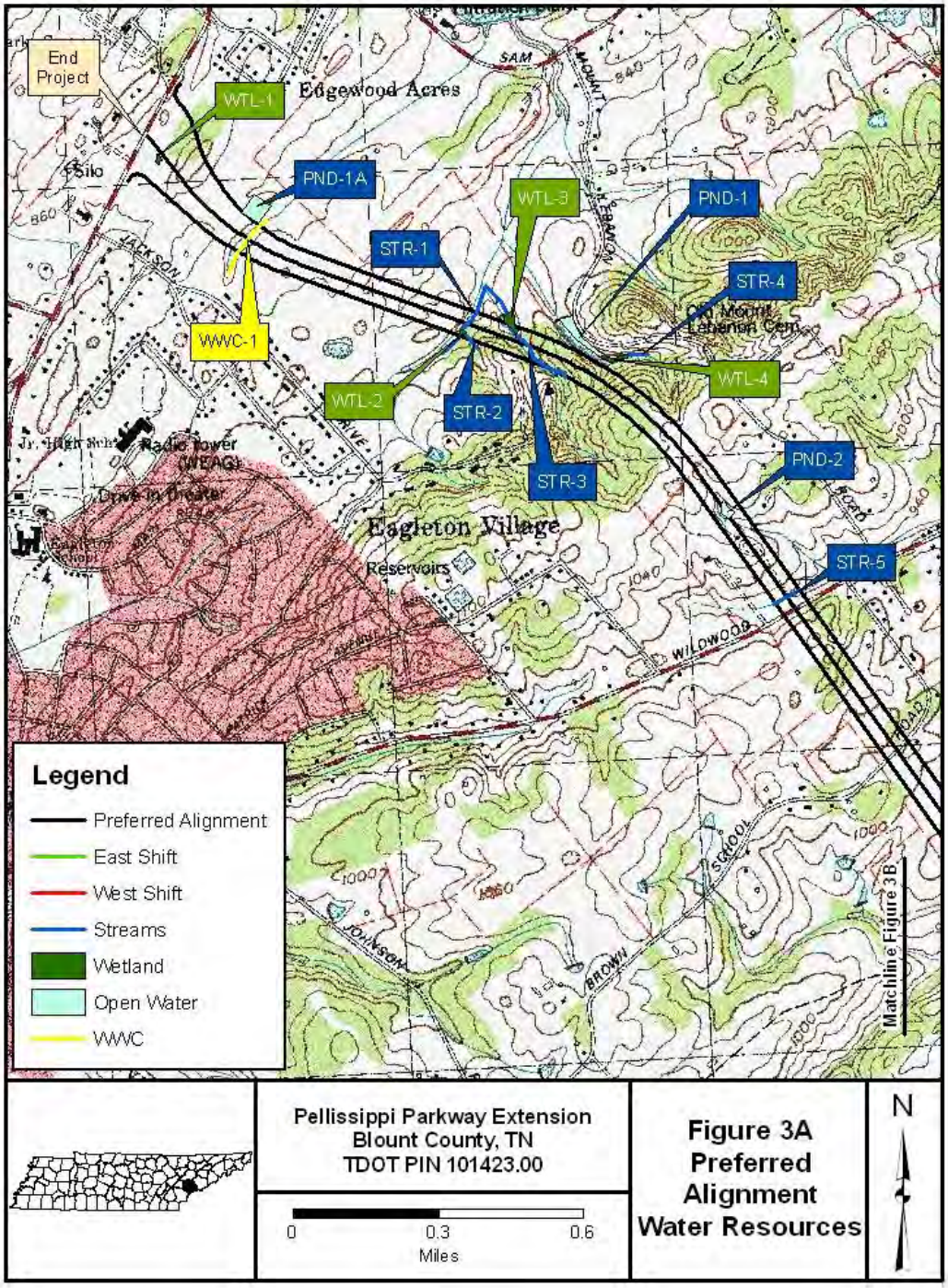
Figure 1
Figure 2
Figures 3A – 3B
Figures 4A – 4B
Figure 5
Figures 6A – 6B

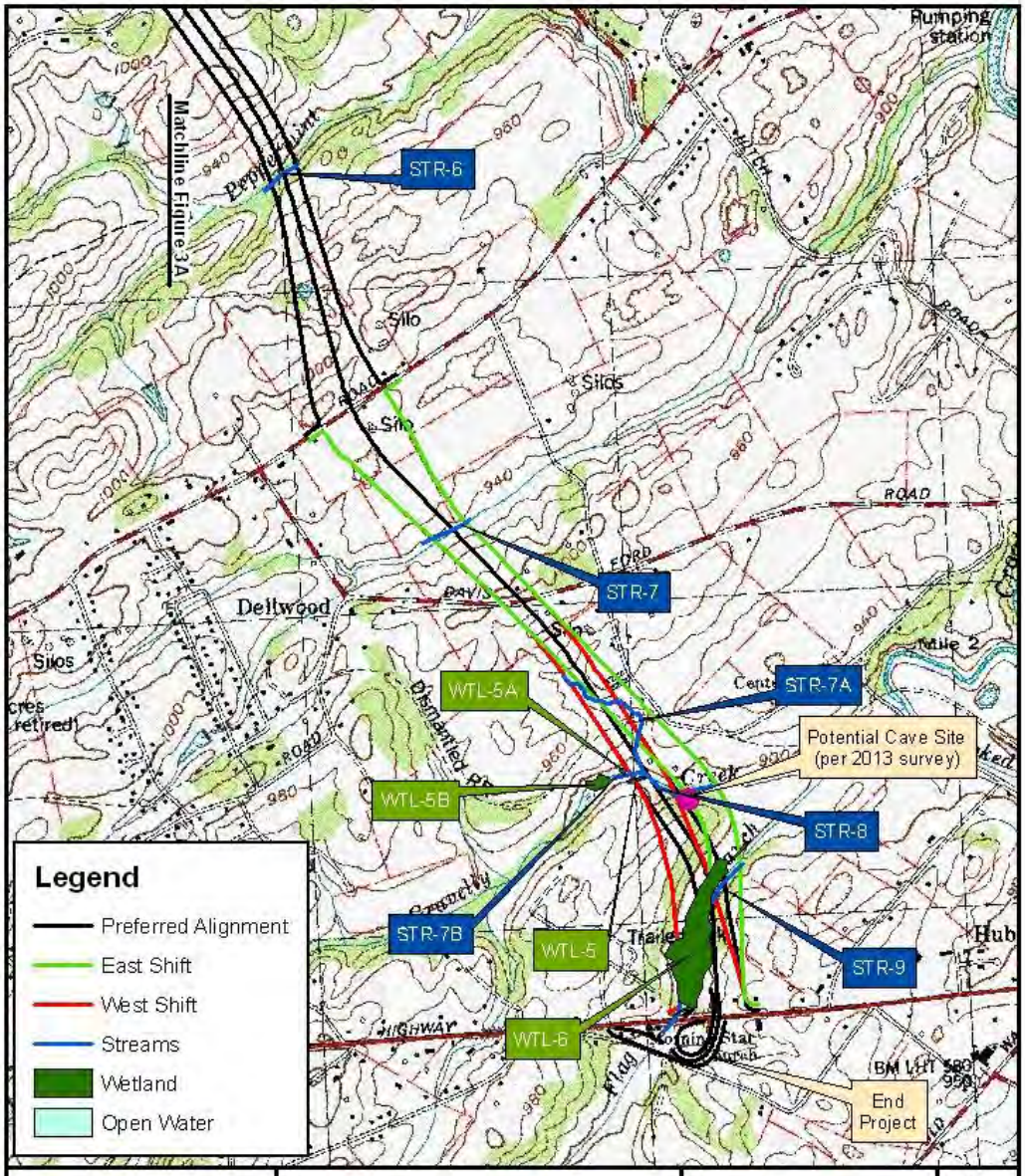


Pellissippi Parkway Extension
Blount County, TN
TDOT PIN 101423.00

Figure 1
Project Location Map


Legend
Preferred Alignment
East Shift
West Shift
Silos
Dellwood
DAVIS
FORD
ROAD
Dismantled RR
Creek
Centennial Ch
Trailer park
HWAY
End Project
Pellissippi Parkway Extension
Blount County, TN
TDOT PIN 101423.00
0
0.2
0.4
Miles
Figure 2
East & West
Alignment Shifts
N


End Project
WTL-1
Edgewood Acres
PND-1A
WTL-3
PND-1
STR-1
STR-4
WWC-1
WTL-4
WTL-2
STR-2
STR-3
PND-2
Eagleton Village
Reservoirs
STR-5
Legend
Preferred Alignment
East Shift
West Shift
Streams
Wetland
Open Water
WWC
Matchline Figure 3B
Pellissippi Parkway Extension
Blount County, TN
TDOT PIN 101423.00
0
0.3
0.6
Miles
Figure 3A
Preferred
Alignment
Water Resources
N

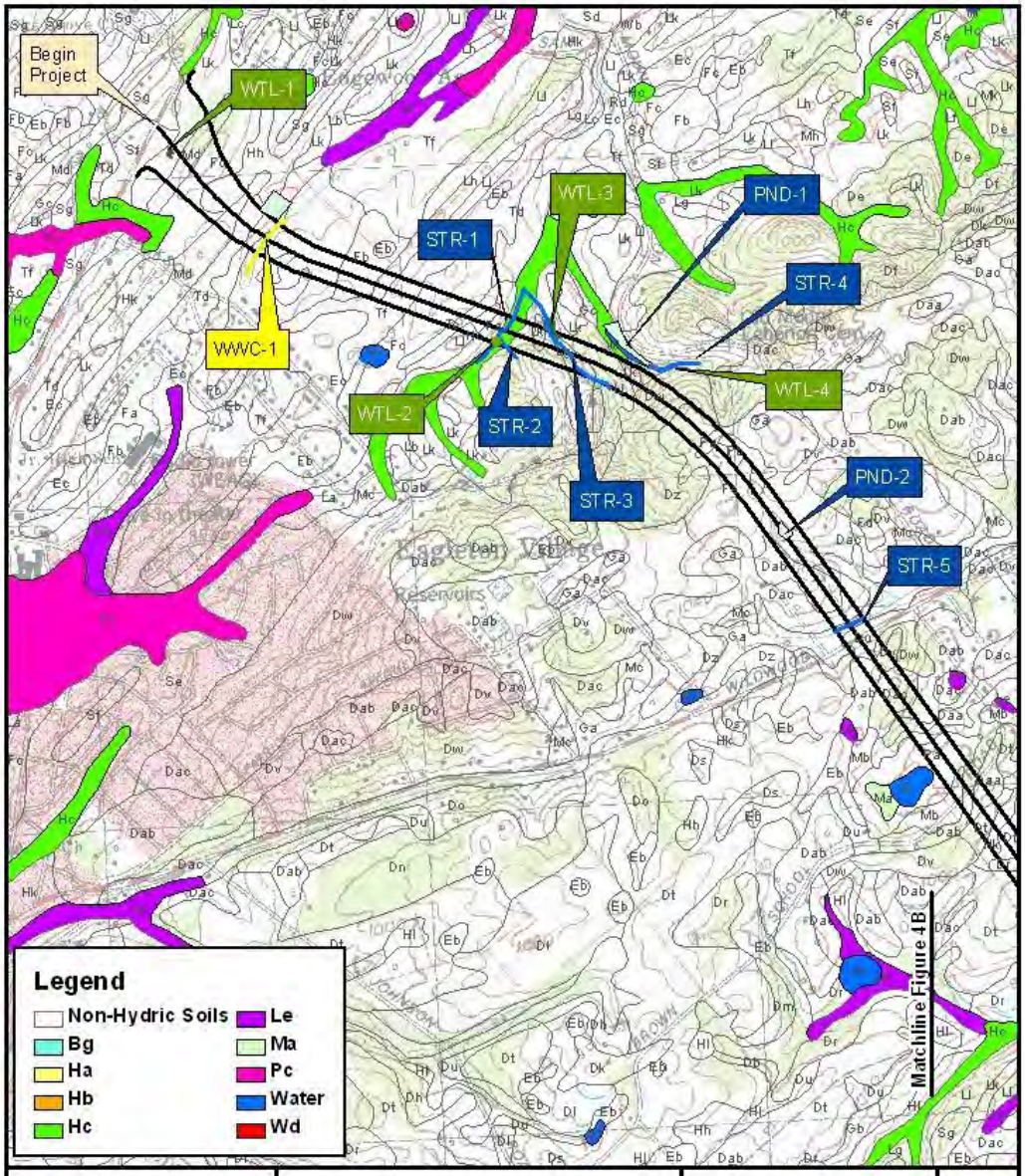


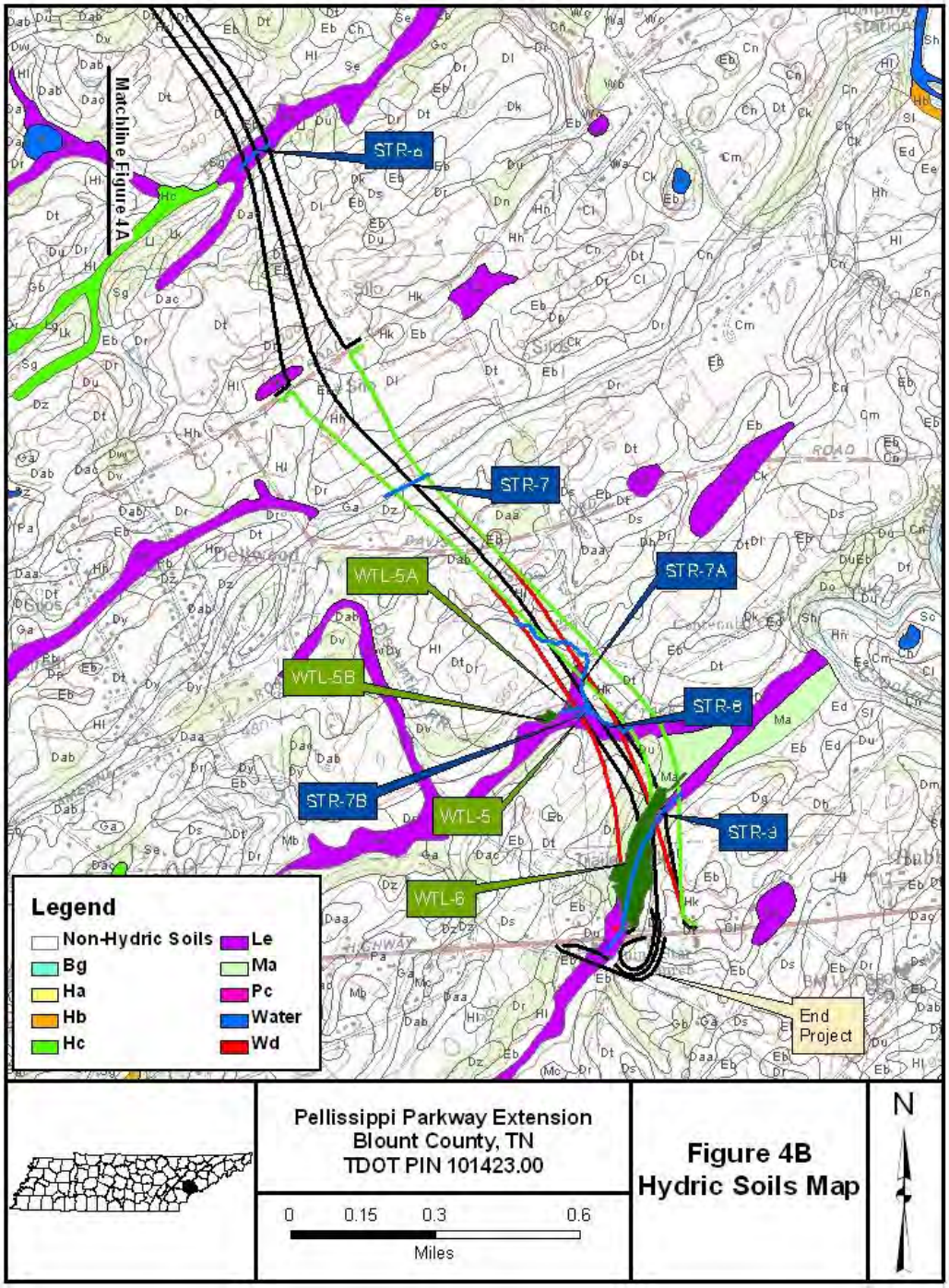
Pellissippi Parkway Extension
Blount County, TN
TDOT PIN 101423.00

0 0.3 0.6
Miles

Figure 3B
Preferred Alignment
Water Resources

N


Begin Project
WTL-1
WWC-1
WTL-2
STR-1
STR-2
WTL-3
STR-3
PND-1
STR-4
WTL-4
PND-2
STR-5
Matchline Figure 4B
Legend
Non-Hydric Soils
Bg
Ha
Hb
Hc
Le
Ma
Pc
Water
Wd
Pellissippi Parkway Extension
Blount County, TN
TDOT PIN 101423.00
0
0.15
0.3
0.6
Miles
Figure 4A
Hydric Soils Map
N

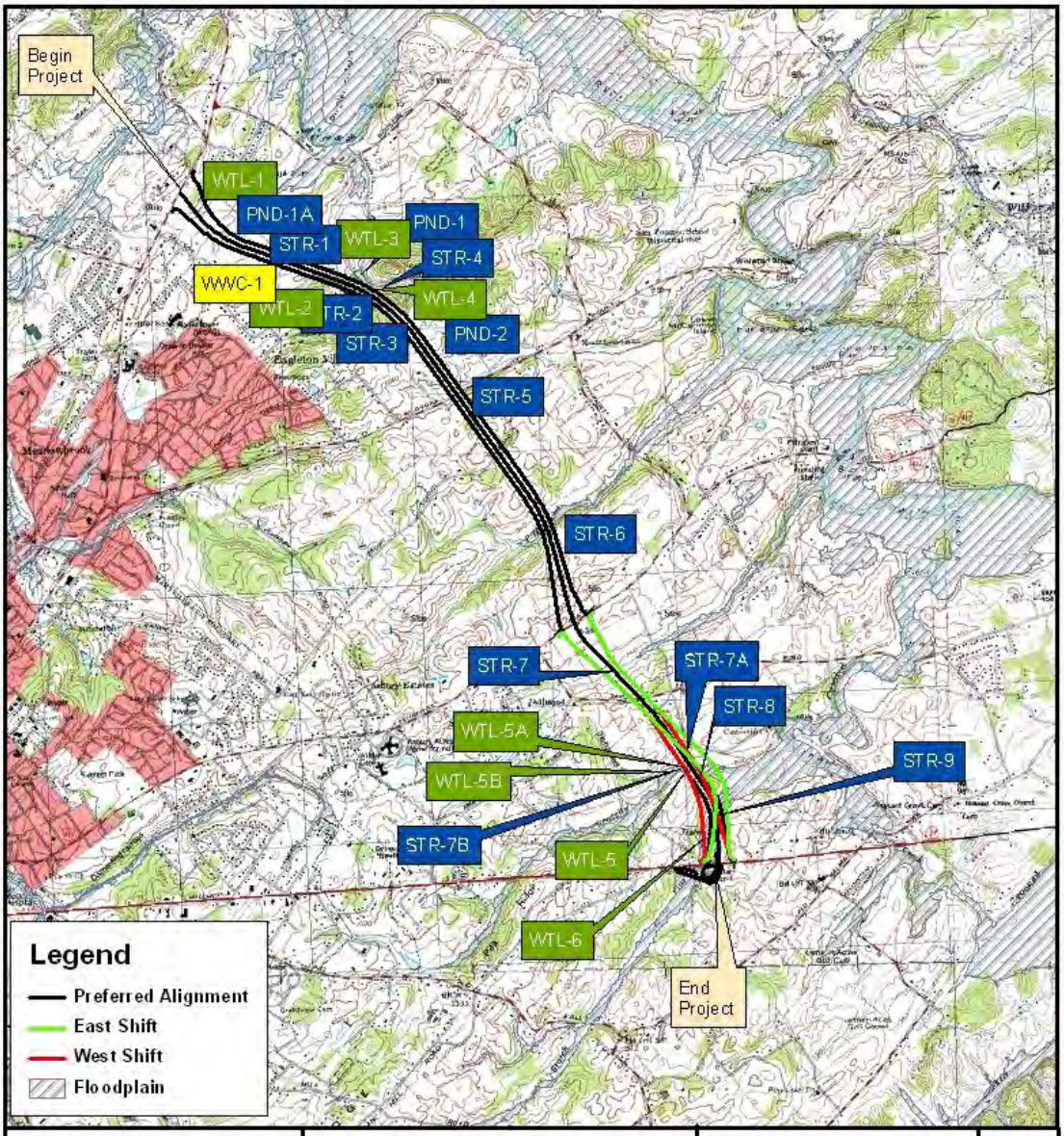


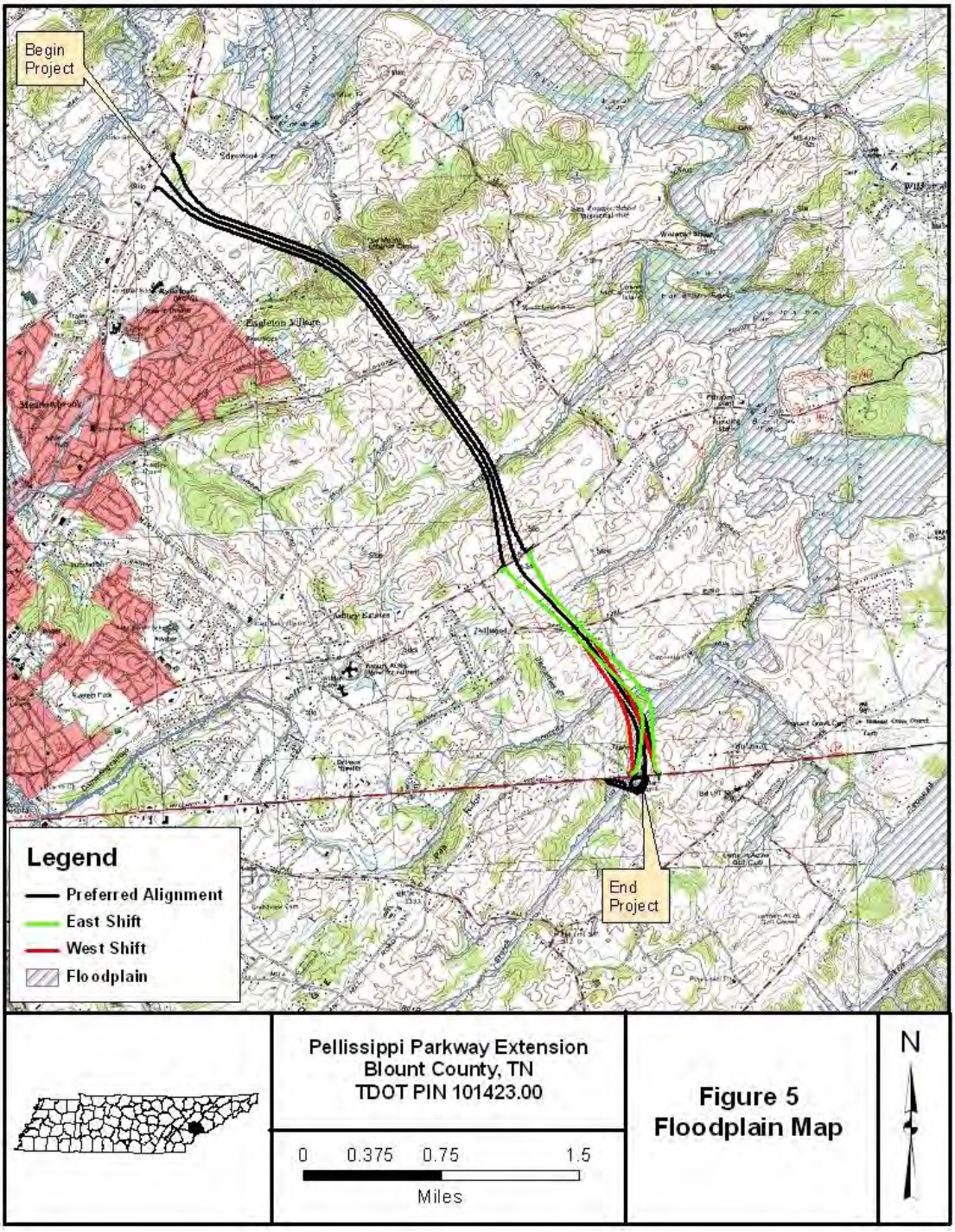
Pellissippi Parkway Extension
Blount County, TN
TDOT PIN 101423.00

0 0.15 0.3 0.6
Miles

Figure 4B
Hydric Soils Map

N


Begin Project
WTL-1
PND-1A
STR-1
WTL-3
PND-1
STR-4
WWC-1
WTL-2
TR-2
WTL-4
STR-3
PND-2
STR-5
STR-6
STR-7
STR-7A
STR-8
WTL-5A
WTL-5B
STR-9
STR-7B
WTL-5
WTL-6
End Project
Legend
Preferred Alignment
East Shift
West Shift
Floodplain
Pellissippi Parkway Extension
Blount County, TN
TDOT PIN 101423.00
0 0.375 0.75 1.5
Miles
Figure 5
Floodplain Map
N


Begin Project
End Project
Legend
Preferred Alignment
East Shift
West Shift
Floodplain
Pellissippi Parkway Extension
Blount County, TN
TDOT PIN 101423.00
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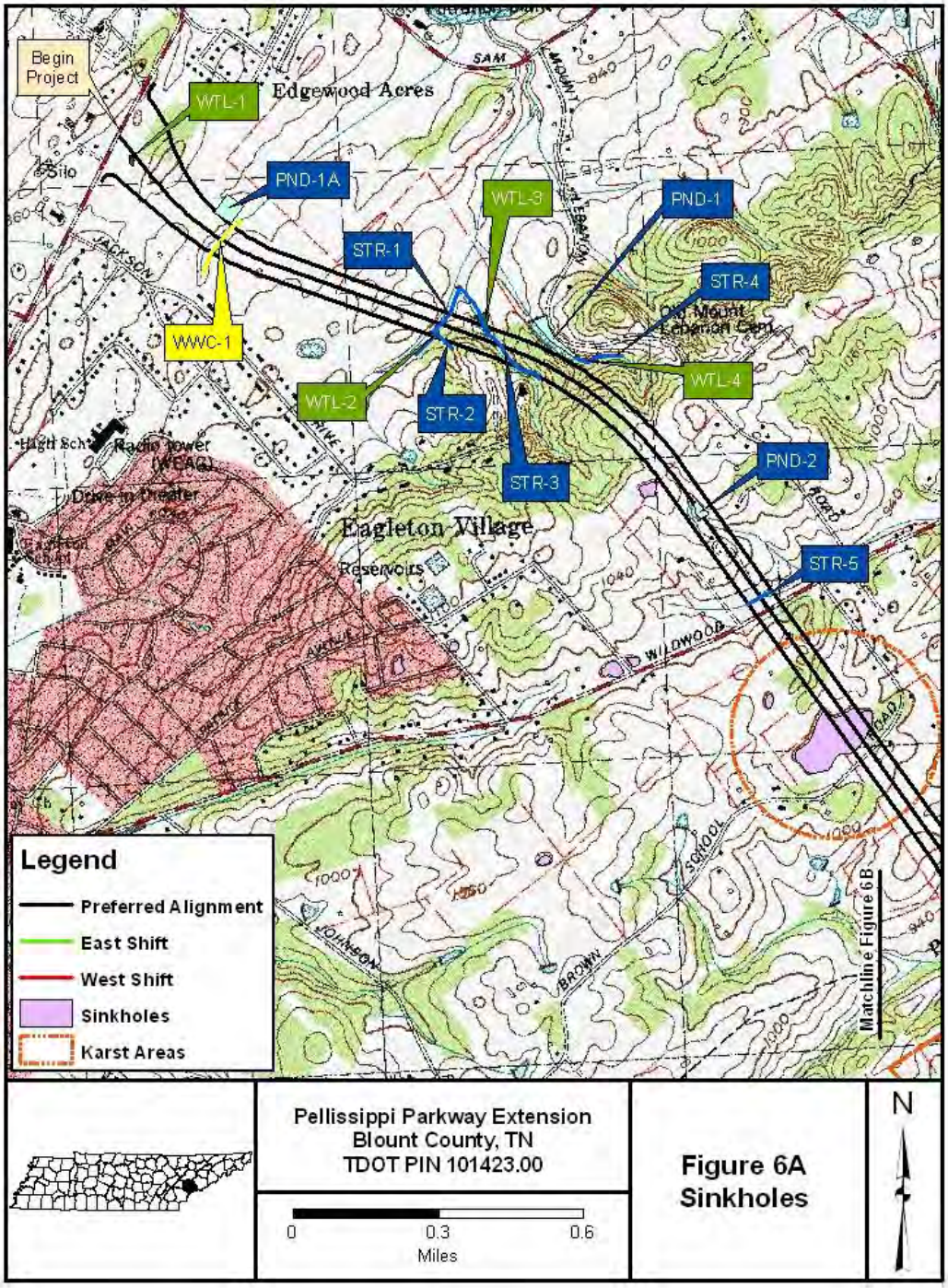
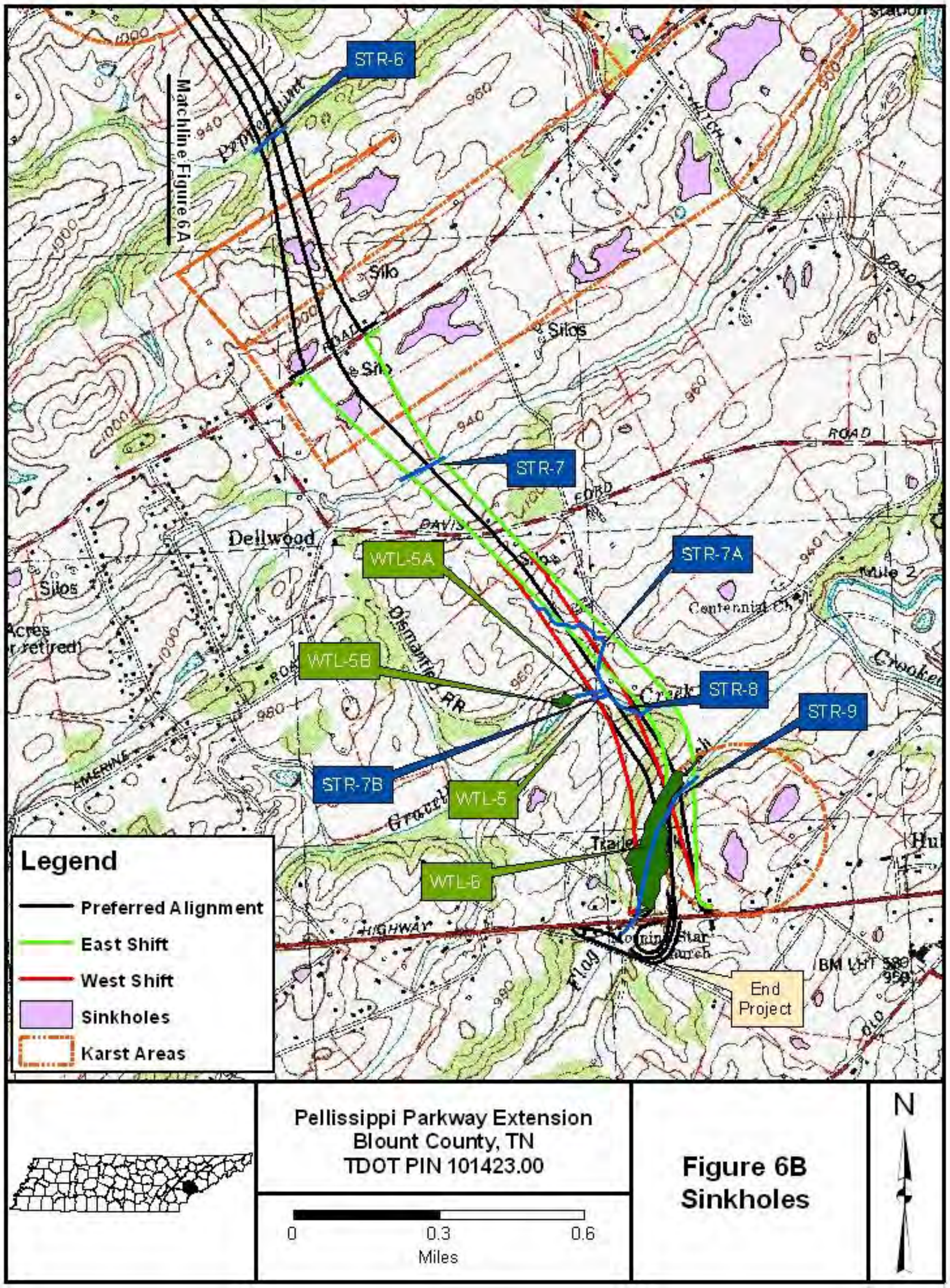
Miles
Figure 5
Floodplain Map
N


Begin Project
WTL-1
Edgewood Acres
PND-1A
WTL-3
PND-1
STR-1
STR-4
WWC-1
WTL-4
WTL-2
STR-2
PND-2
STR-3
Eagleton Village
Reservoirs
STR-5
Legend
Preferred Alignment
East Shift
West Shift
Sinkholes
Karst Areas
Matchline Figure 6B
Pellissippi Parkway Extension
Blount County, TN
TDOT PIN 101423.00
0
0.3
0.6
Miles
Figure 6A
Sinkholes
N


Matchline Figure 6A
STR-6
STR-7
STR-7A
STR-7B
STR-8
STR-9
WTL-5A
WTL-5B
WTL-5
WTL-6
End Project
Dellwood
Silos
Silo
Centennial Ch
Legend
Preferred Alignment
East Shift
West Shift
Sinkholes
Karst Areas
Pellissippi Parkway Extension
Blount County, TN
TDOT PIN 101423.00
0
0.3
0.6
Miles
Figure 6B
Sinkholes
N

Appendix B

Photographs

Photo 1: WTL-1 View Looking Southeast

Photo 2: PND-1A View Looking Northeast

Photo 3: PND-1A View Looking East

Photo 4: WWC-1 View Looking Northeast

Photo 5: WWC-1 View Looking Southwest

Photo 6: STR-1 View Looking East

Photo 7: WTL-2 View Looking East

Photo 8: STR-2 View Looking South

Photo 9: STR-2 View Looking North

Photo 10: STR-3 View Looking Northeast

Photo 11: STR-3 View Looking South

Photo 12: STR-3 View Looking South

Photo 13: WTL-3 View Looking North

Photo 14: WTL-3 View Looking North at north end of wetland.

Photo 15: PND-1 View Looking Northwest

Photo 16: WTL-4 View Looking Southeast

Photo 17: STR-4 View Looking North

Photo 18: STR-4 View Looking South

Photo 19: STR-5 View Looking West

Photo 20: STR-5 View Looking East

Photo 21: STR-5 View Looking West

Photo 22: STR-6 View Looking West

Photo 23: STR-7 View Looking East

Photo 24: STR-7 View Looking West

Photo 25: STR-7A View Looking Northwest, North of Railroad Bed

Photo 26: STR-7A View Looking Northwest, near origin of STR-7A

Photo 27: STR-7A View Looking Southeast at north side of railroad bed

Photo 28: STR-8 View Looking East

Photo 29: STR-7B View Looking East

Photo 30: WTL-5A View Looking Northwest

Photo 31: WTL-5B View Looking Northwest

Photo 32: Cave View Looking Southwest

Photo 33: WTL-6 View Looking South

Photo 34: WTL-6 View Looking North

Photo 35: WTL-6 View Looking Southwest

Photo 36: WTL-6 View Looking Northeast

Photo 37: WTL-6 View Looking Southwest

Photo 38: WTL-6 Wetland Soil Sample View

Photo 39: WTL-6 View Looking South

Photo 40: STR-9 at Beaver Dam Looking South

Appendix C

Field Data Sheets

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Blount	Named Waterbody: N/A	Date/Time: 4-03-13/3:00pm
Assessors/Affiliation: Jonathan Sell/PB		Project ID : 101423.00
Site Name/Description: Pellissippi Parkway Extension		
Site Location: WWC 1		
USGS quad: Blount County	HUC (12 digit): 60102010106	Lat/Long: 35°48'8.591"N / 83°56'12.978"W
Previous Rainfall (7-days) : 1.22 inches		
Precipitation this Season vs. Normal : very wet wet (average) dry drought unknown Source of recent & seasonal precip data :NOAA NOWData		
Watershed Size :14,600 acres	Photos: (Y) or N (circle) Number : 4 and 5	
Soil Type(s) / Geology :Cumberland Plateau and Mountains Source: NRCS Blount County Soil Survey		
Surrounding Land Use :Fallow land being converted to commercial/residential		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : (Severe) Moderate Slight Absent		

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge		x
2. Defined bed and bank absent, dominated by upland vegetation / grass		WWC
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions		WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall		WWC
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase		Stream
6. Presence of fish (except *Gambusia*)		Stream
7. Presence of naturally occurring ground water table connection		Stream
8. Flowing water in channel and 7 days since last precipitation in local watershed		Stream
9. Evidence watercourse has been used as a supply of drinking water		Stream

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination =

Secondary Indicator Score (if applicable) =

Justification / Notes :

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal =)	**Absent**	**Weak**	**Moderate**	**Strong**
1. Continuous bed and bank	0	1	2	3
2. Sinuous channel	0	1	2	3
3. In-channel structure: riffle-pool sequences	0	1	2	3
4. Sorting of soil textures or other substrate	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	0.5	1	1.5
9. Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade controls	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map	No = 0		Yes = 3	

B. Hydrology (Subtotal =)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0	1	2	3
15. Water in channel and >48 hours since sig. rain	0	1	2	3
16. Leaf litter in channel (January – September)	1.5	1	0.5	0
17. Sediment on plants or on debris	0	0.5	1	1.5
18. Organic debris lines or piles (wrack lines)	0	0.5	1	1.5
19. Hydric soils in stream bed or sides of channel	No = 0		Yes = 1.5	

C. Biology (Subtotal =)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3	2	1	0
21. Rooted plants in channel [1]	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28.Wetland plants in channel [2]	0	0.5	1	2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = _____

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Ecology Field Data Sheet: **Water Resources** Form G

Project: (Blount County: Route No. SR 162, termini, LM, PE No., PIN 101423.00)

Date of survey: 04-03-2013 Biologist:Jon Sell & Travis Garnto Affiliation:Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	PND-1 / Pond 1 - Preferred Alternative
3-Latitude/Longitude	35°47'57.122"N / 83°55'29.251"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Pond
blue-line on topo? (y/n)	No
defined channel (y/n)	No
straight or meandering	N/A
channel bottom width	200.0 ft
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
riffle/run/pool	N/A
width of buffer zone	LB: 400.0 ft. RB: 0.0 ft.
water flow	N/A
water depth	No water
water width	N/A
general water quality	N/A
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	RB: *Festuca* sp. LB: *Fagus grandifolia* , *Ligustrum sinense* , *Rubus* sp., *Acer rubrum, Cornus florida* , *Quercus alba* , *Quercus falcata* , *Panicum* sp., *Polystichum aristichoides* , *Ilex verticullata* , and *Carya tomentosa*
overhead canopy (%)	0%
benthos	Gyrinidae, Bidessus, Corixidae, and *Bidessus* sp.
fish	Most likely Cyperinidae, *Gambusia* sp., *Lepomis* sp., and *Micropterus* sp.
algae or other aquatic life	none recorded
habitat assessment score	Use TDEC (2006)
photo number(s)	Photo 15
rainfall information	0.56" on March 31, 2013 and 0.02" on April 1, 2013
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 1.3 acres

Ecology Field Data Sheet: **Water Resources** Form G

Project: (Blount County: Route No. SR 162, termini, LM, PE No., PIN 101423.00)

Date of survey: 04-03-2013 Biologist:Jon Sell & Travis Garnto Affiliation:Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	PND-1A / Pond 1A - Preferred Alternative
3-Latitude/Longitude	35°48'12.022"N / 83°56'11.991"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Pond
blue-line on topo? (y/n)	No
defined channel (y/n)	No
straight or meandering	N/A
channel bottom width	200.0 ft
top of bank width	235.0 ft
bank height and slope ratio	3:1 ratio
avg. gradient or stream (%)	N/A
substratum	silt, clay
riffle/run/pool	N/A
width of buffer zone	LB: 0.0 ft. RB: 0.0 ft.
water flow	N/A
water depth	N/A
water width	N/A
general water quality	No water in pond at time of survey
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	RB and LB: *Festuca* sp., *Andropogon virginicus*
overhead canopy (%)	0%
benthos	none recorded
fish	none recorded
algae or other aquatic life	none recorded
habitat assessment score	Use TDEC (2006)
photo number(s)	Photo 2, 3
rainfall information	0.56" on March 31, 2013 and 0.02" on April 1, 2013
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	No water in pond at time of survey

Ecology Field Data Sheet: **Water Resources** Form G

Project: (Blount County: Route No. SR 162, termini, LM, PE No., PIN 101423.00)

Date of survey: 4-03-13 Biologist:Jon Sell & Travis Garnto Affiliation:Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	PND-2 / Pond 2 - Preferred Alternative
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 qulaity 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 Solidago canadensis and Phytolacca americana
overhead canopy (%)	0%
benthos	Gyrinidae, Bidessus, Corixidae, and *Bidessus* 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)	N/A
rainfall information	0.56" on March 31, 2013 and 0.02" on April 1, 2013
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

Ecology Field Data Sheet: **Water Resources** Form G

Project: (Blount County: Route No. SR 162, termini, LM, PE No., PIN 101423.00)

Date of survey: 4-01-2013 Biologist:Jon Sell & Travis Garnto Affiliation:Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-1 / Stream 1 - Preferred Alternative
3-Latitude/Longitude	35°47'54.16"N / 83°55'51.22"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	low sinuousity; natural channel
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 was mostly pool and run
width of buffer zone	LB: 0 ft. RB: 0 ft.
water flow	No stream flow
water depth	1.0 ft.
water width	2.0 ft
general water quality	Medium quality
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 *Festuca* sp., *Polygonum punctatum*, *Andropogon virginicus*
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)	Photo 6
rainfall information	0.56" on March 31, 2013 and 0.02" on April 1, 2013
6-HUC code & name (12-digit)	60102010105 - 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	

Ecology Field Data Sheet: **Water Resources** Form G

Project: (Blount County: Route No. SR 162, termini, LM, PE No., PIN 101423.00)

Date of survey: 4-03-2013 Biologist:Jon Sell & Travis Garnto Affiliation:Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-2 / Stream 2 - Preferred Alternative
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)	No
defined channel (y/n)	Yes
straight or meandering	low sinuousity; natural channel
channel bottom width	2.5 ft
top of bank width	4.0 ft
bank height and slope ratio	2:1 ratio
avg. gradient or stream (%)	<5%
substratum	50% sand / 50% organic debris
riffle/run/pool	The stream was was mostly pool and run
width of buffer zone	LB: 10 ft. RB: 10 ft.
water flow	1 ft/sec
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 Festuca sp., *Typha latifolia, Polygonum punctatum, Vernonia* sp., *Paspalum notatum*, *Fagus grandifolium, Cornus florida, Pinus taeda, Platanus occidentalis, Celtis occidentalis*
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)	Photo 8, 9
rainfall information	0.56" on March 31, 2013 and 0.02" on April 1, 2013
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	This stream joins STR-1

Ecology Field Data Sheet: **Water Resources** Form G

Project: (Blount County: Route No. SR 162, termini, LM, PE No., PIN 101423.00)

Date of survey: 4-03-2013 Biologist:Jon Sell & Travis Garnto Affiliation:Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-3 / Stream 3 - Preferred Alternative
3-Latitude/Longitude	35°47'59.786"N / 83°55'43.252"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
riffle/run/pool	The stream was mostly run
width of buffer zone	LB: 150 ft. RB: 150 ft.
water flow	1.0 ft/sec
water depth	0.2 ft.
water width	3.0 ft
general water quality	medium quality
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 *Ligustrum sinense* , *Smilax rotundifolia* , *Rubus* sp., *Salix nigra* , *Quercus alba* , *Fraxinus americana, Tilia americana, Cornus florida, Fagus grandifolia*
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)	Photo 10, 11, 12
rainfall information	0.56" on March 31, 2013 and 0.02" on April 1, 2013
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	This stream joins STR-1

Ecology Field Data Sheet: **Water Resources** Form G

Project: (Blount County: Route No. SR 162, termini, LM, PE No., PIN 101423.00)

Date of survey: 4-03-2013 Biologist:Jon Sell & Travis Garnto Affiliation:Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-4 / Stream 4 - Preferred Alternative
3-Latitude/Longitude	35°47'56.154"N / 83°55'36.103"W
4-Potential Impact	Sedimentation
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	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	0.1 ft.
water width	0.1 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 *Fagus grandifolia, Ligustrum sinense, Cornus florida, Rubus sp., Panicum sp., Quercus alba, Fraxinus americana, Tilia americana, and Smilax rotundifolia*
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)	Photo 17, 18
rainfall information	0.56" on March 31, 2013 and 0.02" on April 1, 2013
6-HUC code & name (12-digit)	60102010105 - 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	This stream drains WTL-4

Ecology Field Data Sheet: **Water Resources** Form G

Project: (Blount County: Route No. SR 162, termini, LM, PE No., PIN 101423.00)

Date of survey: 4-03-2013 Biologist:Jon Sell & Travis Garnto Affiliation:Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-5 / Stream 5 - Preferred Alternative
3-Latitude/Longitude	35°47'28.79"N / 83°55'02.02"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	2.0 ft.
top of bank width	4.0 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	stagnant
water depth	1.0 ft.
water width	2.0 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 somewhat unstable with minor sloughing and scouring
dominant species: LB, RB	Dominant species for LB and RB are *Ligustrum sinense* , *Rubus* sp., *Lonicera japonica* *Solidago canadensis*
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)	Photo 19, 20, 21
rainfall information	0.56" on March 31, 2013 and 0.02" on April 1, 2013
6-HUC code & name (12-digit)	60102010105 - 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	

Ecology Field Data Sheet: **Water Resources** Form G

Project: (Blount County: Route No. SR 162, termini, LM, PE No., PIN 101423.00)

Date of survey: 4-03-2013 Biologist:Jon Sell & Travis Garnto Affiliation:Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-6 / Stream 6 / Peppermint Branch - Preferred Alternative
3-Latitude/Longitude	35⁰46'59.22"N / 83⁰54'20.93"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 but channelized/altered in sections
channel bottom width	3.0 ft.
top of bank width	6.0 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 riffle, run and pool
width of buffer zone	LB: 100 ft. RB: 200 ft.
water flow	2.0 ft. per second
water depth	1.0 ft.
water width	4.0 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 somewhat unstable with minor sloughing and scouring
dominant species: LB, RB	Dominant species for LB and RB are *Ligustrum sinense* , *Panicum* sp., *Plantanus occidentalis* *Nyssa Sylvatica, Polystichum acrosichoides* , *Cornus florida* , *Ulmus americana* , *Hedera helix* , *Smilax rotundifolia* , *Toxicodendron radicans,* and *Carya tomentosa*
overhead canopy (%)	80%
benthos	None were observed
fish	None were observed
algae or other aquatic life	None present
habitat assessment score	Use TDEC (2006)
photo number(s)	Photo 22
rainfall information	0.56" on March 31, 2013 and 0.02" on April 1, 2013
6-HUC code & name (12-digit)	60102010106 - Little River Watershed
7-Confirmed by:	Confinrmation 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	

Ecology Field Data Sheet: **Water Resources** Form G

Project: (Blount County: Route No. SR 162, termini, LM, PE No., PIN 101423.00)

Date of survey: 4-04-2013 Biologist:Jon Sell & Travis Garnto Affiliation:Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-7 / Stream 7 - Preferred Alternative
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	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: 30 ft. RB: 35 ft.
water flow	moderate
water depth	3.0 ft
water width	4.0 ft.
general water quality	water quality was good and clarity was good
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 *Quercus alba*, *Ligustrum sinense*, *Acer rubrum*, *Liquidambar styraciflua*, *Rubus* sp., *Toxicodendron radicans*, *Ulmus americana*, *Ulmus rubra*
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)	Photo 23, 24
rainfall information	0.56" on March 31, 2013 and 0.02" on April 1, 2013
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	

Ecology Field Data Sheet: **Water Resources** Form G

Project: (Blount County: Route No. SR 162, termini, LM, PE No., PIN 101423.00)

Date of survey: 9-23-08 Biologist:Travis Garnto & Andrea Benson Affiliation:Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-7A / Stream 7A - Preferred Alternative, East Shift, West Shift
3-Latitude/Longitude	35°45'56.742"N / 83°53'51.482"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Intermittent
blue-line on topo? (y/n)	No
defined channel (y/n)	Yes
straight or meandering	low sinuosity; natural channel
channel bottom width	1.0 ft.
top of bank width	3.0 ft.
bank height and slope ratio	3:1 ratio
avg. gradient or stream (%)	<5%
substratum	45% san / 45% silt / 10% gravel
riffle/run/pool	The stream was mostly run
width of buffer zone	LB: 0 ft. RB: 0 ft.
water flow	2 ft/sec
water depth	0.2 ft
water width	1.5 ft
general water quality	Mostly clear
OHWM indicators	abrupt change in plant community
groundwater connection	Yes
bank stability: LB, RB	LB and RB are both have sloughing and scouring from bovine foot traffic
dominant species: LB, RB	Dominant species for LB and RB are *Tridens flavus, Alopecurus* sp., *Taraxacum officinale, Festuca* 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)	Photo 25, 26, 27
rainfall information	0.56" on March 31, 2013 and 0.02" on April 1, 2013
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	Stream is in a bovine pasture and is subject to bovine foot traffic; stream runs under old rail road bed through manmade

Ecology Field Data Sheet: **Water Resources** Form G

Project: (Blount County: Route No. SR 162, termini, LM, PE No., PIN 101423.00)

Date of survey: 4-01-2013 Biologist:Travis Garnto & Andrea Benson Affiliation:Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-7B / Stream 7B - Preferred Alternative, West Shift
3-Latitude/Longitude	35⁰45'50.72"N / 83⁰53'52.236"W
4-Potential Impact	Crossing
5-Feature description:	
What is it?	Perennial
blue-line on topo? (y/n)	No
defined channel (y/n)	Yes
straight or meandering	meandering; natural channel
channel bottom width	1.0 ft.
top of bank width	2.0 ft. to 8.0 ft.
bank height and slope ratio	2:1 ratio
avg. gradient or stream (%)	<5%
substratum	Mixture of sand, clay, silt, gravel, cobble
riffle/run/pool	riffle/run/pool
width of buffer zone	LB: 25 ft. RB: 25 ft.
water flow	2 ft/sec
water depth	0.2 ft.
water width	3.0 ft. to 7.0 ft
general water quality	Good
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 *Ulmus americana, Quercus nigra, Solidago* sp., *Acer rubrum, Ligustrum sinense, Nyssa sylvatica, Toxicodendron radicans, Cercis canadensis, Juniperus virginana*
overhead canopy (%)	50%
benthos	Caddisfly (*Trichoptera* sp.)
fish	fish species were absent
algae or other aquatic life	algae, cyanobacteria, earth worms, crayfish burrows present
habitat assessment score	Use TDEC (2006)
photo number(s)	Photo 29
rainfall information	0.56" on March 31, 2013 and 0.02" on April 1, 2013
6-HUC code & name (12-digit)	60102010105 - 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	This stream joins with STR-8

Ecology Field Data Sheet: **Water Resources** Form G

Project: (Blount County: Route No. SR 162, termini, LM, PE No., PIN 101423.00)

Date of survey: 4-01-2013 Biologist:Travis Garnto & Andrea Benson Affiliation:Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-8 / Stream 8 / Gravelly Creek - Preferred Alternative, West Shift, East Shift
3-Latitude/Longitude	35°45'51.437"N / 83°53'51.968"W
4-Potential Impact	Crossing; siltation
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. to 10.0 ft.
top of bank width	2.0 ft. to 12.0 ft.
bank height and slope ratio	1:1 ratio
avg. gradient or stream (%)	<5%
substratum	sand, silt, gravel, cobble, boulder
riffle/run/pool	Mostly riffle and run with a few pools
width of buffer zone	LB: 25 ft. RB: 25 ft.
water flow	3.0 ft/sec
water depth	0.5 ft.
water width	2.0 ft. to 10.0 ft
general water quality	Good; clear clarity
OHWM indicators	Abrupt change in plant community
groundwater connection	No
bank stability: LB, RB	LB and RB are both moderately stable with gentlt sloping banks
dominant species: LB, RB	Dominant species for LB and RB are *Ulmus americana* , *Quercus nigra* , *Solidago* sp., *Ligustrum sinense* , *Acer rubrum* , *Nyssa sylvatica* , *Toxicodendron radicans* , *Juniperus virginiana* , and *Cercis canadensis*
overhead canopy (%)	30%
benthos	None observed
fish	Only family observed was Gyrinidae
algae or other aquatic life	Some algae
habitat assessment score	Use TDEC (2006)
photo number(s)	Photo 28
rainfall information	0.56" on March 31, 2013 and 0.02" on April 1, 2013
6-HUC code & name (12-digit)	60102010105 - 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	This stream is wooded on one bank and the other bank runs at the edge a bovine pasure and is subjected to bovine foot traffic/crossings.

Ecology Field Data Sheet: **Water Resources** Form G

Project: (Blount County: Route No. SR 162, termini, LM, PE No., PIN 101423.00)

Date of survey: 4-01-2013 Biologist:Jon Sell & Travis Garnto Affiliation:Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	STR-9 / Stream 9 / Flag Branch - Preferred Alternative, West Shift, East Shift
3-Latitude/Longitude	35°45'41.902"N / 83°53'39.71"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	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 pool and run
width of buffer zone	LB: 25 ft. RB: 25 ft.
water flow	Moderate
water depth	2.0 ft.
water width	3.0 ft. to 10.0 ft.
general water quality	N/A
OHWM indicators	bed and bank, scour
groundwater connection	Probable
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 *Euonymus americanus, Ulmus rubra, Toxicodendron radicans, Nyssa sylvatica, Parthenocissus quinquifolia, Quercus prinus, Juniperus virginiana* , *Ligustrum sinense* and *Fraxinus pennsylvanica*
overhead canopy (%)	20%
benthos	None observed
fish	None observed
algae or other aquatic life	none present
habitat assessment score	Use TDEC (2006)
photo number(s)	Photo 40
rainfall information	0.56" on March 31, 2013 and 0.02" on April 1, 2013
6-HUC code & name (12-digit)	60102010105 - 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	STR-9 drains WTL-6

Ecology Field Data Sheet: **Water Resources** Form G

Project: (Blount County: Route No. SR 162, termini, LM, PE No., PIN 101423.00)

Date of survey: 4-03-2013 Biologist:Jon Sell & Travis Garnto Affiliation:Parsons Brinckerhoff

1-Station: from Plans	
2-Map label and Name	WWC-1 / Wet Weather Conveyance 1 - Preferred Alternative
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
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	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 *Polygonum punctatum*, *Fescue* sp., *Xanthium* sp., *and Alopecurus* 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)	Photo 4, 5
rainfall information	0.56" on March 31, 2013 and 0.02" on April 1, 2013
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	Dry drainage ditch running through cow pasture.

Appendix D

Agency Correspondance

TDEC Rare Species Database Comparison, 2006 and 2013

TDEC Rare Species Database Search Comparison							
Common Name	Scientific Name	State Status	Federal Status	2006		2013	
				One Mile Radius	Four Mile Radius	One Mile Radius	Four Mile Radius
Duskytail Darter	*Etheostoma percnurum*	Endangered	Endangered	◊	◊		
Tangerine Darter	Percina aurantiaca	D	--	◊	◊	◊	◊
Longhead Darter	*Percina macrocephala*	Threatened	--	◊	◊	◊	◊
Snail Darter	*Percina tanasi*	Threatened	Threatened	◊	◊	◊	◊
Finerayed Pigtoe	*Fusconaia cuneolus*	Endangered	Endangered	◊	◊	◊	◊
Appalachian Bugbane	*Cimicifuga rubifolia*	Threatened	--		◊		
Branching Whitlow-grass	*Draba ramosissima*	S	--		◊		◊
A Liverwort	*Radula voluta*	S	--		◊		◊
Hellbender	*Cryptobranchus alleganiensis*	D	--		◊	◊	◊
Ashy Darter	*Etheostoma cinereum*	Threatened	--		◊	◊	◊
Tennessee Cave Salamander	*Gyrinophilus palleucus*	Threatened	--		◊		
Flame Chub	*Hemitremia flammea*	D	--		◊		◊
Least Bittern	*Ixobrychus exilis*	D	--		◊		◊
Blotchside Darter	*Percina burtoni*	D	--		◊	◊	◊
King Rail	*Rallus elegans*	D	--		◊		◊
Virginia Rail	*Rallus limicola*	--	--		◊		
Common Barn Owl	*Tyto alba*	D	--		◊		◊
Spiny Riversnail	*Io fluvialis*	--	--		◊		
Heron Rookery	*Heron rookery*	--	--		◊		
Marbled Darter	*Etheostoma marmorpinnum*	Endangered	Endangered			◊	◊
Oyster Mussel	*Epioblasma capsaeformis*	Endangered	Endangered				◊
Tennessee Heelspliter	*Lasmigona holstonia*	Rare	--				◊
American Ginseng	*Panax quinquefolius*	S-CE	--				◊
Torrey's Mountian-mint	*Pycnanthemum torrei*	S	--				◊

**D-Deemed in need of Management, S-Special Concern, CE- Commercially Exploited

STATE OF TENNESSEE

DEPARTMENT OF ENVIRONMENT AND CONSERVATION

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

March 1, 2013

Meridith Krebs
Lead Environmental Planner, Project Manager
Parsons Brinckerhoff
1900 Church Street, Suite 400
Nashville, Tennessee 37203

Subject: Pellissippi Parkway Extension (SR-162)
From SR-33 to SR-73, TDOT PIN 101423.00
Blount County, Tennessee
Rare Species Database Review

Dear Ms. Krebs:

Thank you for your correspondence requesting a rare species database review for the Pellissippi Parkway Extension (SR-162) project, located in Blount County, Tennessee (TDOT PIN 101423.00). Given the time since the 2009 review, we feel it is appropriate to provide a current list extracted from the natural heritage database.

On reviewing the database with regard to the project boundaries, we find that the following rare species have been observed previously within one mile of the project:

Type	Scientific Name	Common Name	Global Rank	St. Rank	Fed. Prot.	St. Prot.	Habitat
Invertebrate Animal	Fusconaia cuneolus	Finerayed Pigtoe	G1	S1	LE	E	Riffles of fords and shoals of mod gradient streams in firm cobble and gravel substrates; middle & upper Tennessee River watershed.
Vertebrate Animal	Cryptobranchus alleganiensis	Hellbender	G3G4	S3	No Status	D	Rocky, clear creeks and rivers with large shelter rocks.
Vertebrate Animal	Etheostoma cinereum	Ashy Darter	G2G3	S2S3	--	T	Small to medium upland rivers with bedrock or gravel substrate and boulders.

Type	Scientific Name	Common Name	Global Rank	St. Rank	Fed. Prot.	St. Prot.	Habitat
Vertebrate Animal	Etheostoma marmorpinnum	Marbled Darter	G1	S1	LE	E	Pools and moderate runs with clean pebbles, cobble, & small boulders; lower Little River (Tennessee River drainage).
Vertebrate Animal	Percina aurantiaca	Tangerine Darter	G4	S3	--	D	Large-moderate size headwater tribs to Tennessee River, in clear, fairly deep, rocky pools, usually below riffles.
Vertebrate Animal	Percina burtoni	Blotchside Logperch	G2G3	S2	--	D	Large creeks and small-medium rivers with low turbidity and gravel-cobble substrates; Tennessee & Cumberland river watersheds.
Vertebrate Animal	Percina macrocephala	Longhead Darter	G3	S2	--	T	Clear, larger upland creeks and small-med rivers, usually in rocky flowing pools upst/dnst rubble riffles; Tenn & Cumb river watersheds.
Vertebrate Animal	Percina tanasi	Snail Darter	G2G3	S2S3	LT	T	Sand and gravel shoals of moderately flowing, vegetated, large creeks; upper Tennessee River watershed.

Within four miles of the project the following additional rare species have been reported:

Type	Scientific Name	Common Name	Global Rank	St. Rank	Fed. Prot.	St. Prot.	Habitat
Invertebrate Animal	Epioblasma capsaeformis	Oyster Mussel	G1	S1	LE	E	Shallow riffles in mod-swift current of small-medium rivers with coarse sand and gravel; Tennessee & Cumberland river systems.
Invertebrate Animal	Lasmigona holstonia	Tennessee Heelsplitter	G3	S2	--	Rare, Not State Listed	Spring runs, creeks, & small rivers, in subst of sand & mud; upper Tenn & Conasauga river watersheds; Blue Ridge & Ridge & Valley.
Nonvascular Plant	Radula voluta	A Liverwort	G3	S2	--	S	Shady Moist Boulders By Waterfalls Or Streams
Vascular Plant	Draba ramosissima	Branching Whitlow-grass	G4	S2	--	S	Calcareous Bluffs
Vascular Plant	Panax quinquefolius	American Ginseng	G3G4	S3S4	--	S-CE	Rich Woods
Vascular Plant	Pycnanthemum torrei	Torrey's Mountain-mint	G2	S1	--	S	Barrens

Type	Scientific Name	Common Name	Global Rank	St. Rank	Fed. Prot.	St. Prot.	Habitat
Vertebrate Animal	Hemitremia flammea	Flame Chub	G3	S3	--	D	Springs and spring-fed streams with lush aquatic vegetation; Tennessee & middle Cumberland river watersheds.
Vertebrate Animal	Ixobrychus exilis	Least Bittern	G5	S2B	--	D	Marshes with scattered bushes or other woody growth; readily uses artificial wetland habitats.
Vertebrate Animal	Rallus elegans	King Rail	G4	S2	--	D	Marshes, upland-wetland marsh edges, flooded farmlands, shrub swamps.
Vertebrate Animal	Tyto alba	Barn Owl	G5	S3	--	D	Open and partly open country, often around human habitation; farms.

Note that at least one name change is now in effect (*Etheostoma marmorpinnum*, formerly *E. percnurum*), but that protections remain the same. Should suitable habitat exist on or immediately downstream of the selected route, we ask that project plans provide for the protection of these species. We ask that you coordinate this project with the Tennessee Wildlife Resources Agency (Rob Todd, rob.todd@tn.gov , 615-781-6577) to ensure that legal requirements for protection of state listed rare animals are addressed. Additionally, we ask that you contact the U.S. Fish and Wildlife Service Field Office, Cookeville, Tennessee (931-525-4970) for comments regarding federally listed species. Based on the numerous proposed stream crossings, we anticipate that directed surveys for some of the above aquatic species may be necessary.

For stabilization of disturbed areas, the Tennessee Natural Heritage Program advocates the use of native trees, shrubs, and warm season grasses, where practicable. Care should be taken to prevent re-vegetation of disturbed areas with plants listed by the Tennessee Exotic Pest Plant Council as harmful exotic plants: http://www.tneppc.org/

Please keep in mind that not all of Tennessee has been surveyed and that a lack of records for any particular area should not be construed to mean that rare species necessarily are absent. For information regarding species protection status and ranks, please visit http://www.tn.gov/environment/na/pdf/Status&Ranks.pdf.

To assist in determining whether rare species are located at a given site, the Tennessee Natural Heritage Program has implemented a publicly accessible website where rare species data lists by county, quadrangle, watershed, and MS4 boundaries can be obtained: http://environment-online.state.tn.us:8080/pls/enf_reports/f?p=9014:3:3875605994273657.

Thank you for considering Tennessee's rare species throughout the planning of this project. Should you have any questions, please do not hesitate to contact David at (615) 532-0441 or david.withers@tn.gov .

Sincerely,

Chelsea L Broach

Chelsea L. Broach
Interim Data Manager

David Ian Withers
Natural Heritage Zoologist

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
ENVIRONMENTAL DIVISION
SUITE 900, JAMES K. POLK BUILDING
505 DEADERICK STREET
NASHVILLE, TENNESSEE 37243-1402
(615) 741-3655

JOHN C. SCHROER
COMMISSIONER

BILL HASLAM
GOVERNOR

September 24, 2012

Ms. Mary Jennings
US Dept. of Interior
Fish and Wildlife Service
446 Neal St.
Cookeville, TN 38501

Subject: INDIANA BAT: Section 7 Clearance
SR-162 EXT, Pellissippi Pkwy., from SR-33 to SR-73
Blount County, TN
PIN: 101423.00 PE #05097-0229-14

Dear Ms. Jennings:

Due to recent concerns regarding the federally listed endangered Indiana bat (*Myotis sodalis*), a mist net and Anabat survey were conducted on the subject project from July 30 to August 1, 2012 to determine the possible presence of the Indiana bat in the project area. The attached reports summarize the survey findings. Based on the information provided in these reports, it is the opinion of TDOT that the proposed project is **not likely to adversely affect** the federally listed endangered Indiana bat (*Myotis sodalis*). The TDOT respectfully request your concurrence or other finding for this determination.

The above coordination and request for endangered species information is in compliance with the U.S. Fish and Wildlife Coordination Act of 1958, and the Endangered Species Act of 1973, as amended. Thank you for your assistance with this project. If you have any questions or need additional information, please do not hesitate to contact me at (865) 594-2437.

Sincerely,

Keven Brown
Biologist, TDOT Region 1
Ecology Section

Xc: Mr. John Hewitt – TDOT Permits
Ms. Ann Andrews – TDOT Planning
Rob Todd – TWRA
Bo Baxter - TVA
Project File

United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, TN 38501

October 11, 2012

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

Subject: FWS #12-CPA-0855. Proposed construction of the State Route 162 Extension (Pellissippi Parkway) from State Route 33 to State Route 73; P.E. 05097-0229-14, PIN #101423.00, Blount County, Tennessee.

Dear Mr. Brown:

Thank you for your letter dated September 24, 2012, transmitting acoustic and mist netting survey results for the proposed construction of the State Route 162 Extension (Pellissippi Parkway) from State Route 33 to State Route 73 in Blount County, Tennessee. Surveys were conducted along the proposed corridor to determine if the area is being utilized as summer roosting habitat by the federally endangered Indiana bat (*Myotis sodalis*). Personnel of the U.S. Fish and Wildlife Service have reviewed the information provided and offer the following comments.

Joint mist netting and acoustical studies were performed from July 30 through August 1, 2012, at three sites determined to contain suitable habitat for the Indiana bat. The acoustical study resulted in the recording of 2,021 bat calls, of which none were identified as Indiana bats. The mist netting efforts resulted in the capture of three bats, representing two non-listed species. The Tennessee Department of Transportation (TDOT) has concluded that the project is "not likely to adversely affect" the Indiana bat because the no Indiana bats were recorded during the surveys.

Due to negative survey results for the Indiana bat, we concur with TDOT's finding of "not likely to adversely affect" for this species. Unless new information otherwise indicates Indiana bat use of the area, this survey will be valid until April 1, 2015. Although it is likely that this project would have an insignificant effect on the Indiana bat, we would appreciate consideration given to the removal of trees with a DBH (diameter at breast height) of five inches or greater from October 15 through March 31 to further minimize potential for harm to the Indiana bat. Based on the best information available at this time, we believe that the requirements of section 7 of the Endangered Species Act of 1973, as amended, are fulfilled. Obligations under the Act must be reconsidered if (1) new

information reveals impacts of the 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 you have any questions regarding our comments, please contact John Griffith of my staff at 931/525-4995 or by email at *john_griffith@fws.gov*.

Sincerely,

Mary E. Jennings
Field Supervisor

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
ENVIRONMENTAL DIVISION
SUITE 900, JAMES K. POLK BUILDING
505 DEADERICK STREET
NASHVILLE, TENNESSEE 37243-1402
(615) 741-3655

JOHN C. SCHROER
COMMISSIONER

BILL HASLAM
GOVERNOR

June 21, 2013

Mrs. Leigh Ann Tribble
Environmental Program Eng.
Federal Highway Administration
Tennessee Division Office
404 BNA Dr., Suite 508
Nashville, TN 37217

Subject: Biological Assessment
SR-162EXT, from SR-33 to SR-73 (US 321)
Blount County, Tennessee
PIN: 101423.00 P.E. #05097-0229-14

Dear Mrs. Tribble:

Enclosed please find a Biological Assessment for the subject project. This Biological Assessment has been prepared pursuant to Section 7(c) of the Endangered Species Act of 1973, as amended, and addresses the following federally listed species, as well as two state listed species:

Species	Status	
	State	Federal
Snail darter – *Percina tanasi*	T	LT
Marbled darter – *Etheostoma marmorpinnum* {formerly the duskytail darter - *Etheostoma percnurum*}	E	LE
Fine-rayed pigtoe – *Fusconaia cuneolus*	E	LE
Indiana bat – *Myotis sodalis*	E	LE
Ashy darter – *Etheostoma cinereum*	T	--
Longhead darter – *Percina macrocephala*	T	--

LT – Federally threatened LE – Federally endangered T – State threatened E – State endangered

This Biological Assessment is based on information received from the U. S. Fish and Wildlife Service (Log #12-I-0454) dated June 10, 2013 responding to a May 15, 2013 Tennessee Department of Transportation (TDOT) letter requesting information. Information from the Tennessee Department of Environment and Conservation (TDEC), Division of Natural Heritage (DNH) was also used.

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

The TDOT requests that you forward this Biological Assessment to the USFWS with a request for concurrence or other opinion for the finding of is **not likely to adversely affect** for the above listed species. 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.

Thank you for your assistance in this project. Please address any questions specific to the BA to Keven Brown at (865) 594-2437.

Sincerely,

Keven Brown
Biologist, TDOT Region 1
Ecology Section

KB:kab

Copy: Mr. John Hewitt - TDOT
Mr. Ann Andrews - TDOT
Mr. Rob Todd – TWRA
Mr. Bo Baxter – TVA
Project File

U.S. Department of Transportation
Federal Highway Administration

Tennessee Division

404 BNA Drive, Suite 508
Nashville, Tennessee 37217
Phone (615) 781-5770

June 27, 2013

In Reply Refer To:
HPP-TN

Ms. Mary E. Jennings
Field Supervisor
U.S. Fish and Wildlife Service
446 Neal Street
Cookeville, Tennessee 38501

Subject: SR-162EXT Biological Assessment Addendum, Blount County, TN

Dear Ms. Jennings:

Enclosed is the June 21, 2013, correspondence from the Tennessee Department of Transportation (TDOT) transmitting a Biological Assessment (BA) for the SR-162EXT, from SR-33 to SR-73(US-321), in Blount County, Pin Number 101423.00. This Biological Assessment is based on information received from the Service dated June 10, 2013 responding to a May 15, 2013 TDOT letter requesting information. Information from the Tennessee Department of Environment and Conservation Division of Natural Heritage was also used.

Based on the information in the attached report, the Tennessee Division Office concurs with TDOT's finding of, "not likely to adversely affect" for the snail darter, marbled darter, fine-rayed pigtoe, Indiana bat, ashy darter, and longhead darter. The Division Office hereby requests your official concurrence or other opinion regarding this finding of, "not likely to adversely affect" and welcomes any comments you may have regarding this finding.

Please provide the entire project name and termini provided in the first line with any subsequent correspondence. Please call me at (615) 781-5760 if you have any questions.

Sincerely,

Leigh Ann Tribble

Leigh Ann Tribble
Environmental Program Engineer

Enclosure

cc: Mr. Jim Ozment, Director, Environmental Division, TDOT, w/o enclosure
Mr. Keven Brown, Biologist, TDOT Region 1, w/o enclosure

United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, TN 38501

July 25, 2013

Ms. Leigh Ann Tribble
Federal Highway Administration
404 BNA Drive, Suite 508
Nashville, Tennessee 37217

Subject: FWS #13-I-0454. Biological Assessment Addendum for the proposed construction of the State Route 162 Extension (Pellissippi Parkway) from State Route 33 to State Route 73; P.E. 05097-0229-14, PIN #101423.00, Blount County, Tennessee.

Dear Ms. Tribble:

Thank you for your letter dated June 27, 2013, transmitting a Biological Assessment (BA) Addendum for the proposed construction of the State Route (SR) 162 Extension from SR 33 to SR 73 in Blount County, Tennessee. The Tennessee Division Office agrees with the Tennessee Department of Transportation's (TDOT) findings of "not likely to adversely affect" for the federally endangered Indiana bat (*Myotis sodalis*), marbled darter (*Etheostoma marmorpinnum*), fine-rayed pigtoe (*Fusconaia cuneolus*), and the federally threatened snail darter (*Percina tanasi*) and requests our concurrence. Personnel of the U.S. Fish and Wildlife Service have reviewed the information provided and offer the following comments.

Bat surveys were conducted along the proposed corridor in the summer of 2012 to establish whether the area is being utilized as roosting habitat by the Indiana bat. Due to negative survey results for this species, we concurred with TDOT's determination of "not likely to adversely affect" in a letter dated October 11, 2012. Unless new information otherwise indicates Indiana bat use of the area, this survey will be valid until April 1, 2015. TDOT has committed, where possible, to removal of trees with a DBH (diameter at breast height) of five inches or greater from October 15 through March 31 to further minimize potential for impacts to the Indiana bat.

Stringent best management practices (BMPs), including erosion and sediment control measures, would be implemented to protect aquatic systems. Because the proposed crossings are all tributaries to the New River, an Exceptional Tennessee Water, TDOT has departed from the standard two-year BMP design requirement and committed to BMPs designed for a five-year storm event. Because of this commitment to stringent water quality measures, we concur with the determination of "not likely to adversely affect" for federally listed aquatic species.

The document indicates that four wetlands could be impacted by the proposed project. The Corps of Engineers and Tennessee Department of Environment and Conservation (TDEC) should be contacted regarding the presence of regulatory wetlands and the requirements of wetlands protection statutes.

In light of TDOT's commitments to improved water quality measures and negative surveys for Indiana bats within the project area, we believe that the requirements of section 7 of the Endangered Species Act of 1973, as amended, are fulfilled for all species that currently receive federal protection under the Act. Obligations under the Act must be reconsidered if (1) new information reveals impacts of the 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 you have any questions regarding our comments, please contact John Griffith of my staff at 931/525-4995 or by email at *john_griffith@fws.gov*.

Sincerely,

For Mary E. Jennings
Field Supervisor

xc: Keven Brown, TDOT, Nashville, TN

TENNESSEE WILDLIFE RESOURCES AGENCY

ELLINGTON AGRICULTURAL CENTER
P. O. BOX 40747
NASHVILLE, TENNESSEE 37204

June 6, 2013

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

Re: Preferred Alternative and Alignment Shifts
Pellissippi Parkway Extension (SR 162) from SR 33 to US 321 (SR 73), Blount County, TN
PIN 101423.00, Project # 05097-1226-04

Dear Ms. Stack:

The Tennessee Wildlife Resource Agency has reviewed the information that you provided regarding the proposed alignment shifts for the Pellissippi Parkway Extension project that would address the issue of a National Register eligible archaeological site that has been identified within the proposed right-of-way of the Preferred Alternative near the southern terminus of the project. The Preferred Alternative was identified in the Concurrence Point 4 Package. It appears from the illustration in Figure 1 of the information packet that all the proposed avoidance alignments would impact the same streams; therefore would affect the same species but the habitat impacts would differ. Based upon the information that I requested and that you provided, it appears that the East Avoidance Alternative (1,541 linear feet of stream impacts and 6.40 acres of wetland impacts) would have less impacts to stream and wetland resources than would the West Avoidance Alternative (2,315 linear feet of stream impacts and 7.96 acres of wetland impacts); therefore we recommend that the East Avoidance Alternative be chosen as the new Preferred Alternative since the current Preferred Alternative (which has the least stream and wetland impacts of all the alternatives) may be eliminated in order to avoid the National Register eligible archaeological site.

Thank you for the opportunity to review and comment on the modification of this proposed project.

Sincerely,

Robert M. Todd

Robert M. Todd
Fish and Wildlife Environmentalist

cc: Vincent Pontello, Wildlife Biologist/East TN TDOT Liaison
Rob Lindbom, Region IV Habitat Biologist
Bart Carter, Region IV Fisheries Coordinator
John Gregory, Region IV Manager
John Griffith, USFWS
Benjamin Brown, TDEC
Larry Long, EPA
Lisa Morris, U.S. Army Corps of Engineers, Nashville District
Leigh Ann Tribble, Federal Highway Administration

United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, TN 38501

July 30, 2010

Mr. Tom Love
Tennessee Department of Transportation
Environmental Planning and Permits Division
Suite 900, James K. Polk Building
505 Deaderick Street
Nashville, Tennessee 37243-0334

Subject: Request for comments on the Draft Environmental Impact Statement for the Pellissippi Parkway Extension from State Route 33 to State Route 73 in Blount County, Tennessee.

Dear Mr. Love:

The Tennessee Department of Transportation (TDOT) has prepared a *Draft Environmental Impact Statement* (DEIS) for the extension of Pellissippi Parkway from State Route 33 to State Route 73 in Blount County, Tennessee. The DEIS was developed by TDOT to document the impacts of the subject project in accordance with the National Environmental Policy Act and the Tennessee Environmental Streamlining Agreement (TESA). In accordance with TESA, TDOT has requested that the U.S. Fish and Wildlife Service review this document and provide any additional comments.

In previous concurrence points, our office mentioned four federally listed species that occur within the study area and may be impacted by this project. These species include the Indiana bat (*Myotis sodalis*), snail darter (*Percina tanasi*), duskytail darter (*Etheostoma percnurum*), and fine-rayed pigtoe (*Fusconaia cuneolus*). In sections 3.14.3.2 and 3.14.3.3 of the *Draft Environmental Impact Statement*, TDOT addressed the potential for harm to these species and provided measures to avoid impacting them. Tree removal would be limited to the time period of October 15 to March 31 to avoid active Indiana bat roost and maternal trees. In addition, stringent best management practices, including erosion and siltation control measures, would be implemented during construction to minimize potential for harm to aquatic species.

Upon review of this document, we believe that impacts to the snail darter, duskytail darter, and fine-rayed pigtoe have been adequately addressed. Therefore, based on the best information available at this time, we believe that the requirements of section 7 of the Endangered Species Act of 1973, as amended, are fulfilled for these species. Obligations under section 7 of the Act must be reconsidered if (1) new information reveals impacts of the 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.

The potential to adversely affect the Indiana bat (*Myotis sodalis*) was addressed in the DEIS by proposing to restrict tree clearing to the period of October 15 through March 31. In a letter to TDOT dated December 1, 2009, we concurred with your determination of "not likely to adversely affect" for the Indiana bat. However, our office no longer believes that a timeframe restriction on tree cutting properly addresses indirect and cumulative impacts to the Indiana bat. Therefore, our concurrence is no longer in effect and further coordination with our office would be required under Section 7 of the Endangered Species Act, as amended, prior to removal of trees for this project.

If you have any questions regarding our comments, please contact John Griffith of my staff at 931/528-6481 (ext. 228) or by email at john_griffith@fws.gov.

Sincerely,

Mary E. Jennings
Field Supervisor

Appendix E

2013 Biological Assessment

BLOUNT COUNTY, TN
STATE ROUTE 162 (PELLISSIPPI PARKWAY) EXTENSION
FROM SR-33 TO SR-73 (US 321)
PIN 101423.00
PE No. 05097-0229-14

BIOLOGICAL ASSESSMENT
FOR:

SNAIL DARTER (*Percina tanasi*)
MARBLED DARTER (*Etheostoma marmorpinnum*)
{formerly the Duskytail darter – *Etheostoma percnurum*}

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

U.S. FISH AND WILDLIFE SERVICE
LOG# 12-I-0454

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

Prepared By:
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I. INTRODUCTION

The Tennessee Department of Transportation (TDOT) proposes to extend SR-162 (Pellissippi Parkway) from SR-33 to SR-73 (U.S. 321) in Blount County, Tennessee (Fig. 1 & 2). 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:

Species	Status	
	State	Federal
Snail darter – *Percina tanasi*	T	LT
Duskytail darter – *Etheostoma percnurum* {Now known as the marbled darter – *Etheostoma marmorpinnum*}	E	LE
Fine-rayed pigtoe – *Fusconaia cuneolus*	E	LE
Ashy darter – *Etheostoma cinereum*	T	--
Longhead darter – *Percina macrocephala*	T	--

LT – Federally threatened LE – Federally endangered T – State threatened E – State endangered

Response from the U. S. Fish and Wildlife Service (Service) on January 12, 2000 indicated that the federally endangered Indiana bat (*Myotis sodalis*) could possibly be present in the project impact area as well. Information from the Service was updated by email on September 27, 2001 and no changes from the January 12, 2000 coordination were indicated. A biological assessment was submitted addressing the above species on November 14, 2001 with a finding of not likely to adversely affect (NLTAA). Response from the Service dated February 5, 2002 concurred with the NLTAA finding for the Indiana bat, but not the other aquatic species due to their possible presence in three of the tributaries to Little River crossed by the project. TDOT submitted additional information to the Service dated February 27, 2002 addressing their concerns. The Service responded by letter dated April 16, 2002 concurring with the NLTAA finding for the above listed aquatic species.

Since conclusion of the initial project species coordination, legal action by a local citizens group, Citizens Against Pellissippi Parkway Extension (CAPPE), necessitated that TDOT reinitiate the NEPA process. In the summer of 2012, TDOT conducted a survey of the project area to determine the possible presence of the Indiana bat, per request from the Service dated May 17, 2012. Results of this survey did not indicate that the Indiana bat was present within the project impact area. A finding of NLTAA for the Indiana bat was submitted to the Service on September 24, 2012. The USFWS concurred with the finding of NLTAA on October 11, 2012. A request for updated species information was submitted to the Service on May 22, 2013. Information from the Tennessee Department of Environment and Conservation, Division of Natural Heritage (TDEC/DNH) database was reviewed on May 22, 2013. The following federally listed species were recorded from within four miles of the project impact area:

Species	Status	
	State	Federal
Snail darter – *Percina tanasi*	T	LT
Marbled darter – *Etheostoma marmorpinnum* {formerly the duskytail darter - *Etheostoma percnurum*}	E	LE

Fine-rayed pigtoe – *Fusconaia cuneolus*	E	LE
Ashy darter – *Etheostoma cinereum*	T	--
Longhead darter – *Percina macrocephala*	T	--

LT – Federally threatened LE – Federally endangered T – State threatened E – State endangered

Response from the Service dated June 10, 2013 provided the Indiana bat (*Myotis sodalis*) for consideration. Due to the possible presence of the above species in the project impact area, informal consultation was initiated. Results of this coordination indicated that an updated biological assessment would be necessary to evaluate potential project impacts to these species.

II. 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. This will be the final segment of SR-162 connecting I-40 in Knox County, TN to SR-73 (US-321) in Blount County, TN. Construction of the proposed project is expected to take from two and a half to three years to complete, based on projects of comparable scope.

III. ACTION AREA

The proposed project is located in the northeast portion of Blount County, TN. Terrain along the project alignment is mostly rolling, but ranges from nearly level to quite hilly in some areas. Land use is varied within the project area. Agriculture uses for livestock pasture or hay production are the most common, with cultivated fields for corn, tobacco, and soybeans also present. Residential lots of varying size are prevalent throughout the project area. In addition, there are several subdivisions that either have been or are currently being developed in this portion of Blount County. Commercial development in the project area is located mostly along the main roadways and consists primarily of small businesses including gas stations, car lots, auto repair shops, antique stores, and restaurants. The Alcoa water filtration plant is located near the beginning of the project, in close proximity to Little River at approximately Little River Mile (LRM) 9.6. No caves are believed to be present in the project impact area.

Wooded sites are scattered throughout the area, ranging from only a few clustered trees to several acres in size. The wooded sites tend to be located either in upland areas too steep or rocky for cultivation or along stream drainages. The upland sites contain a variety of 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, American beech, white ash, and persimmon. Wooded sites along area streams are generally less diverse and contain boxelder, green ash, black willow, sycamore, hackberry, and black walnut. The understory in many of these wooded sites is

dominated by a heavy growth of non-native invasive species including Chinese privet, multi-flora rose, or bush honeysuckle.

Several “blue-line” streams will be crossed by the proposed project. These range in size from small, unnamed, first-order trickles to moderately sized, third-order flows. Peppermint Branch, Gravelly Creek and Flag Branch are the only three named streams that will be crossed. All of the streams that will be crossed are direct tributaries to Little River except for Gravelly Creek and Flag Branch, which flow into Crooked Creek approximately two miles upstream of its confluence with Little River. 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 hay or pasture fields. Livestock have access to a large percentage of these stream lengths which has resulted in significant impacts to both streamside vegetation and the channel substrates. Where canopy is present, it is sparse for the most part and limited to within a few feet of the top of the streambanks. Five of the drainage features depicted as “blue-lines” on the area topo maps were identified as wet weather conveyances. Most of the proposed crossings will be accomplished as close to perpendicular as possible. The proposed drainage structures that will be constructed will likely be either concrete box culverts or pipes depending on the hydraulic requirements. However, channel changes may be required on some of these streams depending on the skew at the crossing site.

At present, there are six known wetlands in the project area. These wetlands are associated mostly with the stream drainages and have been heavily impacted by livestock. They are generally small in size (< one ac.) and classified as either emergent or scrub-shrub wetland types. Vegetation present in these wetlands includes sedge, rush, cattail, black willow, ironweed, alder, elderberry, jewelweed, boneset, cardinal flower, and beggar ticks. Four of these six wetlands could possibly be impacted by project construction.

IV. SPECIES/CRITICAL HABITAT CONSIDERED

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, TN (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). The TDEC/DNH database (2013) listed records for the snail darter from the Little River at LRM 9.4, 15.9 and 17.3 in 2000. The most recent record for the snail darter in Little River was from LRM 8.5 in 2007. These records are all downstream from tributaries that will be crossed by the proposed project.

Marbled Darter – *Etheostoma marmorpinnum*
Federally Endangered
Species Description – The marbled darter (*Etheostoma marmorpinnum)* was initially included as part of the duskytail darter (*Etheostoma percnurum*) species complex which was listed as federally endangered on April 27, 1993 (USFWS 1993). However, Blanton and Jenkins (2008) described *Etheostoma marmorpinnum* as one of four distinct species from this complex. The marbled darter is presently known only from the lower portion of Little River in Blount Co., TN from SR-35 (US 411) downstream to SR-33 (Layman 1991). A single marbled darter was collected in 1947 from South Fork Holston River in Sullivan Co., TN, three years prior to completion of construction of South Holston Dam (Blanton and Jenkins 2008). This species is now believed to be extirpated from the South Fork Holston River (USFWS 1993a; Blanton and Jenkins 2008). The nine mile reach of Little River between LRM 8.5 and LRM 17.5 where *Etheostoma marmorpinnum* occurs is generally characterized by moderate gradient with riffles, runs, and long pools (Blanton and Jenkins 2008). Individuals are usually associated with pools and runs that are one to four feet in depth, have gently flowing currents, and are for the most part silt-free (Layman 1991; Etnier and Starnes 1993). There are several records from the TDEC/DNH database (2013) for the marbled darter from LRM 8.5, 9.5 and 10.0 in 2000, and LRM 17.3 in 2006. 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 (*Fusconaia cuneolus*) was listed as endangered on June 14, 1976 (USFWS 1976) and a recovery plan approved on September 19, 1984 (USFWS 1984a). 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 (2013)

indicated records for *Fusconaia cuneolus* from LRM 9.7 (2008) 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 on March 11, 1967 (32 FR 4001) under the Endangered Species Preservation Act of October 15, 1966 [80 Stat. 926; 16 U.S.C. 668aa(c)]. Critical habitat was designated on September 24, 1976 (41 FR 41914). A recovery plan for the Indiana bat was prepared in March, 1999 (USFWS 1999). 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 five (5) 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 (2013) 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). Acoustical and mist net surveys were conducted in the vicinity of the project corridor in July and August 2012, both with negative results (TDOT 2012).

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 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 (2013) indicated records for the ashy darter from LRM 13.3 (1970), 14.2 (1968), 17.3 (2006), 17.6 (1970), 19.5 (2007), and 20.2 (1988). Several of these records are 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 (2013) indicated records for *Percina macrocephala* from the Little River near LRM 8.5 (1985), 14.2 (1993), 16.0 (1974), 17.3 (2006), 19.3 (2009), 20.2 (1970), 21.6 (2008) and 22.0 (1993). Several of these records are downstream of tributaries that will be crossed by the proposed project.

V. EFFECTS ANALYSIS

Clearing, grubbing, and grading activities required for project construction will remove vegetation within most of the project limits, temporarily exposing large areas of bare soil to the elements for varying periods of time. Rain events that occur while the soil is unprotected have the potential to carrying large amounts of sediment off-site into wet-weather conveyances and streams crossed by the project and ultimately into Little River. Although not as prevalent in the project area, sustained high winds associated with storm fronts may also mobilize exposed, loose soils providing an avenue for deposit into area streams. Sediment that is allowed to leave the project has the potential to adversely affect the aquatic species preset in these streams. Excessive siltation can clog the gills of adult 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.

Several streams that are tributaries to the Little River will be crossed by the proposed project. There were no records noted for any of the aquatic species discussed in this assessment from these tributary streams. However, the project crossings are only one to two miles upstream from their respective confluences with the Little River, where all of the aquatic species discussed above are known to occur. 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 will result in direct disturbance of stream channels and substrates. 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 ft.) which will result in a loss of “day-lighted” stream channel. These encapsulated stream sections will be rendered essentially unusable for most aquatic species. These drainage structures could also act as barriers for movement of aquatic organisms both upstream and downstream. Material used to fill over the installed structures could be lost into a given drainage feature unless protective measures are taken. Although most of the potential impacts would be negative, one positive impact may be realized. On streams where no canopy in currently present, especially in open pastures or hayfields, these long structures could provide a definite cooling effect that would not otherwise be available.

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

Construction of the proposed project will connect I-40 to SR-73, providing four-lane access from Oak Ridge and Knoxville to Maryville. Both residential and commercial development have increased in the project area since the initial field studies were conducted in the late 1990’s. Large tracts of what was once farmland have been sold and developed into subdivisions or small shopping centers. This trend is expected to continue as people who work in Knoxville or Oak Ridge may prefer to live in a more scenic, rural-type setting. Development of large tracts of farmland into subdivisions or for businesses has the potential to adversely impact aquatic species in the immediate project impact area. Soil disturbance and exposure during site development and housing construction may provide a source of sediments that could enter areas streams directly affecting the fauna present as discussed above. Development of large farm tracts also removes what was in many cases an effective vegetative buffer for area streams. The amount of impervious surfaces would increase in the form of roofs, driveways, entrance/access roads, parking lots, and the four new traffic lanes from the project itself. This would in turn reduce the run-off time during storm events, possibly causing flashy, more intense, storm runoff into area streams. Pollutants carried from the developed areas, as well as off the roadways, could potentially impact area streams in a negative manner.

There are, however, some positive impacts that may result. Large agricultural fields that may have been significant sources for sediment run-off during storm events would be stabilized. A pollution source for large amounts of fertilizer, herbicides,

insecticides, or other chemicals harmful to aquatic systems would be greatly reduced, if not eliminated. Sections of stream channel that may have been heavily damaged and degraded by livestock or other agricultural practices would be protected and canopy to reestablish.

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 if any are present. This could lead to loss of vital individuals necessary for bolstering the population of this federally endangered species. There are a few areas that will be affected by project construction where suitable summer roost habitat is present. However, the overall quality is less than optimal. In addition, there are wooded tracts outside the project impact area that are much larger and contain better quality summer roost habitat that could be used by any bats that would possibly be displaced by project construction. 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 just over eight miles (8.25) 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. Recent surveys by TDOT (2012) did not indicate that the Indiana bat was present within the project area. This would greatly reduce, if not eliminate, the likelihood of the proposed project adversely affecting the Indiana bat.

VI. MEASURES TO MINIMIZE HARM

Installation and maintenance of effective erosion control Best Management Practices (BMP's) throughout the duration of the project will be essential to the prevention of adverse impacts to the aquatic species discussed in this assessment. The use of silt fence, hay bales, rock check-dams, detention ponds, slope drains, and erosion control blankets are just a few of the measures that can be used 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. Typical design for these BMP's is based on a two-year storm event. However, the drainage features that will be crossed by this project flow into Little River, which is listed as an Exceptional Tennessee Water (ETW) due to the presence of several state and federally listed aquatic species. Therefore, the Service has requested that the design for BMP's proposed for use on this project be based on a five-year storm event.

Construction of drainage structures will be accomplished "in the dry" so that minimal material is allowed to enter the streams and possibly adversely affect any of the aquatic species present. Streams will be temporarily routed through work areas using pipes or open channels with non-erodible liners until the respective structures are completed. Relocated channel sections will be properly stabilized and any loose materials removed to the practical extent possible prior to turning stream flows back into the constructed channels. Flows will then be returned to these channels with a minimum of sediment disturbance. Where stream crossings are required, these will be accomplished as close to perpendicular as feasible in order 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 during construction of the proposed project will be to restrict clearing of wooded areas, where possible, 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, where possible, should effectively minimize the likelihood of adversely affecting any Indiana bats that might be present in the project area.

The notes listed below addressing each of the above measures to minimize harm will be placed on the project construction plans. Also, any additional recommendations provided by the Service will be placed as notes on the project construction plans as needed.

1. Clearing and grubbing will be limited to the minimum amount necessary to accommodate roadway cut and fill slopes and operation of construction equipment. All disturbed areas will be stabilized, seeded, and mulched as soon as practicable to reduce the potential for soil erosion.

2. Canopy removal along any streams located within the project limits will be kept to the absolute minimum necessary to accommodate project construction.

3. Silt fence with backing will be installed along the toe of all fills and along all streambanks to minimize the potential of sediment from the project entering area streams. A minimum ten (10) foot vegetated buffer or “green belt” will be left between silt fences and the stream edges where possible.

4. Erosion and sediment control measures will be installed concurrent with clearing and grubbing activities, and will be functional prior to commencement of earthmoving activities. Measures may include, but are not limited to, silt fence with backing, clean shot rock checkdams, sandbags, sediment ponds, sediment filter bags, sediment wattles, slope drains, or other suitable methods.

5. Erosion control structures will be inspected regularly and maintained throughout the life of the project so that they are not rendered ineffective. Sediment will be removed from structures as necessary and must be removed when design capacity has been reduced by 50% to insure maximum effectiveness. Material removed from these structures will not be disposed of in any area streams or wetlands.

6. Maintenance needs for erosion and sediment control structures identified during inspections or by other means will be accomplished within twenty-four (24) hours, if possible. If maintenance prior to the next anticipated storm event is impractical, it will be accomplished as soon as practicable.

7. Waste and borrow areas will be developed in accordance with the procedures outlined in the TDOT Statewide Stormwater Management Program for Construction Projects. These sites will be located in non-wetland areas and are to be a sufficient distance from area streams and/or wetlands so that no soil material is allowed to enter them. These areas will be stabilized as soon as practicable. Appropriate erosion and sediment control measures will be used in these areas as needed to minimize soil loss.

8. Stockpiled topsoil or fill material will be treated in such a manner that is not allowed to enter any area streams or wetlands.

9. Equipment staging areas will be located a sufficient distance from streams and wetlands so that no oils, coolants, fuels, or other petroleum products are allowed to enter these features.

10. Drainage structures required at stream crossings will be constructed "in the dry". Stream flows will be diverted through work areas using flexible pipes or berms or channels lined with plastic, clean shot rock, or other non-erodible material. All water from dewatering areas will be pumped into filter bags or sediment ponds prior to release back into a stream.

11. No motorized equipment will be operated in any streams or wetlands in the project limits except as specified in the project water quality permits.

12. Where possible, tree cutting will be accomplished between October 15th and March 31st to minimize potential impacts to the Indiana bat.

13. A Stormwater Pollution Prevention Plan (SWPPP) will be prepared for the proposed project and will contain a detailed erosion and sediment control plan based on a five-year storm event as requested by the USFWS. A copy of the SWPPP will be available on-site.

14. Weekly stormwater inspections will be conducted for the proposed project as per National Pollutant Discharge Elimination System (NPDES) guidelines.

VII. CONCLUSION AND DETERMINATION OF EFFECTS

There are numerous records for the snail darter (*Percina tanasi*), marbled darter (*Etheostoma marmorpinnum*), fine-rayed pigtoe (*Fusconaia cuneolus*), ashy darter (*Etheostoma cinereum*), and longhead darter (*Percina macrocephala*) 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

listed darter species or the mussel species from these tributary streams. Project construction will result in some temporary stream disturbances to at the proposed crossing locations. However, installation and maintenance of effective erosion and siltation control measures throughout project construction will minimize impacts to these streams, which will in turn minimize potential impacts to Little River and the aquatic fauna present there. Provided the necessary BMP's for erosion and sediment control implemented and maintained throughout project construction, it is the opinion of TDOT that the proposed project is **NOT LIKELY TO ADVERSELY AFFECT** the snail darter (*Percina tanasi*), marbled darter (*Etheostoma marmorpinnum*), fine-rayed pigtoe (*Fusconaia cuneolus*), ashy darter (*Etheostoma cinereum*), or longhead darter (*Percina macrocephala*).

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 suitable trees present outside the project limits to accommodate any Indiana bats that might use this area. Recent surveys by TDOT (2012) did not indicate that the Indiana bat was present within the project impact area. In addition, the USFWS concurred with the finding of NLTAA for the Indiana bat for the proposed project on October 11, 2012. Therefore, based on the information provided in this BA it is still the opinion of TDOT that the proposed project is **NOT LIKELY TO ADVERSELY AFFECT** the Indiana bat.

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IX. LIST OF CONTACTS MADE AND PREPARERS

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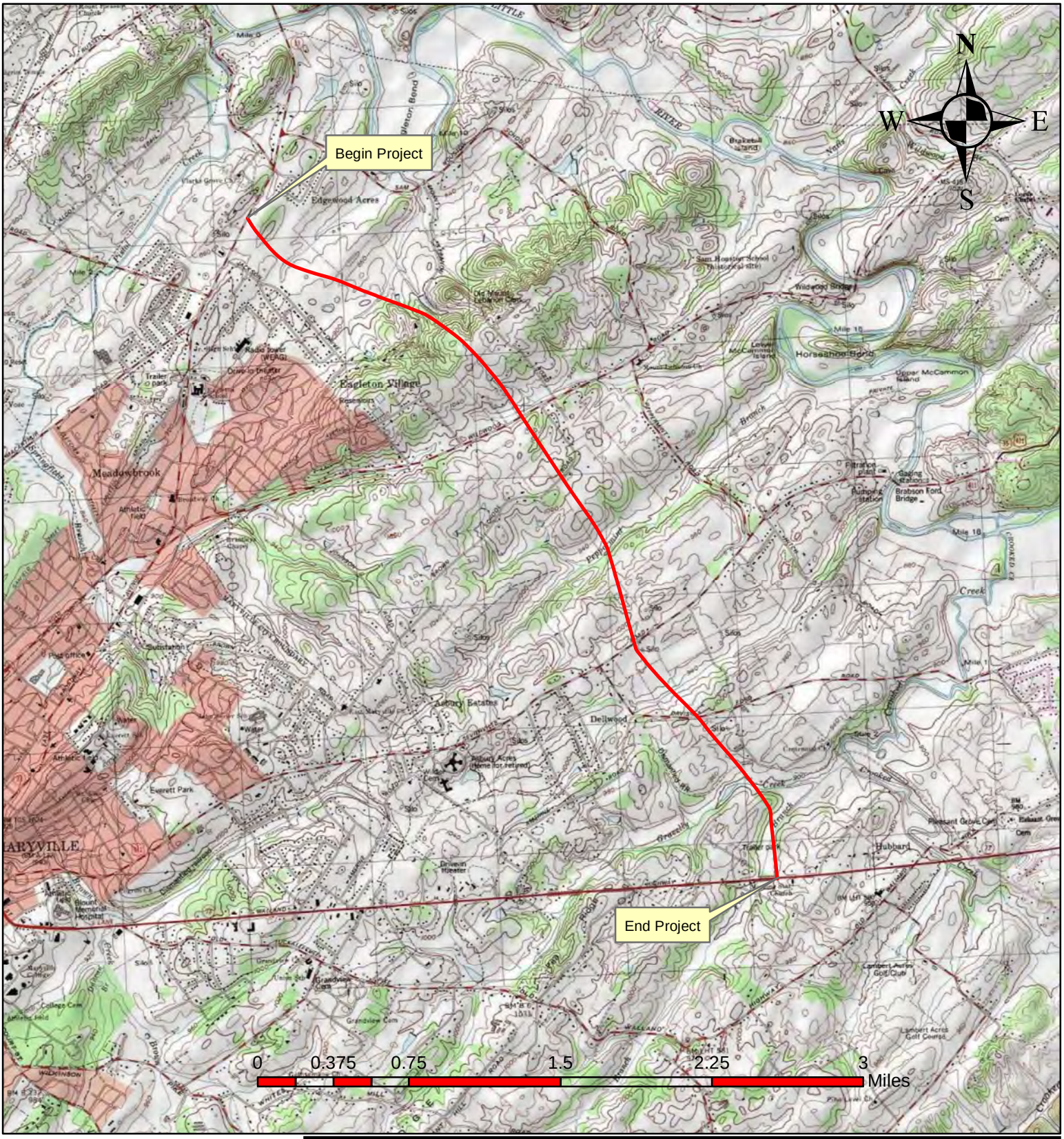
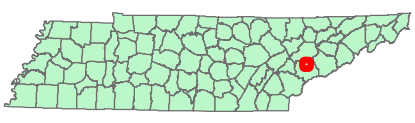
Tennessee Dept. of Transportation
7345 Region Lane
Knoxville, TN, 37914
(865) 594-2437
Keven.Brown@tn.gov





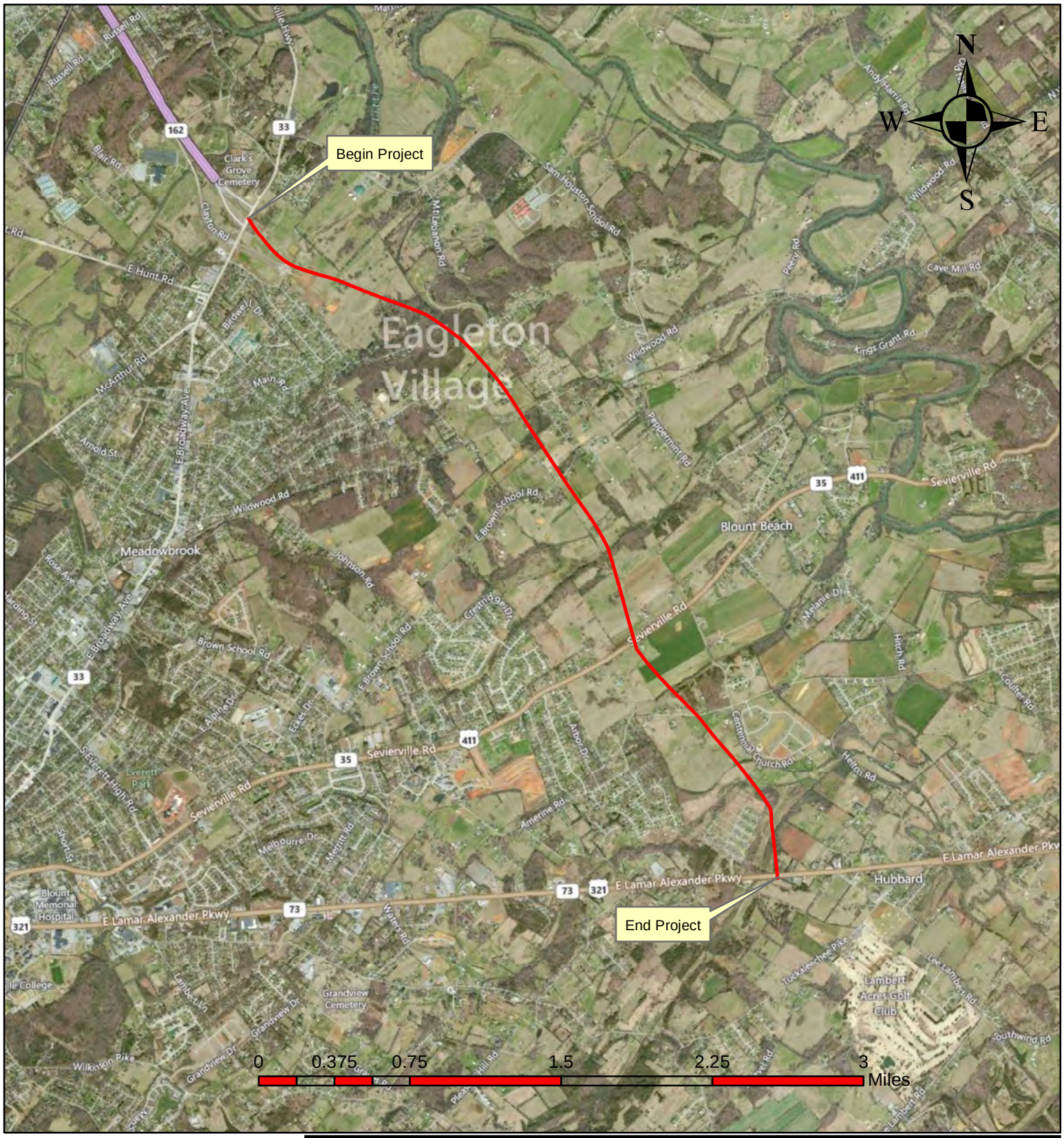
Project Location Map - topo
SR-162EXT, Pellissippi Pkwy, from SR-33 to SR-73
Blount County, TN

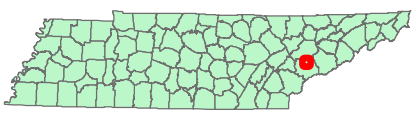
Maryville 147-SW and Wildwood 147-SE

6-4-13

PIN 101423.00 PE #05097-0229-14

TDOT





Project Location Map - aerial
SR-162EXT, Pellissippi Pkwy, from SR-33 to SR-73
Blount County, TN

Maryville 147-SW and Wildwood 147-SE

6-4-13

PIN 101423.00 PE #05097-0229-14

Appendix F

2012 Indiana Bat Mist Net and Acoustical Survey Report

INDIANA BAT (*Myotis sodalis*)
SURVEY REPORT

SR-162EXT (PELLISSIPPI PARKWAY), FROM SR-33 TO SR-73 (US-321)
PE# 05097-0229-14 PIN: 101423.00
MARYVILLE, BLOUNT COUNTY, TENNESSEE

Prepared for:

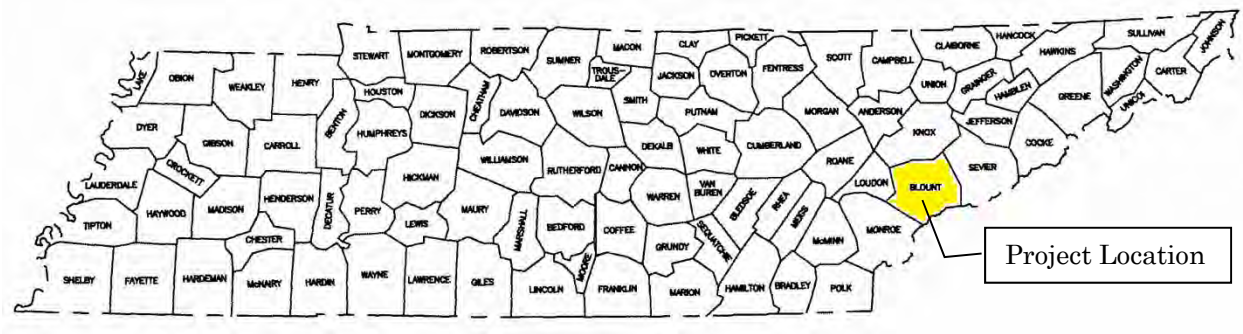
TENNESSEE DEPARTMENT OF TRANSPORTATION
JAMES K. POLK BUILDING – SUITE 900
505 DEADRICK STREET
NASHVILLE, TN

Prepared by:

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
405 DUKE DRIVE, SUITE 270
FRANKLIN, TN 37067

CEC PROJECT 121-226

August 31, 2012



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1.0 INTRODUCTION

This report presents the findings of an Indiana bat (*Myotis sodalis*) presence/probable absence mist net survey conducted for the Tennessee Department of Transportation (TDOT) by Civil & Environmental Consultants, Inc. (CEC). The survey was completed for the proposed extension of State Route 162 from State Route 33 to State Route 73 (US-321) located in Blount County, Tennessee.

The proposed SR-162 alignment is located approximately six miles northeast of Maryville, Tennessee (Figure 1). The project site consists of approximately 4.35 linear miles (7.00 km) which includes residential properties, agricultural fields, and forested tracts. Hydrologic features within the property include the Flag Creek, Gravelly Creek, Peppermint Br., and tributaries to the Little River.

The purpose of this study was to confirm the presence or probable absence of the federally endangered Indiana bat at the project area. This survey was based on CEC's professional judgment and interpretation of the technical criteria outlined in the U.S. Fish and Wildlife Service (USF&WS) (Region 3) agency draft document titled *Indiana bat (Myotis sodalis) Draft Revised Recovery Plan: First Revision* dated April 2007.

2.0 METHODOLOGY

CEC biologists traversed the project area by vehicle and on foot to identify potential bat habitat (roosting areas, feeding areas, drinking pools, and flight corridors). Our field reconnaissance was completed in order to establish mist net sites that would maximize the success of the mist net survey. Given the size, shape, and amount of forested habitat within the project area, a total of three mist net sites were completed for this site. Refer to Appendix A for the USF&WS correspondence relating to the number of proposed mist net sites and proposed net nights.

The three mist net sites completed by CEC within the project area contained all of the following bat habitats: roosting areas, feeding areas, and flight corridors. These sites had the highest potential to capture an Indiana bat (Figure 1).

The 3 mist net sites completed by CEC included a minimum of two mist net sets, placed at least 30 meters apart. All mist nets used during the survey were Avinet - USA made 75/2 38mm mesh, polyester, reduced "bag" for bats (Avinet Inc. - Dryden, New York). The mist nets measure 2.6 meters high, contain four shelves, and are various lengths ranging from 3 meters to 18 meters. CEC used Avinet stackable poles for single high net sets and custom built net poles that allow up to three nets to be stacked on top of each other. These custom-built net poles reach a maximum of 30 feet into the canopy. The custom-built net poles and CEC mist net surveying techniques are based upon Gardner, et al. 1989, and Nagorsen, et al. 1980.

The Indiana bat mist net survey was completed under strict adherence to the USF&WS *Indiana bat (Myotis sodalis) Draft Revised Recovery Plan: First Revision* dated April 2007. All captured bats were identified by Mr. Brent Mock and Ms. Mary Gilmore, authorized Collection Permit holders. Photographs of each mist net site are presented in Appendix C. All collections made during the survey were recorded on field data sheets, which are presented in Appendix D.

Acoustical data was also completed in accordance with the USF&WS. One Titley Scientific Anabat SD2 bat detector was placed at each site. The bat detectors were deployed in stream

corridors, forest corridors, and agricultural foraging areas located over 100 meters away from the mist nets. The detector was placed in foraging locations that would be difficult to mist net. The anabat detector began recording data 30 minutes prior to sunset and continued through the length of the survey. The data was screened using two filters created by Dr. Eric Britzke - one filter (noise) deleted erroneous noise and one filter (morenet) screened for Indiana bat (*Myotis sodalis*) calls. If a *Myotis sodalis* call was recorded an additional mist net site was required per the 2011 Kentucky Mist Net Guidelines.

3.0 RESULTS

CEC sampled a total of 12 net nights (3 survey sites x 2 nights per survey site x 2 net sets per survey night = 12 net nights) from July 30 to August 1, 2012. The survey sites were sampled starting at sunset and lasting for a minimum of five hours. Strong winds occurred for about 20 minutes on the night of July 31. As a result of the wind, the nets were closed for 20 minutes and that time was added to the end of the night. No other severe weather was encountered during the length of the survey.

The following section provides a detailed description of the mist net sites and presents the results of the trapping effort at each site. Table 1 presents a summary of the survey results.

Site 1

Mist net Site 1 was sampled over a 2 day period from July 31 through August 1, 2012. This site was not located in the project ROW, since landowner access was not granted in the forested sections near the Eagleton Village. Since Indiana bats use streams as flight corridors, CEC made the decision to net the Little River near Sam Houston School Rd. On the initial survey night, one mist net set (one 12-meter long, double high net) was erected over a forested stream corridor (Little River). The net spanned the entire width of the stream corridor and expanded upward 20 feet closing in the canopy. The second net set (one 6-meter long, double high net) was erected over a forested corridor that connected a mowed field to the Little River. The net spanned the entire width of the stream corridor and expanded upward 20 feet closing in the canopy. One Eastern Red bat (*Lasiurus borealis*) was collected during the first night of surveying

On the second survey night, one mist net set (one 12-meter long, double high net) was erected over a forested stream corridor (Little River). The net spanned the entire width of the stream corridor and expanded upward 20 feet closing in the canopy. The second net set (one 6-meter long, double high net) was erected over a forested corridor that connected a mowed field to the Little River. The net spanned the entire width of the stream corridor and expanded upward 20 feet closing in the canopy. No bats were collected during the second night of surveying.

CEC sampled Site 1 a total of 2 detector nights from July 31 through August 1, 2012. The bat detector was deployed starting 30 minutes prior to sunset and lasting the length of the mist net survey. The detector was placed along the stream corridor to detect any bats that were foraging on the stream. The detector data was screened against erroneous noise and Indiana bat calls.

On the initial night of acoustical sampling, the bat detector collected a total of 240 recordings. After the noise filter deleted the erroneous noise, 126 calls remained. *Myotis sodalis* calls were not detected at Site 1 using the morenet filter during the initial night.

On the second night of acoustical sampling, the bat detector collected a total of 1205 recordings. After the noise filter deleted the erroneous noise, 611 calls remained. *Myotis sodalis* calls were not detected at Site 1 using the morenet filter during the second night.

Site 2

Mist net Site 2 was sampled over a 2 day period on July 30 and August 1, 2012. On the initial survey night, one mist net set (one 6-meter long, double high net) was erected over a forested stream corridor (Peppermint Branch). The net spanned the entire width of the stream corridor and expanded upward 20 feet closing in the canopy. The second net set (one 6-meter long, double high net) was erected over a forested stream corridor (Peppermint Branch). The net spanned the entire width of the corridor and expanded upward 20 feet closing in the canopy. One Eastern Red Bat (*Lasiurus borealis*) was collected during the first night of surveying.

On the second survey night, one mist net set (one 6-meter long, double high net) was erected over a forested stream corridor (Peppermint Branch). The net spanned the entire width of the stream corridor and expanded upward 20 feet closing in the canopy. The second net set (one 6-meter long, double high net) was erected over a forested stream corridor (Peppermint Branch). The net spanned the entire width of the corridor and expanded upward 20 feet closing in the canopy. One Big Brown bat (*Eptesicus fuscus*) was collected during the second night of surveying.

CEC sampled Site 2 a total of 2 detector nights on July 30 and August 1, 2012. The bat detector was placed along the edge of the forest facing the stream, to detect bats using the stream as a foraging area and flight corridor, and deployed starting 30 minutes prior to sunset and lasting the length of the mist net survey. The detector data was screened against erroneous noise and Indiana bat calls.

On the initial night of acoustical sampling, the bat detector collected a total of 743 recordings. After the noise filter deleted the erroneous noise, 659 calls remained. *Myotis sodalis* calls were not detected at Site 2 using the morenet filter during the initial night.

On the second night of acoustical sampling, the bat detector collected a total of 341 recordings. After the noise filter deleted the erroneous noise, 320 calls remained. *Myotis sodalis* calls were not detected at Site 2 using the morenet filter during the second night.

Site 3

Mist net Site 3 was sampled over a 2 day period on July 30 through 31, 2012. On the initial survey night, one mist net set (one 6-meter long, double high net) was erected over a forested corridor leading to Gravelly Creek. The net spanned the entire width of the corridor and expanded upward 20 feet closing in the canopy. The second net set (one 6-meter long, double high net) was erected over a forested stream corridor (Gravelly Creek). The net spanned the entire width of the corridor and expanded upward 20 feet closing in the canopy. No bats were collected during the first night of surveying.

On the second survey night one mist net set (one 6-meter long, double high net) was erected over a forested corridor leading to Gravelly Creek. The net spanned the entire width of the corridor and expanded upward 20 feet closing in the canopy. The second net set (one 6-meter long, double high net) was erected over a forested stream corridor (Gravelly Creek). The net spanned

the entire width of the corridor and expanded upward 20 feet closing in the canopy. No bats were collected during the second night of surveying.

CEC sampled Site 3 a total of 2 detector nights from July 30 through 31, 2012. The bat detector was placed along the stream corridor facing a potential foraging field and deployed starting 30 minutes prior to sunset and lasting the length of the mist net survey. The detector data was screened against erroneous noise and Indiana bat calls.

On the initial night of acoustical sampling, the bat detector collected a total of 315 recordings. After the noise filter deleted the erroneous noise, 204 calls remained. *Myotis sodalis* calls were not detected at Site 3 using the morenet filter during the initial night.

On the second night of acoustical sampling, the bat detector collected a total of 141 recordings. After the noise filter deleted the erroneous noise, 101 calls remained. *Myotis sodalis* calls were not detected at Site 3 using the morenet filter during the second night.

TABLE 1
INDIANA BAT MIST NET SURVEY SUMMARY

Common Name	Scientific Name	Date	Site	No. of Bats Captured	Federal Status	State Status
Eastern Red bat	*Lasiurus borealis*	7/31/2012	1	1	-	-
Eastern Red bat	*Lasiurus borealis*	7/30/2012	2	1	-	-
Big Brown bat	*Eptesicus fuscus*	8/1/2012	2	1	-	-

4.0 CONCLUSIONS

CEC conducted an Indiana bat (*Myotis sodalis*) presence/probable absence mist net survey along the approximate 4.35 mile proposed SR-162 expansion project located in Blount County, Tennessee between July 30 and August 1, 2012. Three (3) bats were captured and identified at 3 mist net sites in close proximity to the proposed project area. The mist netting effort consisted of a total of 12 net nights. All bats captured were identified, weighed, measured, and released alive. The acoustical efforts consisted of a total of 6 detector nights. No Indiana bats were captured or acoustically detected during the survey. No additional bat surveys are recommended or warranted at this time.

5.0 LEVEL OF CARE

The Indiana bat survey services performed by CEC were conducted in a manner consistent with the criteria outlined in the USF&WS, Region 3 agency draft document titled *Indiana bat (Myotis sodalis) Draft Revised Recovery Plan: First Revision* dated April 2007, and with the level of care and skill ordinarily exercised by members of the environmental consulting profession practicing contemporaneously under similar conditions in the locality of the project.

6.0 REFERENCES

Gardner, J. E., J. D. Garner, and J. E. Hofmann. 1989. A Portable Mist-Netting System for Capturing Bats with Emphasis on *Myotis sodalis* (Indiana bat). Bat Research News 30:1-8.

Nagorsen, D. W.; Peterson, R. L., 1980: Mammal Collectors Manual. A Guide for Collecting, Documenting, and Preparing Mammal Specimens For Scientific Research. Belonging to the unnumbered series: Life Sciences Miscellaneous Publications. Royal Ontario Museum, Toronto. ISBN: 0-88854-255-0 pa.

U.S. Fish and Wildlife Service. 2007. *Indiana bat (Myotis sodalis) Draft Revised Recovery Plan: First Revision*. U.S. Fish and Wildlife Service, Fort Snelling, MN. 258 pp.

FIGURES

0 750 1,500 3,000 Feet

ISSUED FOR: TDOT

ISSUED BY:

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
405 Duke Drive, Ste 270, Franklin, TN 37067
Columbus, OH * Cincinnati, OH * Indianapolis, IN * Nashville, TN * Chicago, IL
St. Louis, MO * Export, PA * Detriot, MI

Indiana Bat Survey
Mist Net Location Map
SR-162 EXT (Pellissippi Parkway)
From SR-33 to SR-73 (US-321)
Blount County
PE 05097-0229-14; Pin 101423.00

DWN. BY: cec	SCALE: 1:30,000	DATE: 08-30-2012	PROJECT NO.: 121-226	FIGURE: 1
CHK. BY: jtd				

APPENDIX A

U.S. FISH & WILDLIFE SERVICE CORRESPONDENCE

May 31, 2012

Ms. Mary Jennings
U.S. Fish & Wildlife Service
446 Neal St.
Cookeville, TN 38501

Subject: Request for Concurrence
Indiana Bat Survey Methodology
Blount Co; SR-162EXT; From SR-33 to SR-73 (US-321), Pellissippi Parkway Extension

Dear Ms. Jennings,

Civil & Environmental Consultants, Inc. (CEC) is requesting concurrence related to Indiana bat (*Myotis sodalis*) surveys. CEC currently possesses a USFWS Permit (TE07358A-3) and a Scientific Collecting Permit from the State of Tennessee (TWRA 1193) for this project. Tennessee Department of Transportation has contracted CEC to conduct a mist net survey for the alignment of SR-162EXT (Pellissippi Parkway Extension) in Blount County (see attached map). The majority of the Project Area consists of open agricultural fields and residential properties. Hydrologic features within the property include the Flag Creek, Gravelly Creek, Peppermint Br., and tributaries to the Little River. The project consists of approximately 7.0 linear kilometers; however, there are less than 1.0 km of contiguous forested area along the alignment that may be disrupted broken up into three distinct forested areas associated primarily with stream corridors.

CEC proposes to conduct a mist net survey to confirm the presence or probable absence of the Indiana bat at the Project Area. The proposed survey work is based on the technical criteria outlined in the USFWS document Indiana Bat Mist-Netting Guidelines dated 2010. The document specifies a minimum of 1 net site per km of stream or linear corridor. Since the Project Area consists of less than 1.0 km of forested habitat within three separate areas, CEC proposes to survey three (3) mist net sites at this location. This Project Area will consist of two nets per site for two consecutive nights for three sites (3 sites x 2 nets per site x 2 nights = 12 net nights). Each mist net site will include at least two mist nets, placed a minimum of 30 meters apart. Sampling time for each mist net will begin at sunset and last for a minimum of 5 hours. In the case of severe weather including precipitation, strong winds, and/or temperatures dropping below 50 degrees Fahrenheit during the initial survey effort, surveys will be terminated and the site will be resurveyed under suitable conditions. If Indiana bats are captured, radio-transmitters will be attached to suitable individuals, the bats will be radio-tracked to daytime roosts, and emergence counts will be conducted at these roosts. CEC will conduct a minimum of 5 consecutive days of radio telemetry tracking and 2 days of emergence counts at Indiana bat roost(s) located in the Project Area, if applicable.

To provide a greater efficiency of documenting presence/absence surveys, CEC will conduct acoustical sampling in conjunction to mist-netting. Since the project consists of three net sites, CEC will deploy 1 detector at each site for a total of 6 detector nights (3 sites x 2 nights x 1 detector = 6 detector nights). The detector will be placed in an area that cannot be effectively sampled with mist nets. The anabat unit will be placed before sunset and continue to operate throughout the entire night and picked up in the morning.

This mist-net survey is scheduled to start in July, weather permitting. The mist-net survey will strictly follow the technical criteria outlined in the Indiana Bat Mist-Netting Guidelines, as well as any additional recommendations by the USFWS. At this time, we respectfully request concurrence on our methodology and our level of effort.

Please sign and return this letter via fax (615) 333-7797 or email, bmock@cecinc.com along with any additional requests or guidelines, if applicable. If you have any questions or require additional information please contact me at (630) 991-7207.

Respectfully,

Civil & Environmental Consultants, Inc.

Brent Mock
Assistant Project Manager

SIGNATURE: DATE:

_____ _____

Attachments: Site Location Maps

Mock, Brent

From: John_Griffith@fws.gov
Sent: Friday, June 08, 2012 3:32 PM
To: Keven Brown
Cc: Duke, Jeff
Subject: RE: SR-162EXT from SR-33 to SR-73, Blount Co. PIN 101423.00

Keven and Jeff,

The study proposal looks good for alignment A. Thanks,

John C. Griffith
Transportation Biologist
U.S. Fish and Wildlife Service
Tennessee Field Office
931-525-4995 (office)
931-528-7075 (fax)

Keven Brown <Keven.Brown@tn.gov>

Keven Brown
<Keven.Brown@tn.gov>

06/06/2012 09:52 AM

To"'John_Griffith@fws.gov'" <John_Griffith@fws.gov>

cc"jduke@cecinc.com" <jduke@cecinc.com>

SubjectRE: SR-162EXT from SR-33 to SR-73, Blount Co. PIN 101423.00

John,

My apologies. I forgot to include in the email that Alternate A is the preferred route.

kb

From: John_Griffith@fws.gov [mailto:John_Griffith@fws.gov]
Sent: Wednesday, June 06, 2012 10:14 AM
To: Keven Brown
Cc: jduke@cecinc.com
Subject: Re: SR-162EXT from SR-33 to SR-73, Blount Co. PIN 101423.00

Keven,

Matt Richards and I discussed a similar proposal with one of his TESA projects. Our advice when multiple alignments are being considered is to perform a cursory habiat comparison between alignments e.g. percentage of forest cover, forest type, stand ages, etc. This information should be weighed in with the many other considerations for final alignment. Bat surveys should only be done once the final alignment is chosen i.e. we will only be providing section 7 coverage on one

alignment. Thanks,

John C. Griffith
Transportation Biologist
U.S. Fish and Wildlife Service
Tennessee Field Office
931-525-4995 (office)
931-528-7075 (fax)

Keven Brown <Keven.Brown@tn.gov>

Keven Brown
<Keven.Brown@tn.gov>

06/05/2012 03:20 PM

To "John_Griffith@fws.gc <John_Griffith@fws.gc

cc "jduke@cecinc.com" <jduke@cecinc.com>

Subject SR-162EXT from SR-3 to SR-73, Blount Co. P 101423.00

John,

A request for concurrence from CEC for the proposed Indiana bat sampling plan for this project is attached. An aerial showing the alternatives is also attached. Let me know if you need any additional info.

Keven Brown
Biologist, Ecology Section
TDOT Region 1
7345 Region Lane
Knoxville, TN 37914
865-594-2437
Keven.Brown@tn.gov
[attachment "Blount SR-162EXT concurrence.pdf" deleted by John Griffith/R4/FWS/DOI]
[attachment "AlignmentsAerial11x17 with TSM.pdf" deleted by John Griffith/R4/FWS/DOI]

APPENDIX B

SCIENTIFIC COLLECTION PERMIT

DEPARTMENT OF THE INTERIOR
U S FISH AND WILDLIFE SERVICE

FEDERAL FISH AND WILDLIFE PERMIT

2 AUTHORITY-STATUTES
16 USC 1539(a)

REGULATIONS
50 CFR 17 22

50 CFR 13

1. PERMITTEE

CIVIL AND ENVIRONMENTAL CONSULTANTS, INC.
530 EAST OHIO STREET
SUITE G
INDIANAPOLIS, IN 46204
U.S.A.

3. NUMBER
TE07358A-3 AMENDMENT

4. RENEWABLE	5. MAY COPY
☒ YES ☐ NO	☒ YES ☐ NO

6. EFFECTIVE	7. EXPIRES
04/19/2012	12/31/2013

8. NAME AND TITLE OF PRINCIPAL OFFICER *(If #1 is a business)*
RYAN A SLACK
PROJECT MANAGER

9. TYPE OF PERMIT
NATIVE ENDANGERED SP. RECOVERY - E WILDLIFE

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED
ON LANDS SPECIFIED WITHIN THE ATTACHED SPECIAL TERMS AND CONDITIONS

11. CONDITIONS AND AUTHORIZATIONS:

A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY, OR RENEWAL, OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS

B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL, TRIBAL, OR OTHER FEDERAL LAW

C. VALID FOR USE BY PERMITTEE NAMED ABOVE

C.1. VALID FOR USE BY RYAN SLACK, JENNIFER DIETZEN, MARY GILMORE, BRENT MOCK, JACK BASIGER, AND LISA WINHOLD. ASSISTANTS MAY WORK UNDER THE DIRECT AND ON-SITE SUPERVISION OF NAMED PERMITTEES. AT LEAST ONE NAMED PERMITTEE MUST REMAIN PRESENT AT EACH MIST-NET SITE WHILE IT IS BEING OPERATED.

D. ACCEPTANCE OF THIS PERMIT SERVES AS EVIDENCE THAT THE PERMITTEE AND ITS AUTHORIZED AGENTS UNDERSTAND AND AGREE TO ABIDE BY THE TERMS OF THIS PERMIT AND ALL SECTIONS OF TITLE 50 CODE OF FEDERAL REGULATIONS, PARTS 13 AND 17, PERTINENT TO ISSUED PERMITS. SECTION 11 OF THE ENDANGERED SPECIES ACT OF 1973, AS AMENDED, PROVIDES FOR CIVIL AND CRIMINAL PENALTIES FOR FAILURE TO COMPLY WITH PERMIT CONDITIONS.

E. Permittee is authorized to take (capture and release, band, and radio-track) the Indiana bat (*Myotis sodalis*) and gray bat (*M. grisescens*) for scientific research aimed at recovery of the species.

F. Activities are authorized at the following locations:

F.1. Locations within Oklahoma (Region 2) upon receipt of written concurrence from the U.S. Fish and Wildlife Service (USFWS) Field Supervisor, as outlined in Condition G.

F.2. Locations within Region 3 of the USFWS: Illinois, Indiana, Iowa, Michigan, Missouri, and Ohio upon receipt of written concurrence from the USFWS Field Supervisor, as outlined in Condition G.

☒ ADDITIONAL CONDITIONS AND AUTHORIZATIONS ALSO APPLY

12. REPORTING REQUIREMENTS
ANNUAL REPORT DUE: 01/31

ISSUED BY	TITLE	DATE
Lisa Mandell	ACTING CHIEF - ENDANGERED SPECIES	04/19/2012

APPENDIX C

PHOTOGRAPHS

Photo 1: Site 1, Net B
View of Net B (~ 20' high) looking west, located in a stream corridor

Photo 2: Site 1, Net A
View of Net A (~ 20' high) looking west, located in a stream corridor

Photo 3: Site 2, Net A
View of Net A (~ 20’ high) looking north, located in a stream corridor

Photo 4: Site 2, Net B
View of Net B (~ 20’ high) looking south, located in a stream corridor

Photo 5: Site 3, Net A
View of Net A (~ 20' high) looking north, located near a stream corridor

Photo 6: Site 3, Net B
View of Net B (~ 20' high) looking west, located in a stream corridor

Photo 7: Site 2, Net A
View of an adult female Big Brown Bat (Eptesicus fuscus)

APPENDIX D

CIVIL & ENVIRONMENTAL CONSULTANTS DATA SHEETS

CEC Bat Capture Data Sheet

Site No. 1	**Project Name:** [illegible]		**Date:** 7-31-12
Location: East of Maryville TN			
County: Blount	**State:** TN	**Client:** TDOT	**Observers:** B. Mark C. Duke
Lat/Long (DMS): N	W	**Zone:**	

#	Time	Species	Age	Sex	Repro. Cond.*	RFA (mm)	Mass (g)	Net/ Ht	Guano/ Hair	Wing Score	Band # Type
1	0100	LABO	J	F	NR	42.0	10.2	A/1	—	1	—
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											

Moon Phase: Waxing ~~gibbous~~ | **%** 97

	Rise	Set
Moon:	1929	0504
Sun:	0643	2041

Time	Temp	Sky	Wind	# Bats
2100	23	2	0	0
2200	21	2	1	0
2300	20	1	1	0
0000	20	0	0	0
0100	20	0	0	1
0200	19	0	0	0
Ave				

Sky Code	
0	Clear
1	Few Clouds
2	Partly Cloudy
3	Cloudy or overcast
4	Smoke or fog
5	Drizzle or light rain
6	Thunderstorm

Beauford Wind Code	
0	Calm (0 mph)
1	Light wind (1-3 mph)
2	Light breeze (4-7 mph)
3	Gentle breeze (8-12 mph)
4	Moderate breeze (13-18 mph)

***Repro. Cond (Reproductive Condition): (P) pregnant; (L) lactating; (PL) post-lactating; (NR) non-reproductive, (TD) testes descended**

CEC Bat Capture Data Sheet

Site No. 1	Project Name: Pellissippi Parkway	Date: 8-1-12
Location: E. of Maryville, TN		
County: Blount	State: TN / Client: TDOT	Observers: B. Mock C. Duke
Lat/Long (DMS): N	W / Zone:	

#	Time	Species	Age	Sex	Repro. Cond.*	RFA (mm)	Mass (g)	Net/ Ht	Guano/ Hair	Wing Score	Band # Type
1		No Captures									
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											

Moon Phase: Full Moon — **%** 100

	Rise	Set
Moon:	2011	612
Sun:	644	2040

Time	Temp	Sky	Wind	# Bats
2050	26	1	1	0
2100	25	1	1	0
2200	24	1	1	0
2300	24	2	2	0
0000	23	2	1	0
0100	22	2	2	0
0200	20	2	1	0
Ave				

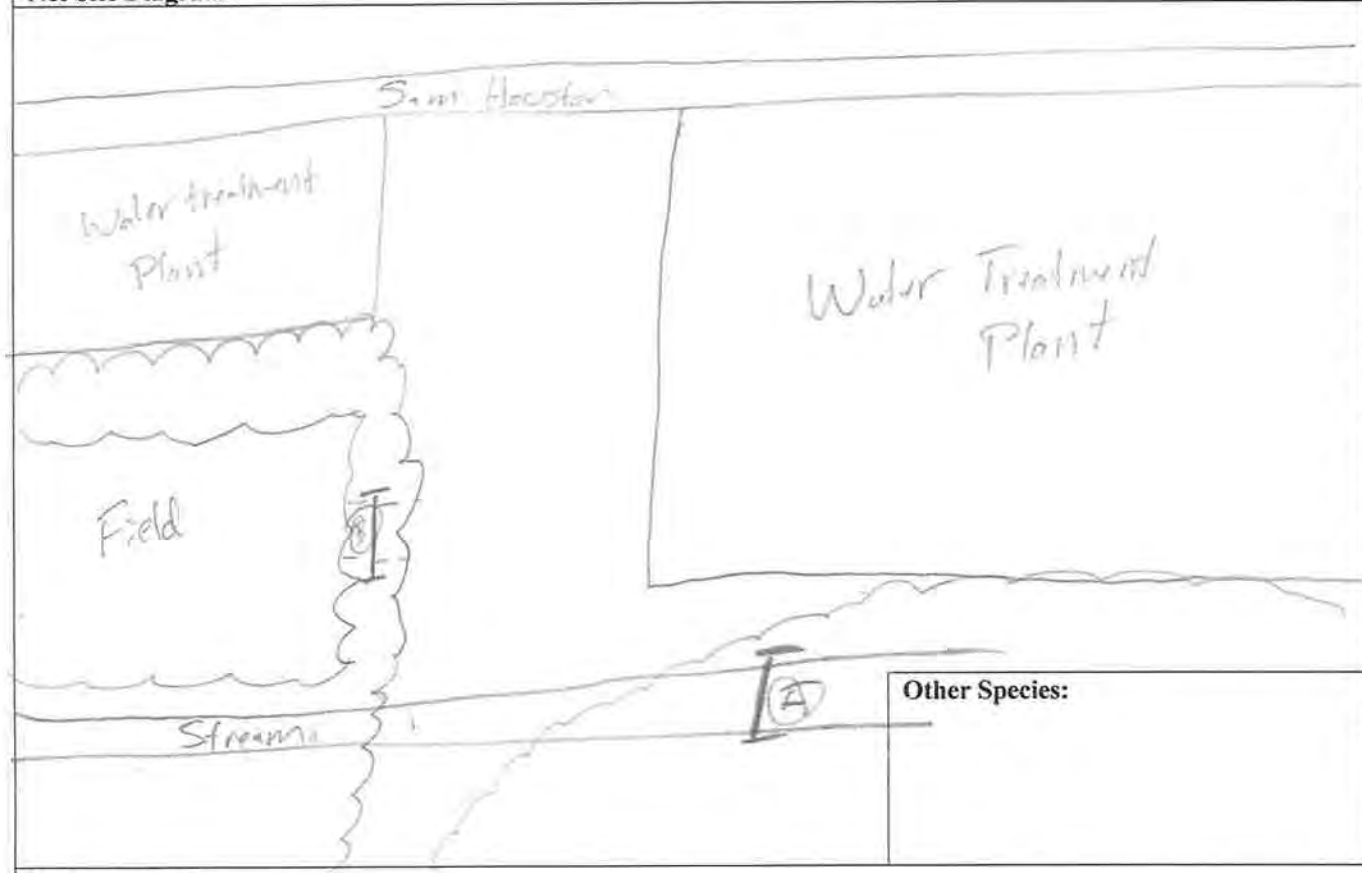
Sky Code	
0	Clear
1	Few Clouds
2	Partly Cloudy
3	Cloudy or overcast
4	Smoke or fog
5	Drizzle or light rain
6	Thunderstorm

Beauford Wind Code	
0	Calm (0 mph)
1	Light wind (1-3 mph)
2	Light breeze (4-7 mph)
3	Gentle breeze (8-12 mph)
4	Moderate breeze (13-18 mph)

***Repro. Cond (Reproductive Condition): (P) pregnant; (L) lactating; (PL) post-lactating; (NR) non-reproductive, (TD) testes descended**

Site No.: 1	Project Name: Pellissippi	Date: 7-31-12

Net Site Diagram



Other Species:

Dominant Vegetation

1	Hackberry
2	Box Elder
3	Black willow
4	Sycamore
5	

Net Site(s) by Habitat

Habitat	A	B	C	
River				
Stream	X			
Pond				
Road Rut				
Corridor		X		
Cave/mine				
Total				

No. of Poles X Net length

A	=	2	X	12
B	=	2	X	6
C	=		X	
D	=		X	

Comments:

CEC Bat Capture Data Sheet

Site No. 2	**Project Name:** Fellississippi		**Date:** 7/30/12
Location: ~~Mon~~ East of Maryville, TN			
County: Blount	**State:** TN	**Client:** TDOT	**Observers:** B. Mocu, C Duke
Lat/Long (DMS): N	W	**Zone:**	

#	Time	Species	Age	Sex	Repro. Cond.*	RFA (mm)	Mass (g)	Net/ Ht	Guano/ Hair	Wing Score	Band # Type
1	2300	LABO	J	F	NR	42.0	12.5	A/2m	X	0	X
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
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21											
22											
23											
24											
25											
26											
27											
28											
29											
30											

Moon Phase: Waxing gibbous **%** 92

	Rise	Set
Moon:	1849	0358
Sun:	643	2042

Time	Temp	Sky	Wind	# Bats
2100	30	1	0	0
2200	28	2	0	1
2300	24	2	0	0
0000	24	3	0	0
0100	24	3	0	0
0200	23	3	0	0
Ave				

Sky Code	
0	Clear
1	Few Clouds
2	Partly Cloudy
3	Cloudy or overcast
4	Smoke or fog
5	Drizzle or light rain
6	Thunderstorm

Beauford Wind Code	
0	Calm (0 mph)
1	Light wind (1-3 mph)
2	Light breeze (4-7 mph)
3	Gentle breeze (8-12 mph)
4	Moderate breeze (13-18 mph)

***Repro. Cond (Reproductive Condition): (P) pregnant; (L) lactating; (PL) post-lactating; (NR) non-reproductive, (TD) testes descended**

CEC Bat Capture Data Sheet

Site No. 2	Project Name: 140		Date: 1 August 2012
Location: east of maryville TN			
County: Blount	State: TN	Client: TDOT	Observers: Mary Gilmore & Casey Hartwig
Lat/Long (DMS): N 35° 46' 58"	W 83° 54' 26"	Zone:	

#	Time	Species	Age	Sex	Repro. Cond.*	RFA (mm)	Mass (g)	Net/ Ht	Guano/ Hair	Wing Score	Band # Type
1	2155	EPFU	A	F	PL	47	19.5	t/lm	-	0	-
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
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14											
15											
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20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											

Moon Phase: Full Moon **%** 100

	Rise	Set
Moon:	2011	612
Sun:	644	2040

Time	Temp	Sky	Wind	# Bats
2050	25.5	1	1-2	0
2100	25.5	1	1-2	0
2200	25	1	1	1
2300	22.5	2	2	0
00	22.5	2	2	0
0100	21	2	1-2	0
0200	20	2	1-2	0
Ave				1 total

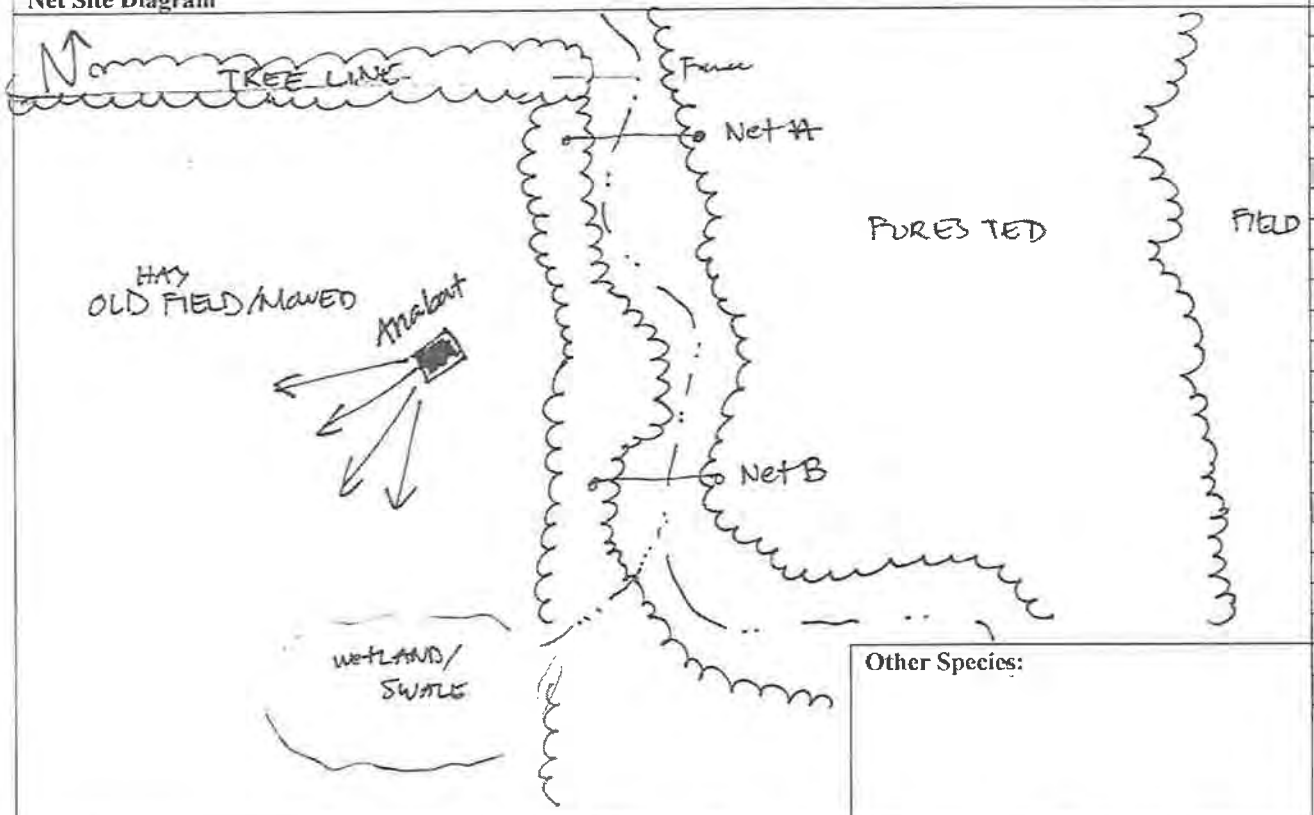
Sky Code	
0	Clear
1	Few Clouds
2	Partly Cloudy
3	Cloudy or overcast
4	Smoke or fog
5	Drizzle or light rain
6	Thunderstorm

Beauford Wind Code	
0	Calm (0 mph)
1	Light wind (1-3 mph)
2	Light breeze (4-7 mph)
3	Gentle breeze (8-12 mph)
4	Moderate breeze (13-18 mph)

*Repro. Cond (Reproductive Condition): (P) pregnant; (L) lactating; (PL) post-lactating; (NR) non-reproductive, (TD) testes descended

Site No.: 2 | Project Name: 140 | Date: 30 July 2012 & 1 August 2012

Net Site Diagram



Dominant Vegetation

1	Acer rubrum
2	Celtis occidentalis
3	Acer negundo
4	Liquidambar styraciflua
5	Ulmus americana

Net Site(s) by Habitat

Habitat	A	B	C	
River				
Stream	X	X		
Pond				
Road Rut				
Corridor				
Cave/mine				
Total				

No. of Poles X Net length

A	=	2	X	6m
B	=	2	X	6m
C	=		X	
D	=		X	

Other Species:

Comments:

A: 35° 46' 57.81" N ; 83° 54' 25.30" W

B: 35° 46' 56.49" N; 83° 54' 26.83" W

CEC Bat Capture Data Sheet

Site No. 3	Project Name: 140	Date: 30 July 2012
Location: east of manyville		
County: Blount	State: TN / Client: TDOT	Observers: Mary Gilmore & Casey Hertwig
Lat/Long (DMS): N 35° 45' 51"	W 83° 53' 30" / Zone:	

#	Time	Species	Age	Sex	Repro. Cond.*	RFA (mm)	Mass (g)	Net/ Ht	Guano/ Hair	Wing Score	Band # Type
1											
2											
3											
4											
5		NO Capture!									
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											

Moon Phase: waxing gibbous — % 92

	Rise	Set
Moon:	1847	0358
Sun:	643	2042

Time	Temp	Sky	Wind	# Bats
2100	30	1	0	0
2200	27.5	2	0	0
2300	25	2-3	0	0
00	25	3	0	0
0100	23	3	0	0
0200	23	2-3	0	0
Ave				

Sky Code	
0	Clear
1	Few Clouds
2	Partly Cloudy
3	Cloudy or overcast
4	Smoke or fog
5	Drizzle or light rain
6	Thunderstorm

Beauford Wind Code	
0	Calm (0 mph)
1	Light wind (1-3 mph)
2	Light breeze (4-7 mph)
3	Gentle breeze (8-12 mph)
4	Moderate breeze (13-18 mph)

*Repro. Cond (Reproductive Condition): (P) pregnant; (L) lactating; (PL) post-lactating; (NR) non-reproductive, (TD) testes descended

CEC Bat Capture Data Sheet

Site No. 3	Project Name: 140	Date: 31 July 2012
Location: east of Maryville TN		
County: Blount	State: TN Client: TDOT	Observers: Mary Gilmore & Casey Herwig
Lat/Long (DMS): N 35° 45' 51"	W 83° 53' 30" Zone:	

#	Time	Species	Age	Sex	Repro. Cond.*	RFA (mm)	Mass (g)	Net/ Ht	Guano/ Hair	Wing Score	Band # Type
1											
2											
3											
4											
5											
6		NO Captures									
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											

Moon Phase: Waxing gibbous	% 97
	Rise / Set
Moon:	1929 / 0504
Sun:	643 / 2041

Time	Temp	Sky	Wind	# Bats
2100	22.5	2-3	0	0
2200	22	2	1	0
2300	21.5	1	1	0
000	21	0	1	0
0100	20	0	0	0
0200	20	0	0	0
0230	20	0	0	0
Ave				

Sky Code	
0	Clear
1	Few Clouds
2	Partly Cloudy
3	Cloudy or overcast
4	Smoke or fog
5	Drizzle or light rain
6	Thunderstorm

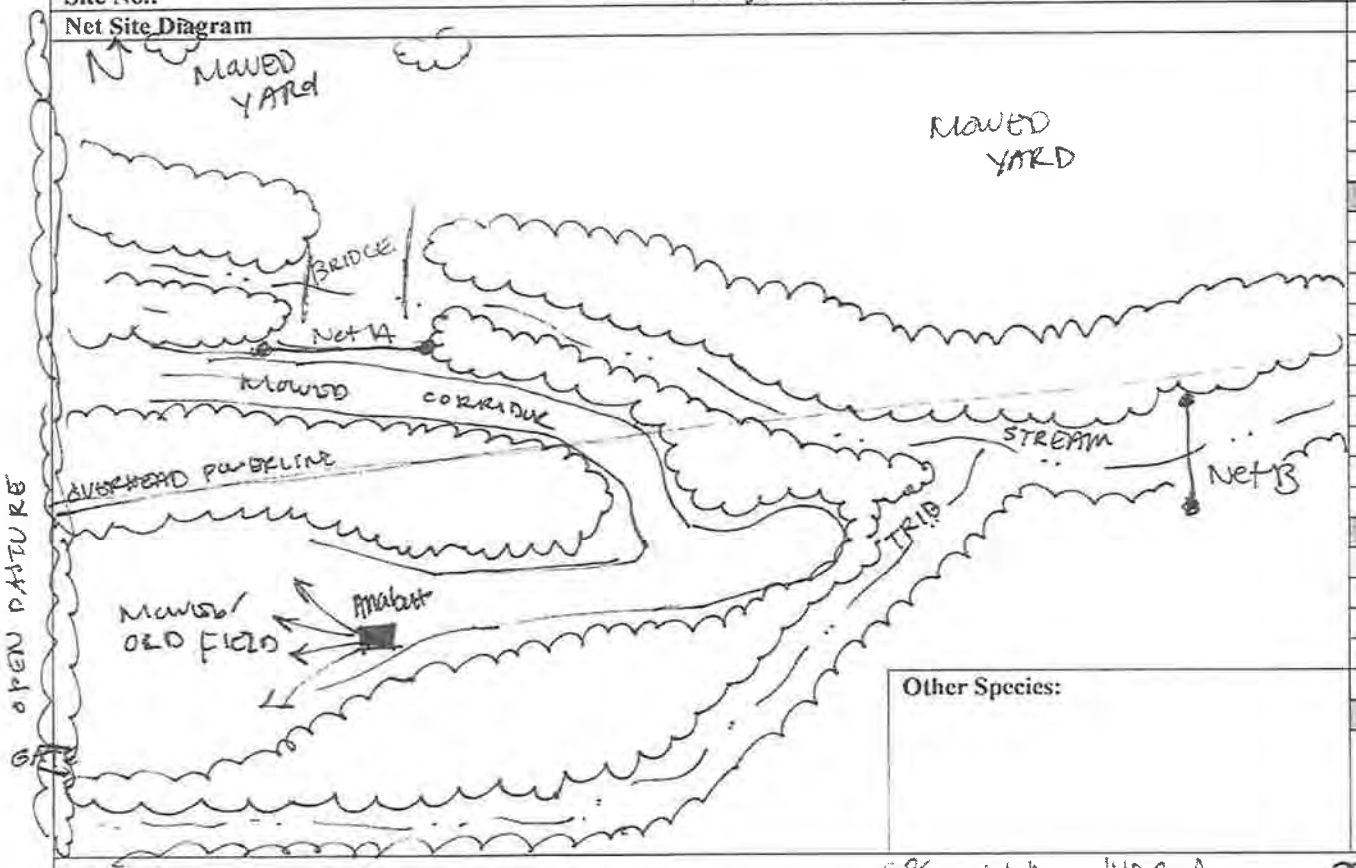
Beauford Wind Code	
0	Calm (0 mph)
1	Light wind (1-3 mph)
2	Light breeze (4-7 mph)
3	Gentle breeze (8-12 mph)
4	Moderate breeze (13-18 mph)

*Repro. Cond (Reproductive Condition): (P) pregnant; (L) lactating; (PL) post-lactating; (NR) non-reproductive, (TD) testes descended

Thunderstorm from 2130 - 2200, nets down.

Site No.: 3 | Project Name: 140 | Date: 30 July 2012 & 31 July 2010

Net Site Diagram



Dominant Vegetation

1	Juglans nigra
2	Acer negundo
3	Celtis occidentalis
4	Salix nigra
5	Albizia julibrissin

Net Site(s) by Habitat

Habitat	A	B	C	
River				
Stream		X		
Pond				
Road Rut				
Corridor	X			
Cave/mine				
Total				

No. of Poles X Net length

A	=	2	X	6m
B	=	2	X	6m
C	=		X	
D	=		X	

Other Species:

Comments:

GPS: Net A: 140.3-A – 35° 45' 51.54" N; 83° 53' 31.05" W

Net B: 140.3-B -35° 45' 51.06" N; 83° 53' 28.47" W