ENVIRONMENTAL ASSESSMENT

IMPROVE SAFETY, MOBILITY, AND GEOMETRICS ON US 150 FROM THE BLUEGRASS PARKWAY TO THE NELSON/WASHINGTON COUNTY LINE

Nelson County, Kentucky

KYTC Item Number: 4-396.10

Submitted Pursuant to the National Environmental Policy Act 42 U.S.C. 4332(2)(c)
by
the U.S. Department of Transportation, Federal Highway Administration,
the Kentucky Transportation Cabinet and the Tennessee Department of Transportation

Federal Highway Administration

Kentucky Transportation Cabinet

February 2020

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Approved For Public Availability

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1.0 PROJECT DESCRIPTION

The Kentucky Transportation Cabinet's (KYTC) 2018 Six-Year Highway Plan (SYP) identified several planned improvements to the US 150 corridor in Nelson and Washington Counties, including improvements between the Bluegrass Parkway and the Nelson/Washington County line, which is the subject of this Environmental Assessment (EA). Improvements through Nelson and Washington Counties were the subject of a planning study completed by the KYTC in 2015, *US 150 Scoping Study – Final Report Nelson and Washington Counties KYTC Item No. 4-396.00* (see Appendix A). The purpose of the US 150 improvement projects through both counties is to enhance local and regional mobility; increase capacity where necessary; and to provide a safer, more efficient connection between the Bluegrass Parkway and Interstate 75 (I-75). Currently, US 150 provides the only regional east/west connection for areas between the Bluegrass Parkway in Bardstown and I-75 in Mount Vernon. In an effort to provide a more reliable and safer regional connector, past improvements have been made to the US 150 corridor between the east end of the project area and I-75 in Rockcastle County.

In Nelson County, the current project will improve nearly 5.5 miles of roadway between the east side of the Bluegrass Parkway and the Washington/Nelson County line at Beech Fork. The road passes through the small community of Botland near the middle of the project. The road is characterized by substandard geometry and limited sight distance. On the eastern end of the project, approximately 0.7 miles of the road was constructed on a maximum grade of 8.4% as it approaches the county line and crosses Beech Fork.

Improvement alternatives on the existing corridor and on new alignment have been considered. All alternatives begin just east of the recently reconstructed Bluegrass Parkway interchange and terminate just west of the bridge over Beech Fork at the Washington County line. The bridge at this location was replaced in 2013, has sufficient width to carry the new alternatives, and has an National Bridge Inventory (NBI) Rating of "Good" (8) and a Health Index of 99.89. Given the condition of this structure, all alternatives will use this bridge as a connection to the project in Washington County (Item No. 4-396.2, 4-396.3, and 4-8958).

1.1 Project Setting

1.1.1 Nelson County, Kentucky

Nelson County is located in central Kentucky, with the proposed project ending at the Washington County line (see Figure 1). Adjacent Kentucky counties are: Washington, Spencer, Anderson, Bullitt, Hardin, LaRue, and Marion Counties. Nelson County is fairly hilly, with frequent rolling hills and steep valleys, and is situated within the Mississippian and Bluegrass physiographic regions of Kentucky.

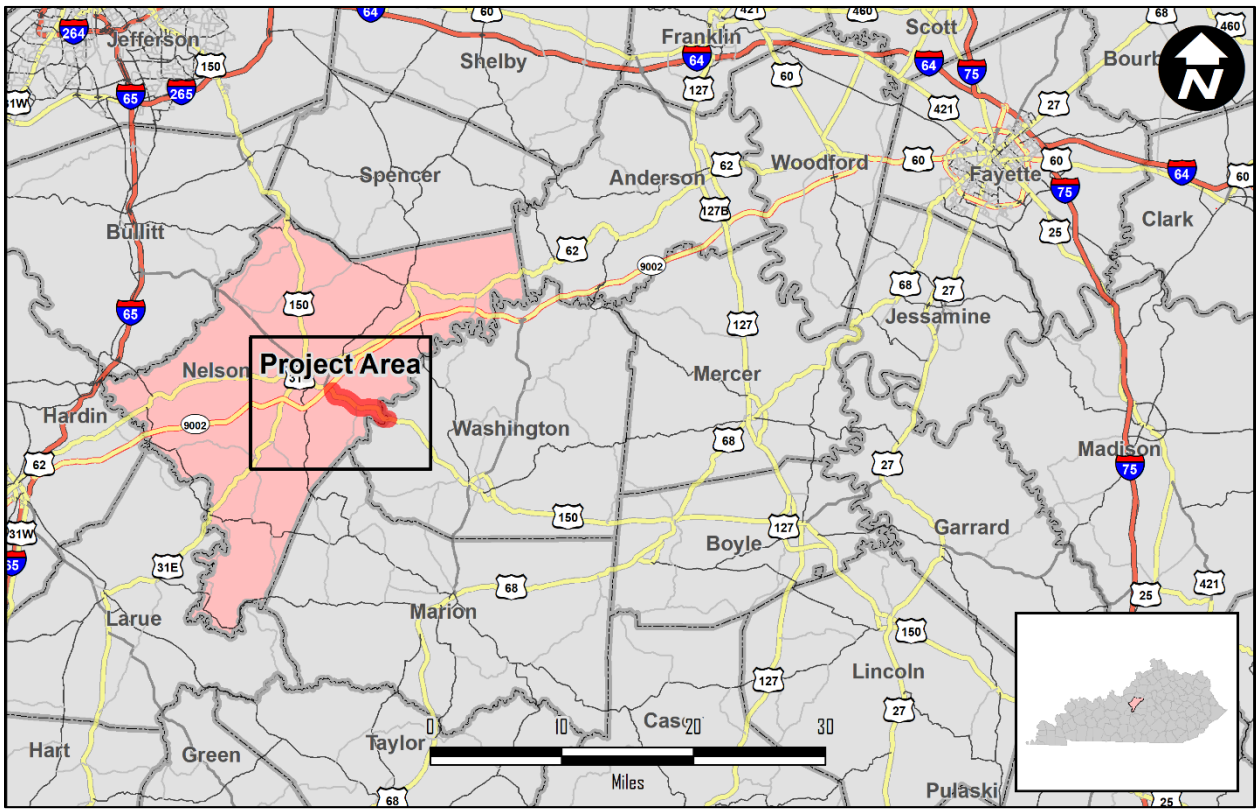


Figure 1: Project Area Map

1.1.2 Project Corridor

In Kentucky, US 150 stretches approximately 120 miles between Louisville and Mount Vernon, Kentucky. In Nelson County, US 150 is a minor arterial roadway carrying between 9,500 and 13,500 vehicles per day. Improvements made to the US 150 corridor in the 1980's through the late 1990's from Springfield near the former St. Catherine College campus in Washington County to I-75 in Rockcastle County, have resulted in a more reliable and safer connection to I-75 via Danville and Stanford. The Springfield bypass project (Item Number 4-307.01) was constructed in 2011 on new alignment, and improved traffic flow around the town. The 2000s saw US 150 improved east of Stanford (8-244.06) and from 2013-2015, improvements continued (Item Number 8-0163) west of Mount Vernon in Rockcastle County, approaching I-75. In addition, numerous smaller grade, drainage, and resurfacing projects have been implemented on the route to improve safety and travel through the corridor.

With the exception of the area near Bardstown, the US 150 project corridor has a rural landscape. Along the route, there are numerous dispersed residences, abundant farmland, and small patches of forest interspersed throughout the landscape. The small community of Botland is located near the middle of the project area and consists of residences, a few commercial businesses, and a church. Many of these structures are remnants of the community's days as a stagecoach stop and turnpike tolling station in the early to mid-1800s.

1.2 Purpose and Need

1.2.1 Project Purpose

The purpose of this project is to enhance local and regional mobility; increase capacity where necessary; and to provide a safer, more efficient connection between the Bluegrass Parkway and I-75 to the east. Currently, US 150 provides the only regional east/west connection for areas between the Bluegrass Parkway in Bardstown and I-75 in Mount Vernon. In an effort to provide a more reliable and safer regional connector, past improvements, such as realignments (4-307.01), widening (8-0163, 244.06), grade, drainage, and resurfacing have been made to the US 150 corridor between the east end of the project area and I-75 in Rockcastle County. Unimproved sections are characterized by frequent access points and problematic sightlines, with many areas having insufficient sight distance for pulling onto or off of US 150.

The purpose of the project is to:

- Provide safe and efficient linkage along US 150 between Bardstown and Springfield in Washington County; and
- Improve connectivity between the Bluegrass Parkway and I-75.

1.2.2 Project Need

Three primary needs have been identified for the US 150 corridor:

- Correct geometric deficiencies: The existing roadway includes geometric deficiencies, including narrow lanes and shoulder widths, and substandard horizontal and vertical curves that do not meet current design standards.
- Improve regional connectivity: Connectivity in the region is negatively affected by the substandard design and inability for travelers to navigate around trucks, farm equipment, and slow-moving vehicles.
- Improve safety.

Figure 2: Freight Traffic on US 150

1.2.2.1 Geometric Deficiencies

US 150 is a two-lane roadway that was constructed during the 1950s and early 1960s. An assessment of the vertical geometry in the corridor identified a maximum existing grade of 8.4%. The *AASHTO 2011 Policy on Geometric Design of Highways and Streets* (6th edition) recommends a maximum 6% grade for Rural Minor Arterial routes. The existing pavement includes 11- to 12-foot driving lanes with shoulder widths varying from 8-10 feet, with 3-4 feet of that paved. Policy recommends 12-foot driving lanes and 8-foot graded shoulders, at a minimum.

Figure 3: Typical Lane and Shoulder

Two horizontal curves do not meet the design criteria for a 45 mph design speed; numerous vertical curves do not have the minimum stopping sight distance for a 55 mph design speed. There is one bridge in the project area, over Mill Creek. The bridge has an NBI Rating of Fair with a Health Index of 82.86.

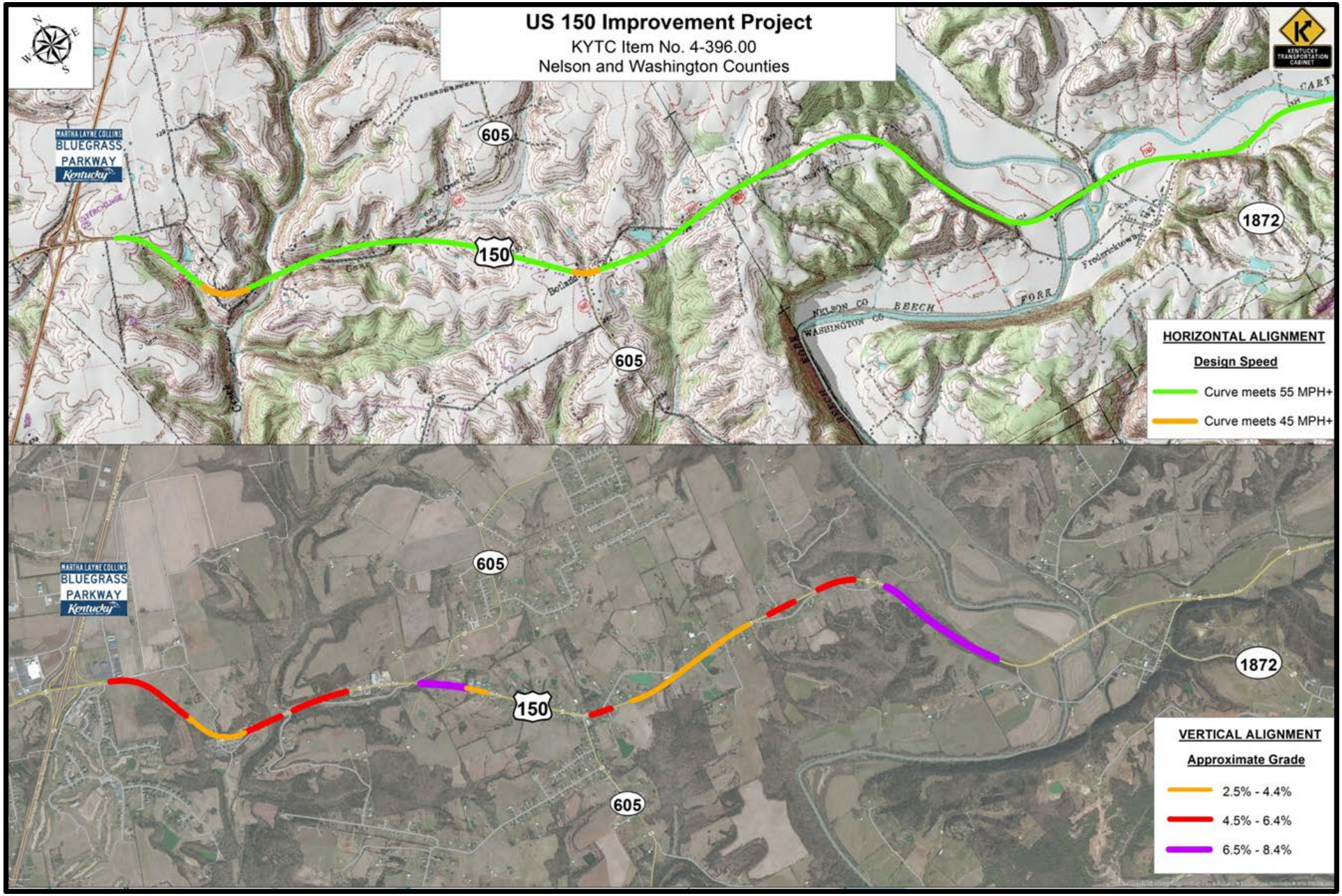


Figure 4: Geometric Deficiencies of Existing Roadway

1.2.2.2 Regional Connectivity

The current highway does not adequately serve the regional need for efficient connection to the parkway and interstate systems lying to the west and east. Many drivers, including trucking companies, use this route to travel east-west through the region, and this highway impacts the safety and efficiency of that travel. By improving the geometrics of the roadway, delays due to crashes will be reduced and a more predictable travel through the corridor will be recognized, thus improving regional connectivity. In addition, an improved roadway will better serve the agricultural and manufacturing businesses in the broader central Kentucky area.

Agriculture is an essential part of the Nelson County and central Kentucky economies. Agricultural producers and trucking companies utilize the state and national highway system daily to access fields and facilities, and as a connection to the interstate system. During the spring planting and fall harvest season, this section of US 150 provides access to many of the agricultural fields along the corridor. As a result, slow-moving agricultural equipment hinders movement of traffic and freight, adversely affects travel times through the corridor, and negatively influences regional connectivity.

Along with the agricultural operations, heavy trucks utilize US 150 to ship goods by connecting Nelson County and the region to nearby trucking routes like the Bluegrass Parkway and I-75. Manufacturing, distribution, and tourism are also major economic components within the area with American Fuji Seal, Tower International, and several bourbon facilities providing a large percentage of the local and regional employment. Many of these facilities rely upon the US 150 corridor for east-west connectivity. These existing transportation needs are all affected by the substandard facility and poor operational characteristics of the corridor.

1.2.2.3 Safety

Crashes that occurred in the corridor between January 2014 and December 2018 were reviewed to identify locations where high crash rates may exist. During the analysis period, there were 145 crashes within the Nelson County project limits. Of these crashes, 32% (47) were single vehicle; 36% (52) were rear end; 10% (14) were angle; and 15% (21) were sideswipes. The remaining 7% were comprised of head-on (5 crashes); opposing left turn (3 crashes); and backing (3 crashes). The crash data are included in Appendix B.

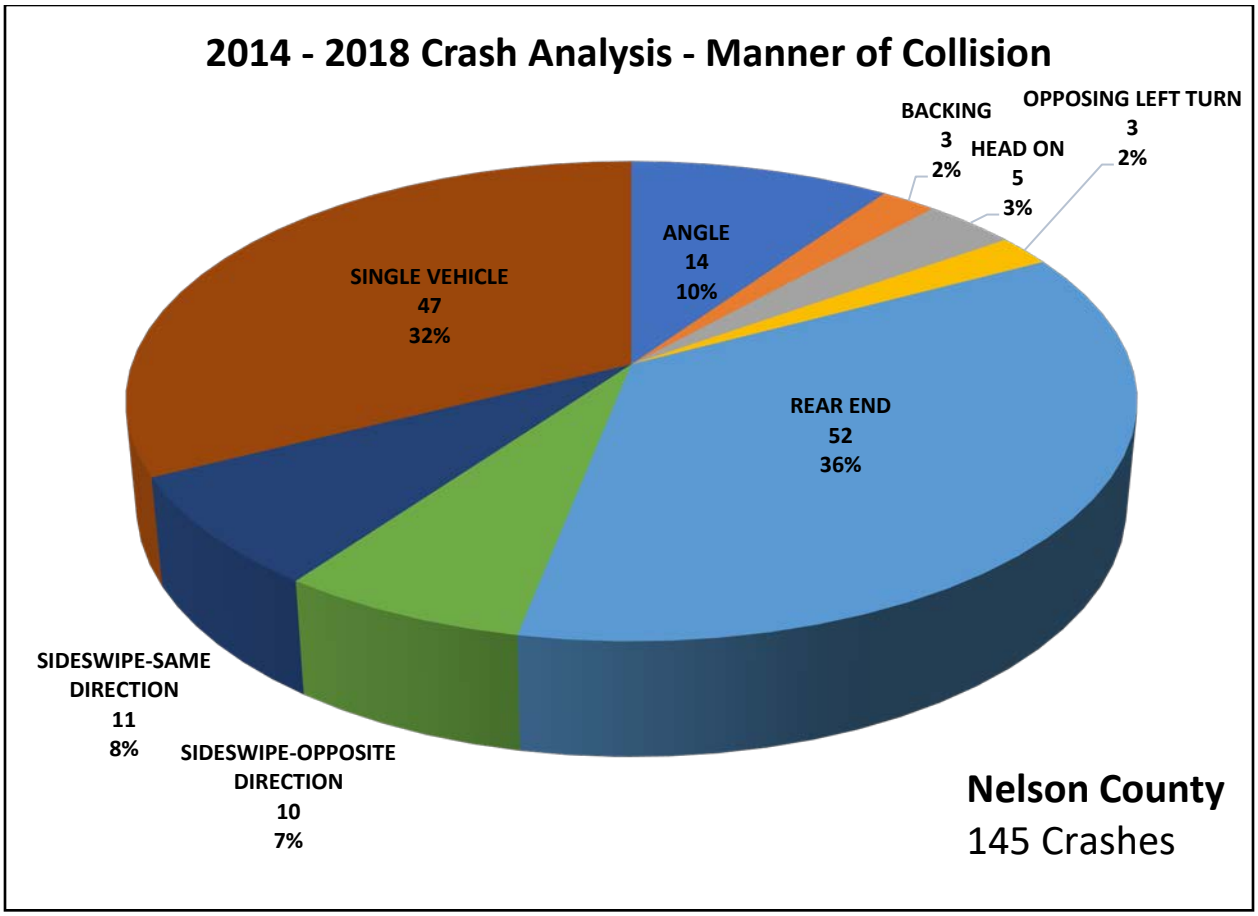


Figure 5: Crash Analysis Data

Crashes were geospatially referenced and compared to statewide data to identify locations experiencing above-average crash rates (see Figure 6). The methodology is defined in the Kentucky Transportation Center research report, *Analysis of Traffic Crash Data in Kentucky* (Kentucky Transportation Center, 2013). As defined in the methodology, segments vary in length and are divided along roadways where geometry or traffic volumes change. For each segment, the number of crashes, traffic volume, rural/urban, number of lanes, and segment length were evaluated to determine the critical rate factor (CRF). The CRF is one measure of the safety of a road, expressed as a ratio of the crash rate at the location compared to the average crash rate for roadways of the same functional classification throughout the state. If the CRF is 1.00 or greater, it is assumed that crashes cannot be attributed to random occurrence. There are no locations within the project corridor with a CRF greater than 1.0; however, there have been twice as many fatalities (5.75 fatalities per hundred million vehicle miles [HMVM]) in the Study Area than the statewide average (2.80 fatalities per HMVM) for similar facilities (see Appendix B).

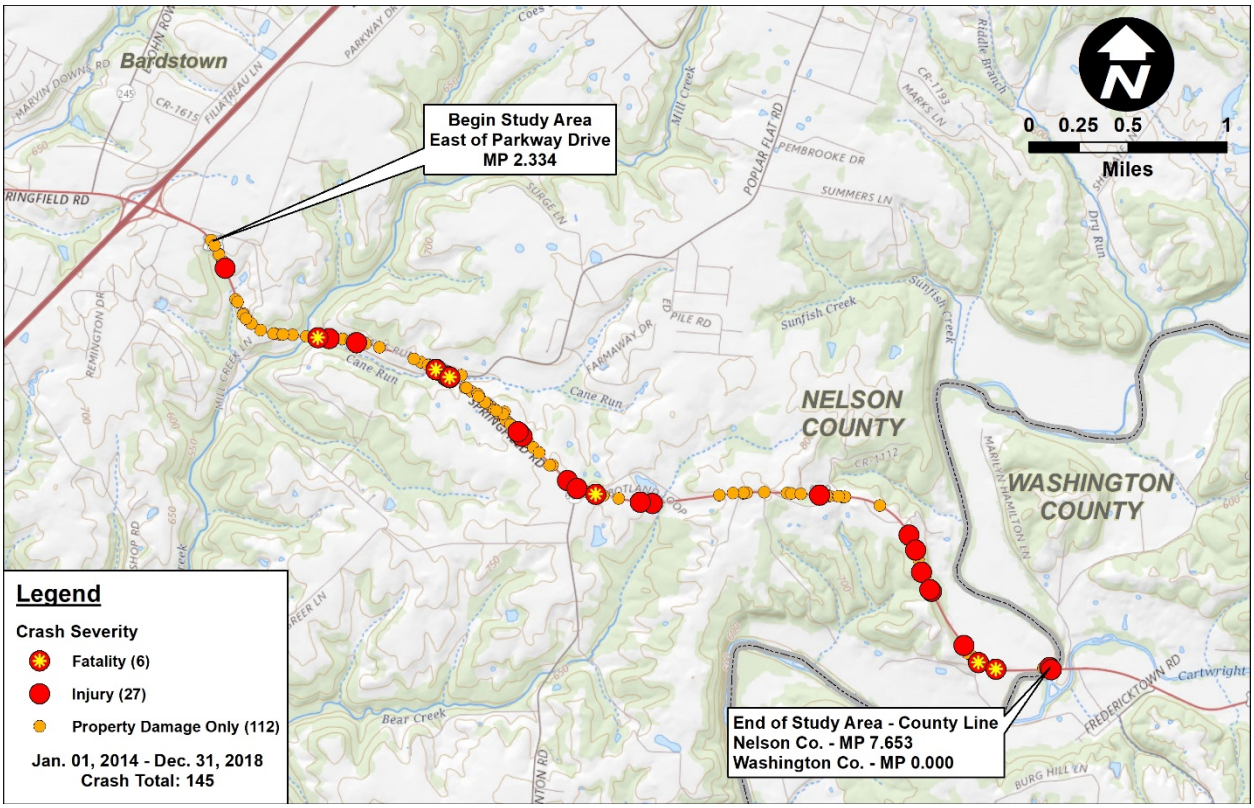


Figure 6: Crash Locations - January 2014 through December 2018

1.3 Logical Termini

The project will improve US 150 along the existing corridor or on new alignment. The project has a logical terminus to the west at Parkway Drive, near the recently reconstructed interchange of the Bluegrass Parkway. A project to improve US 150 from KY 245, across the Bluegrass Parkway, to east of Leslie Ballard Lane (4-8309), is programmed to use state SPP funds for construction in 2020. If constructed prior to this project (4-396.10), the western terminus would presumably be slightly adjusted to tie-in with that construction.

The eastern terminus is at the bridge over Beech Fork. The bridge at this location was replaced in 2013, has sufficient width to carry the new alternatives, an NBI Rating of "Good" (8) and a Health Index of 99.89. Given the condition of this structure, all alternatives will use this bridge as a connection to the project in Washington County.

1.4 Traffic

US 150 is classified as a State Primary Route on the State System and is functionally classified as a Rural Minor Arterial. US 150 is designated as part of the National Network for freight movement. In Kentucky, US 150 stretches approximately 120 miles from Louisville to Mount Vernon. Improvements have already been made to the US 150 corridor from Springfield near St. Catherine College in Washington County to

I-75 in Rockcastle County, which have provided a more reliable and safer connection to I-75 via Danville and Stanford.

Using the 2019 Traffic Forecast (see Appendix C) prepared by the KYTC's Division of Planning, a Level of Service (LOS) analysis was conducted to evaluate the performance of the roadway in both the existing condition as well as under future design year traffic.

LOS is a qualitative measure describing operational conditions within a traffic stream, based on service measures such as speed and travel time, freedom to maneuver, traffic interruptions, comfort, and convenience. There are six levels of service, ranging from A through F. LOS A is associated with free-flow conditions, high freedom to maneuver, and little or no delay. Conditions at or near capacity typically are associated with LOS E. At LOS F, traffic conditions are oversaturated and beyond capacity, with low travel speeds, little or no freedom to maneuver, and high delays. In rural areas, LOS C or better is desirable.

Levels of service for different facility types are based on service measures deemed most appropriate for describing operations. For two-lane highways, levels of service are determined based on two parameters – average travel speed and percent time spent following in a platoon.

The analysis determined that US 150 currently operates at LOS D from east of Parkway Drive to KY 605 North (Poplar Flats Road) (MP 2.21 to MP 3.85); at LOS D from KY 605 North to KY 605 South (Manton Road) (MP 3.85 to MP 4.75); and at LOS C from KY 605 South to the Washington County Line (4.75 to MP 7.65). The two western segments are expected to operate at LOS E in the 2040 design year under the No-Build condition, while the most eastern section, east of Manton Road, is expected to operate at LOS D. 2018 average daily traffic (ADT) volumes for the Study Area are shown in Table 1 and on Figure 7.

US 150 carries between 9,100 and 13,900 vehicles per day (vpd) through the project corridor. Volume-to-Capacity (V/C) ratios, shown in Table 1, indicate where roadway segments approach or exceed the daily volume of traffic that can accommodated. In the case of US 150, all roadway segments in the Study Area currently operate at less than full capacity with a V/C of 0.53 or less (0.90 or more in rural areas suggests capacity constraints). With the predicted increased traffic in the 2040 design year, V/C ratios increase to 0.65 in the western section of the project nearest the Bluegrass Parkway and Bardstown.

Table 1: US 150 Traffic Summary

Segment	Begin MP	End MP	Existing (2019)			No-Build (2040)		
			ADT	V/C	LOS	ADT	V/C	LOS
East of Parkway Dr. to KY 605 South	2.21	3.85	13,900	0.53	D	17,000	0.65	E
KY 605 North to KY 605 South	3.85	4.75	12,300	0.48	D	15,000	0.58	E
KY 605 South to Washington Co. Line	4.75	7.65	9,100	0.39	C	11,000	0.46	D

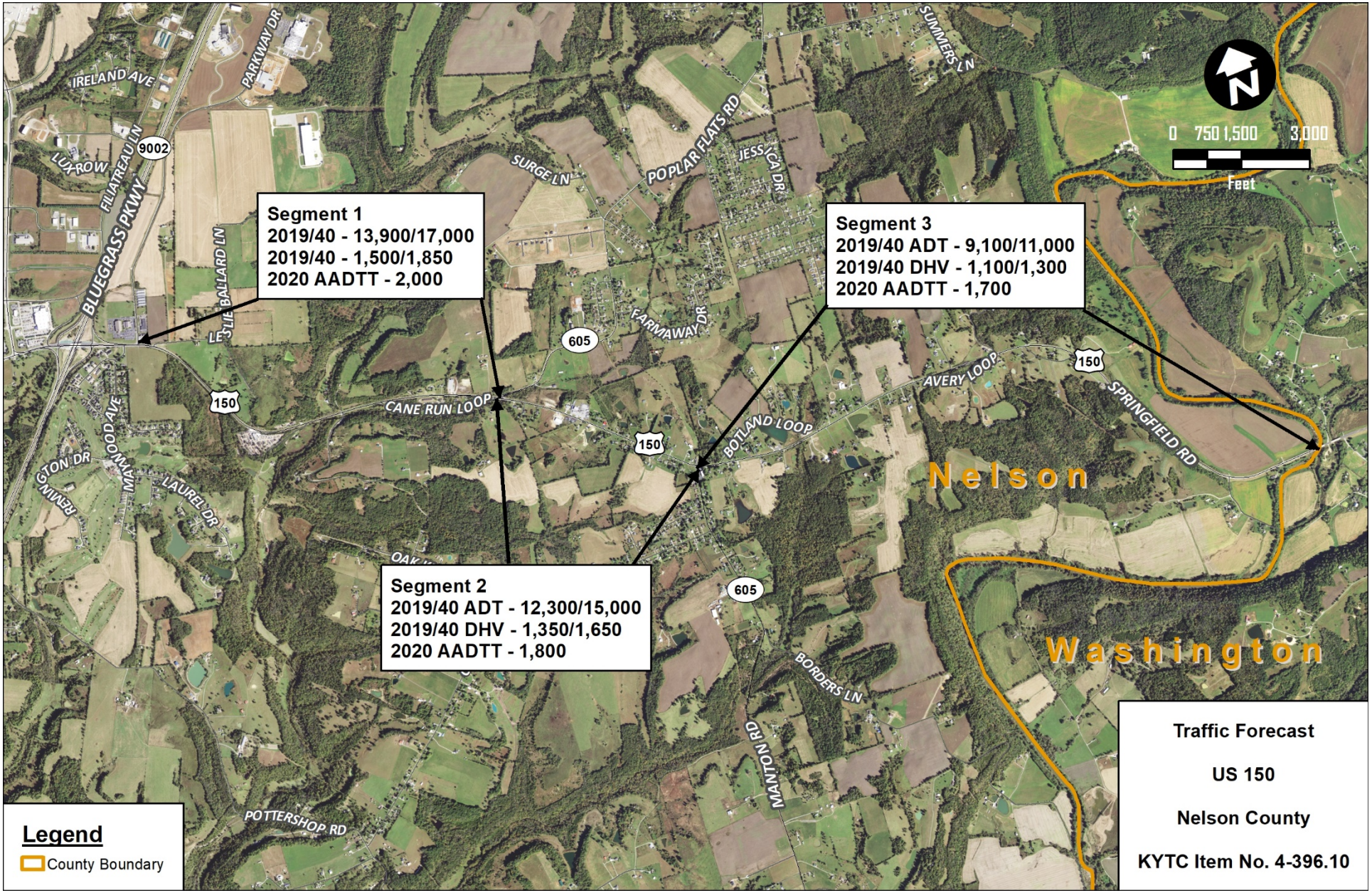


Figure 7: Traffic Forecast

1.5 Consistency with Local Plans

The KYTC has included this project in its *FY 2018-2024 Six-Year Highway Plan*, enacted in June 2018. The Nelson County section is listed under Item No. 4-396.10 and has $600,000 in design funding committed in 2020; it is programmed for construction in 2024.

Of the fifteen (15) economic districts in the state, Nelson County belongs to the Lincoln Trail Development District (LTADD). The LTADD assists eight local county governments: Breckinridge, Grayson, Hardin, Larue, Marion, Meade, Nelson, and Washington.

The LTADD 2019 Comprehensive Economic Development Strategy (CEDS) notes that the LTADD region has experienced moderate to slight population growth over the last decade, with urban centers enjoying the greatest increases. Slow or negative growth in many of the smaller cities is consistent with state and national trends. The CEDS identifies "Objective 3. Preserve, maintain, and enhance the existing transportation system to ensure reliable, efficient and effective mobility." It further presents strategies to be implemented in support of the objective that are relevant to the proposed improvement of US 150 including:

- Improve the operating efficiency of the existing infrastructure by reducing travel time, delays and traffic hazards.
- Encourage and support major highway projects identified as having a substantial positive regional and/or local impact.
- Continue to support all projects in the Six-Year Highway Plan and the Regional High Priority projects on the Unscheduled Projects List.
- Ensure compatibility with the transportation facilities of adjacent counties.

The LTADD and local government officials have voiced strong support for the proposed US 150 project through personal communication, individual meetings, and public meetings. Local officials and stakeholders expressed support for the project at the various meetings conducted during development of the project and at the local officials meeting conducted in advance of the public meeting held April 23, 2019. Their support is further reflected in the maximum 15 point "Local Boost" assigned to the project under the Strategic Highway Investment Formula for Tomorrow (SHIFT), the KYTC's data-driven, objective approach that compares capital improvement projects and prioritizes limited transportation funds.[1]

The Joint City-County Planning Commission of Nelson County re-adopted the *Nelson County 2035: Comprehensive Plan (2016)*. Within that document, "Chapter 5: Transportation Plan" states, "By coordinating land use planning and transportation planning, a well-planned and coordinated transportation system will result in optimal traffic flow, circulation, and connectivity, efficient access management, improved pedestrian safety, and reduction of traffic conflicts." The improvement of US 150

[1] Lincoln Trail Area Development; https://www.ltadd.org/transportation/

between the Bluegrass Parkway and the Washington County line is identified in that document as an unscheduled need. The project is described as follows:

"Springfield Road (US 150) Widening from Parkview Drive (KY 49) to Bluegrass Parkway (Eastern Bardstown Gateway) (Project #8, Maps #5-3 and 5-4). The Eastern Bardstown Gateway is a primary gateway into Bardstown, and specifically to My Old Kentucky Home State Park, from the Bluegrass Parkway. A corridor study should be conducted to protect the integrity of this primary arterial and gateway and to ensure managed access, compatible land uses, coordinated design, and pedestrian and bicycle facilities."

2.0 PROPOSED ALTERNATIVE CONCEPTS

2.1 Alternatives Considered

In addition to the No-Build Alternative, which provides a baseline for the comparison of build alternative impacts and performance, six build alternatives (Alternatives 1, 2, 2A, 3, 4, and 5) were analyzed during project development. Alternatives being considered include one along the existing corridor, several off-corridor alignments and the No-Build alternative. All of the alternatives have been designed to satisfy a minimum 55 mph design speed.

2.1.1 No-Build Alternative

The No-Build Alternative would leave the existing road as it currently is, with maintenance activities such as routine paving, striping, and drainage, performed when necessary. In comparison to the proposed build alternatives, short-term costs to maintain current roadway operations would be less expensive due to the lack of expenditures needed for right-of-way acquisition and residential displacements, utility relocations, or project construction. In addition, the No-Build Alternative would impose no direct construction impacts. However, implementation of the No-Build Alternative would leave the area with a deficient and poorly linked transportation corridor. The No-Build Alternative would neither correct the geometric deficiencies in the existing roadway nor provide improved passenger and freight access to the parkway system as outlined in the purpose and need (see Section 1.2). The No-Build Alternative would not fulfill the purpose and need of the proposed project and was, therefore, dismissed from further consideration.

2.1.2 Alternative 1

Alternative 1 provides for an improved alignment primarily along the existing corridor. The alternative begins east of the Bluegrass Parkway as a five-lane rural typical section with 12-foot lanes and 8-foot paved shoulders, matching those of the new Bluegrass Parkway interchange. It proceeds eastward, widening along the existing alignment approximately one-half mile before reaching a substandard horizontal curve. At this location near Mill Creek Lane, the alignment shifts slightly to the north in order to lessen the severity of the curve and then returns to the existing corridor, continuing eastward on the existing alignment. Just east of the intersection with KY 605 North (Poplar Flats Road), near the Quick Stop Gas Station, the typical section transitions briefly to a five-lane curb and gutter section, then to three lanes with curb and gutter in order to minimize impacts to historic properties east of Botland. The alternative maintains this configuration eastward, past KY 605 South (Manton Road) and the eastern Botland Loop intersection, before transitioning to two lanes with a passing lane through the remainder of the corridor to the project terminus at the Beech Fork Bridge.

2.1.3 Alternatives 2 and 2A

Alternative 2 lies north of the existing alignment in a new corridor throughout most of its length. It departs from the existing alignment just east of Parkway Drive and consists of a four-lane roadway with a 40-foot depressed median and 8-foot shoulders. It traverses eastward, crossing KY 605 North (Poplar Flats Road) south of the Mill Creek Baptist Church and residential properties on Polley Drive and Farmaway Drive,

before transitioning to a 2+1 (two lanes with passing lane) configuration. Sufficient right of way would be acquired in this section for the ultimate construction of a four-lane divided roadway to match the section to its west. The alternative continues eastward, passing north of Botland and proceeding to near McIntyre Lane, where four-lane right-of-way acquisition would cease. From there, a 2+1 typical section would continue, rejoining the existing alignment near Trinity Cemetery Loop and progressing down the existing hill to the Beech Fork Bridge.

Seven options were preliminarily developed that would provide connection between Alternative 2, existing US 150, and KY 605 North. The options vary slightly in location and configuration and are shown in Figures 9 and 10. Both T-intersections and free-flow movements were considered at the junction with existing US 150.

Alternative 2A is similar to Alternative 2, with a slight variation in the eastern part of the project where the alternative returns to the existing alignment, avoiding an historic property that is directly affected by Alternative 2. Like Alternative 2, Alternative 2A lies north of the existing alignment in a new corridor throughout most of its length. It departs from the existing alignment just east of Parkway Drive and consists of a four-lane roadway with a 40-foot depressed median and 8-foot shoulders. It traverses eastward, crossing KY 605 North (Poplar Flats Road) south of the Mill Creek Baptist Church and residential properties on Polley Drive and Farmaway Drive, before transitioning to a 2+1 (two lanes with passing lane) configuration. Sufficient right of way would be acquired in this section for the ultimate construction of a four-lane divided roadway to match the section to its west. The alternative continues eastward, passing north of Botland, then turning southeastward to rejoin the existing roadway corridor near the western end of Avery Loop, where four-lane right-of-way acquisition would cease. From there, a 2+1 typical section would continue, progressing down the existing hill to the Beech Fork Bridge. All options for connecting Alternative 2 with existing US 150 and KY 605 North are also available for Alternative 2A.

2.1.4 Alternative 3

Alternative 3 begins north of the existing road before crossing and moving to the south of the existing alignment. It departs from the existing alignment just east of Parkway Drive and consists of a four-lane roadway with a 40-foot depressed median and 8-foot shoulders. The alignment proceeds eastward, then turns southeasterly to cross the existing alignment near the KY 605 North (Poplar Flats Road) intersection with existing US 150. Approximately one-half mile east of KY 605 North, it transitions to a 2+1 (two lanes with passing lane) typical section, which would be constructed on right of way acquired for ultimate construction of a four-lane facility with depressed median. The transition to the more narrow section is completed before it crosses KY 605 South (Manton Road) approximately 470 feet south of the existing intersection with US 150. From there, it remains well south of the existing corridor, passing through open fields and undeveloped forested land before returning to the existing alignment just west of the Beech Fork Bridge.

Three options have been developed for connecting KY 605 North (Poplar Flats Road) with Alternative 3 (see Figure 11). All of the options would create a new connecting road that would intersect with Alternative 3 south of existing US 150. Option A creates a four-way intersection with US 150, then

continues southward to connect with Alternative 3. With Option B, Poplar Flats Road converges with existing US 150 as an eastward through movement. A right turn onto a new connector would carry traffic to Alternative 3. Option C would create a free-flowing connection on KY 605 to Alternative 3. Access to existing US 150 in each direction would be created by offset intersections with stop signs on the US 150 approaches.

2.1.5 Alternative 4

Alternative 4 begins east of the Bluegrass Parkway as a five-lane rural typical section with 12-foot lanes and 8-foot paved shoulders, matching those of the new Bluegrass Parkway interchange. It proceeds eastward, widening along the existing alignment approximately one-half mile before reaching a substandard horizontal curve. At this location near Mill Creek Lane, the alignment shifts slightly to the north in order to lessen the severity of the curve, then crosses the existing road to travel to its south, transitioning to a four-lane rural typical section with a depressed 40-foot median. It continues eastward, making a new connection to KY 605 North (Poplar Flats Road), after which it then begins a transition to a 2+1 (two-lanes with passing lane) typical section, which would be constructed on right of way acquired for ultimate construction of a four-lane facility with depressed median. It crosses KY 605 South (Manton Road) approximately 470 feet south of the existing intersection with US 150. It then continues eastward, remaining well south of the existing corridor, passing through open fields and undeveloped forested land before returning to the existing alignment just west of the Beech Fork Bridge.

Three options have been developed for connecting KY 605 North (Poplar Flats Road) with Alternative 4 (see Figure 12). All of the options would create a new connecting road that would intersect with Alternative 4 south of existing US 150. Option A creates a four-way intersection with US 150, then continues southward to connect with Alternative 4. With Option B, Poplar Flats Road converges with existing US 150 as an eastward through movement. A right turn onto a new connector would carry traffic to Alternative 4. Option C would create a free-flowing connection on KY 605 to Alternative 4. Access to existing US 150 in each direction would be created by offset intersections with stop signs on the US 150 approaches.

2.1.6 Alternative 5

Alternative 5 combines the eastern portion of Alternatives 2 and 3 with the western alignments of Alternatives 3 and 4, returning to the existing corridor for approximately 0.75 miles between KY 605 North (Poplar Flats Road) and KY 605 South (Manton Road). It departs from the existing alignment just east of Parkway Drive and consists of a four-lane roadway with a 40-foot depressed median and 8-foot shoulders. The alignment proceeds eastward, then turns southeasterly to re-join the existing roadway corridor near the intersection with KY 605 North (Poplar Flats Road), where it transitions briefly to a five- lane curb and gutter typical section before narrowing to a three-lane typical section until reaching the KY 605 South (Manton Road) intersection. From there, it departs southerly from the existing alignment, transitioning to a 2+1 configuration to be constructed on right of way acquired for ultimate construction of a four-lane facility with depressed median. After converging with Alternatives 3 and 4, it continues eastward,

remaining well south of the existing corridor, passing through open fields and undeveloped forested land before returning to the existing alignment just west of the Beech Fork Bridge.

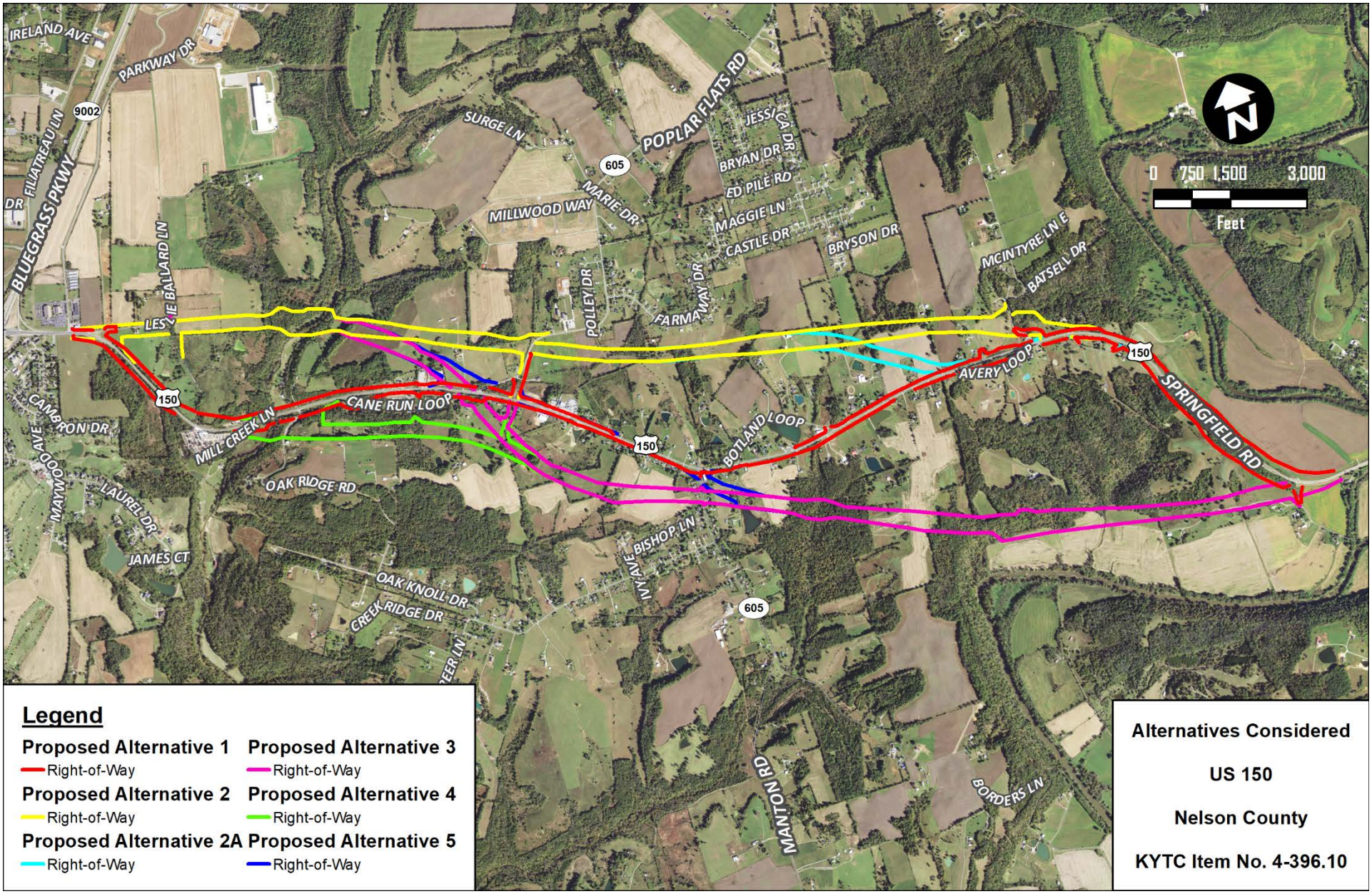


Figure 8: Alternatives Considered in this EA

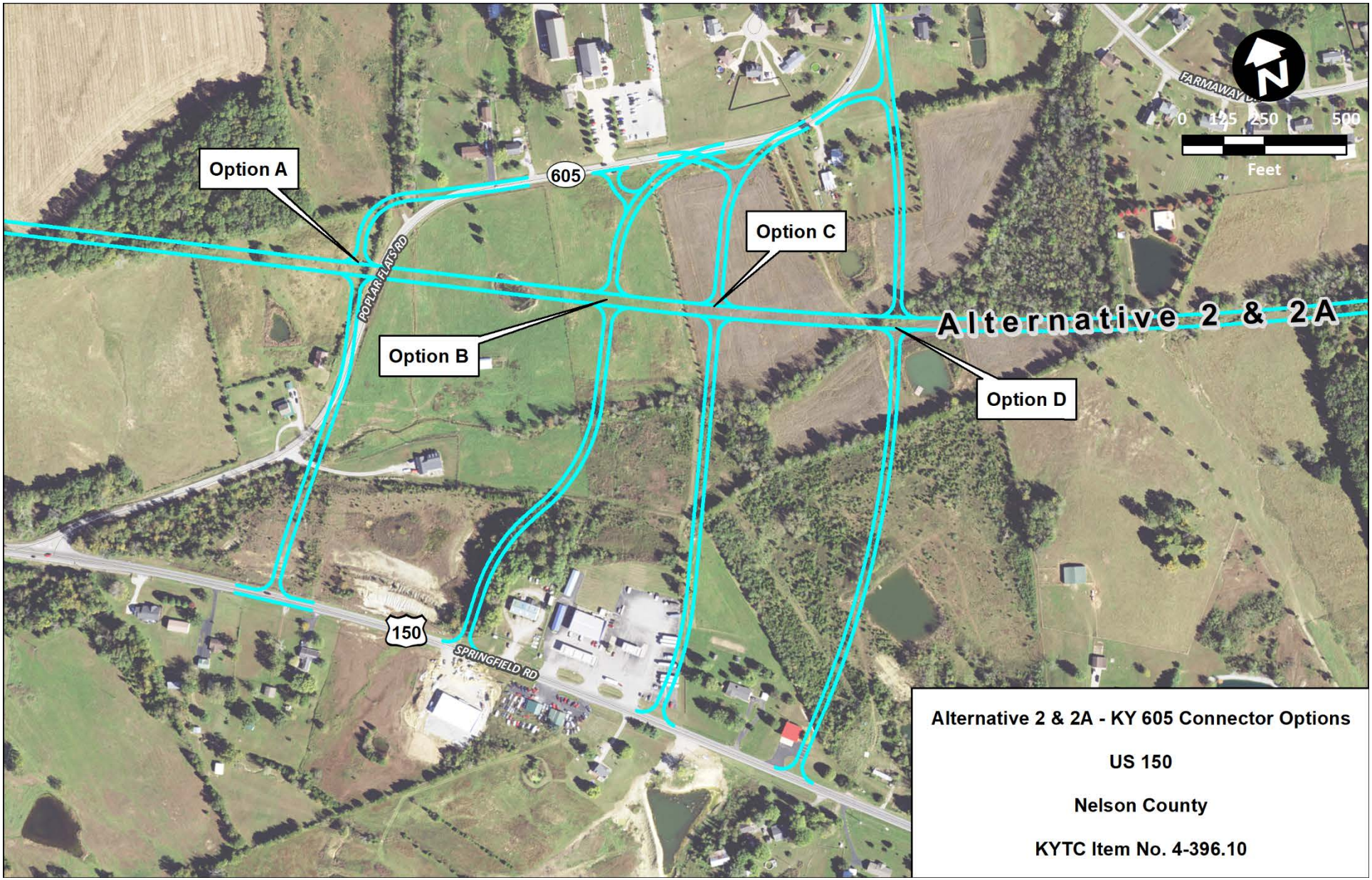


Figure 9: Alternatives 2 and 2A – Options A, B, C, and D for Connecting to Existing Routes

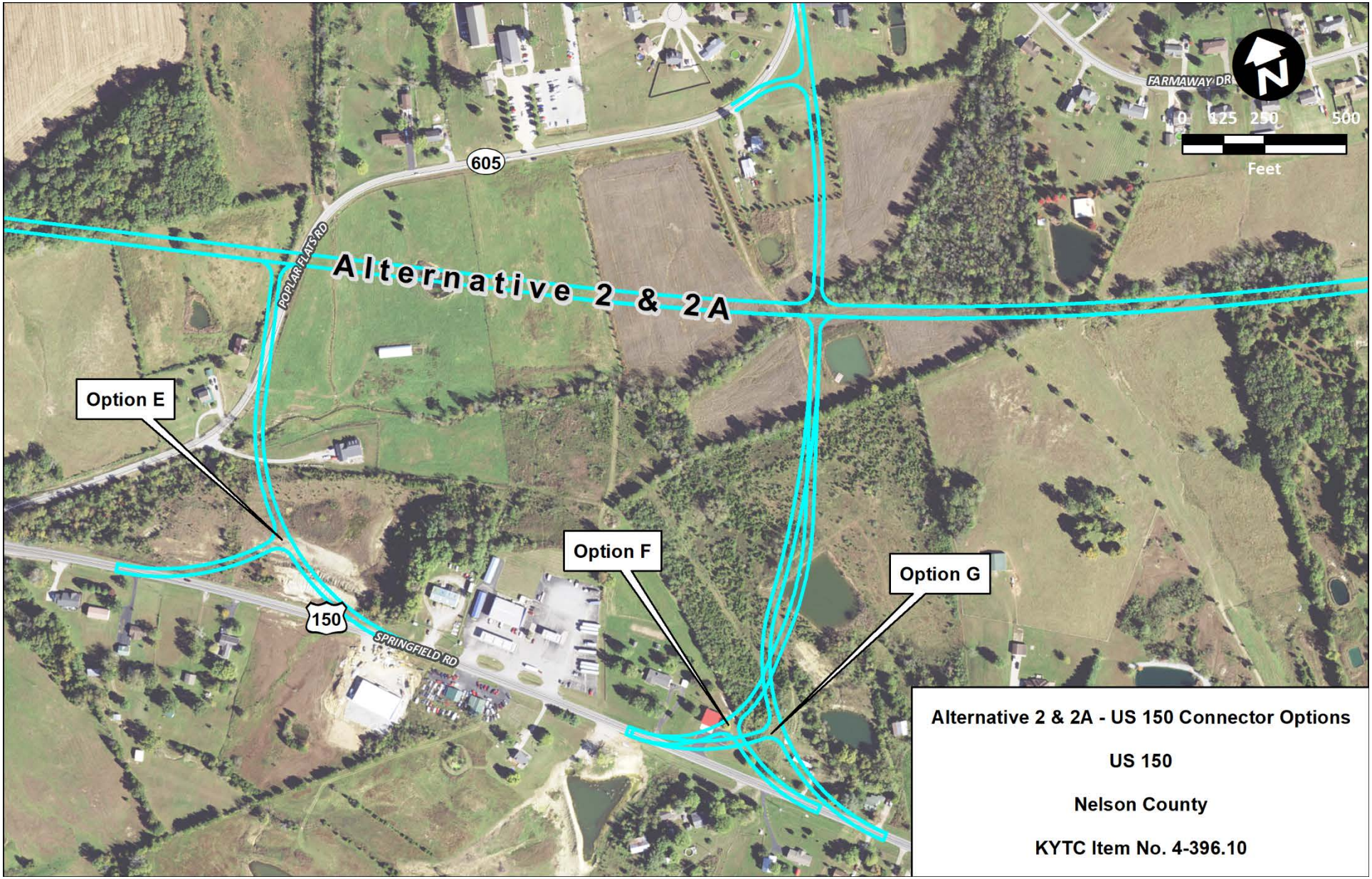


Figure 10 Alternatives 2 and 2A – Options E, F, and G for Connecting to Existing Routes

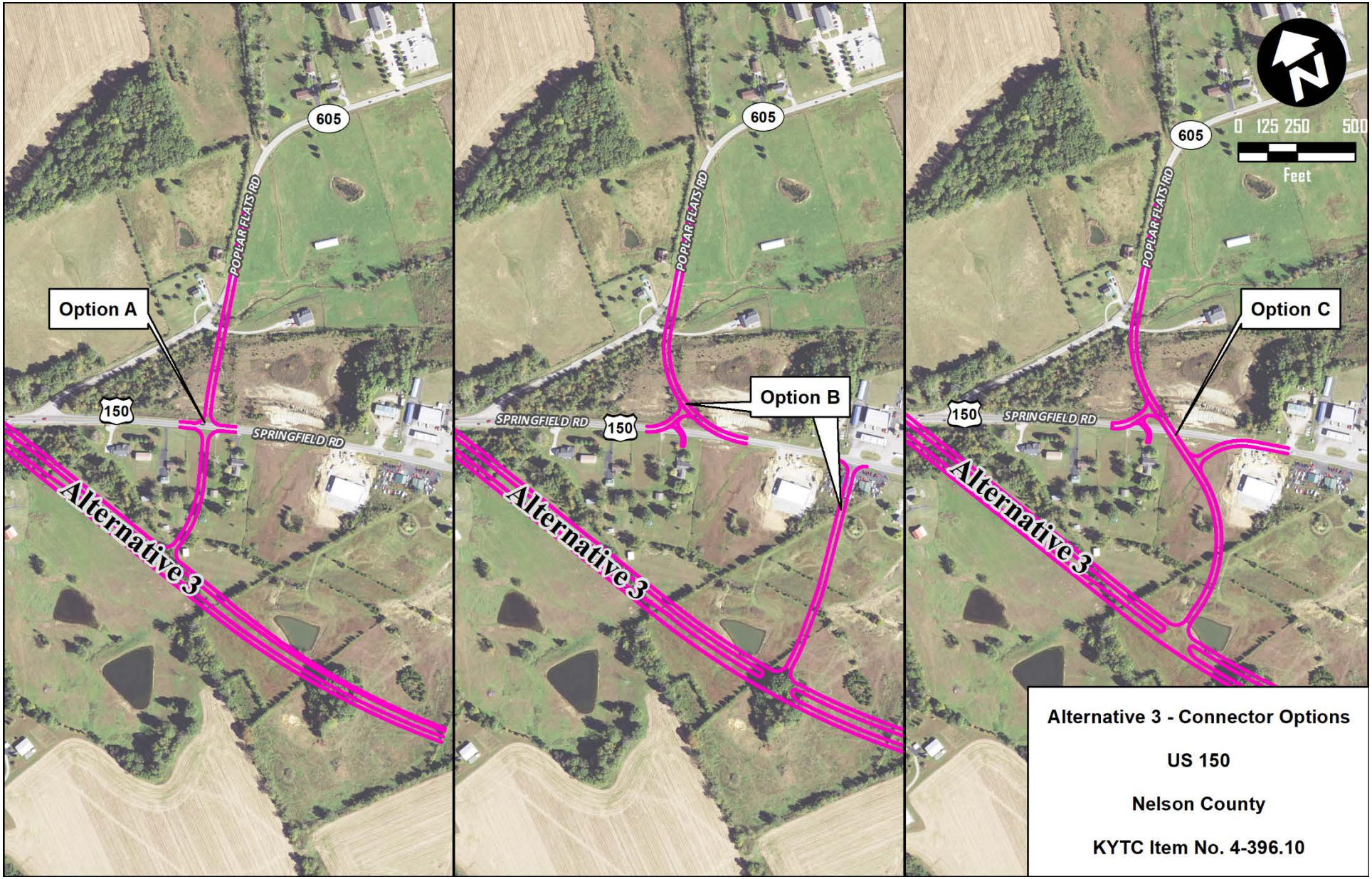


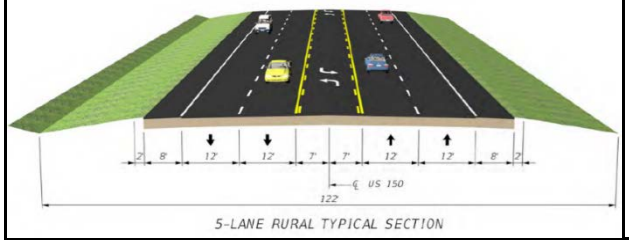
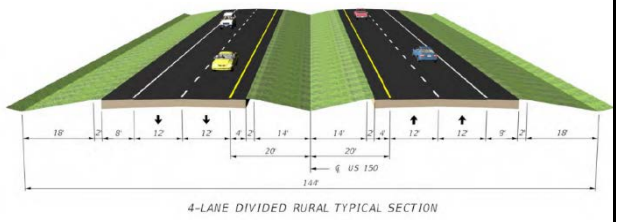
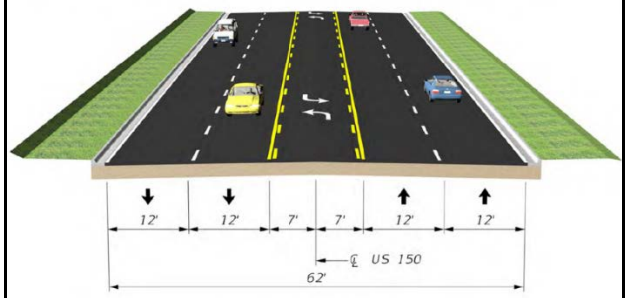
Figure 11: Alternative 3 Connector Options

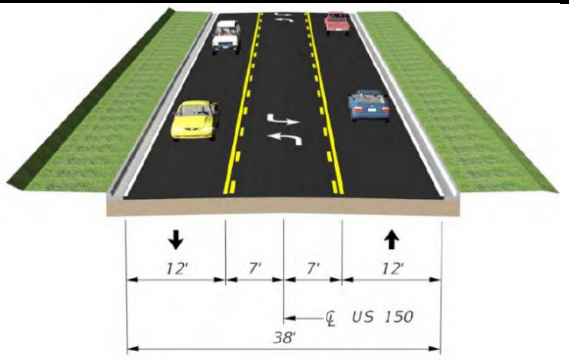
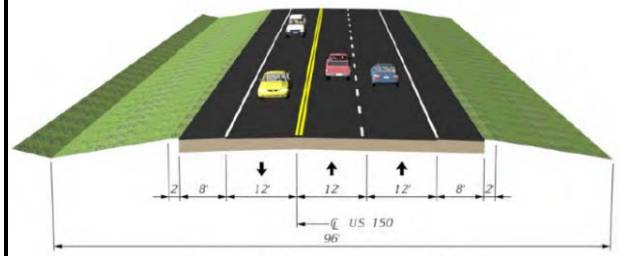
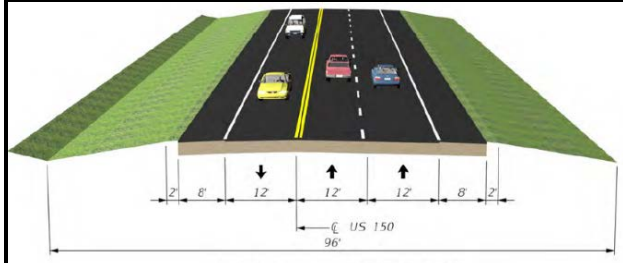
Figure 12: Alternative 4 Connector Options

2.2 Typical Section

The typical section for the project varies depending on traffic, right-of-way constraints, and proximity to historic properties, among other factors. Typical sections were ultimately selected to accommodate traffic and meet driver expectations while minimizing impacts to the extent practicable. Typical sections on the western end of the project, where traffic is higher, generally provide for four travel lanes. East of the KY 605 North (Poplar Flats Road) intersection, traffic lessens and the typical sections are generally reduced to two travel lanes with either a center turning lane or a passing lane. Where alternatives lie off corridor, the road would be constructed on right of way sufficient for future widening to four lanes. Table 2 identifies the various typical sections proposed for the project and, for each alternative, the locations where each template would be used.

Table 2: Typical Sections

Typical Section	Alternative 1	Alternative 2	Alternative 2A	Alternative 3	Alternative 4	Alternative 5
 5-LANE RURAL TYPICAL SECTION	Beginning of Project east of the Bluegrass Parkway to KY 605 N (Poplar Flats Rd.)				Beginning of Project east of the Bluegrass Parkway to Oak Ridge Road	
 4-LANE DIVIDED RURAL TYPICAL SECTION		Beginning of Project east of the Bluegrass Parkway to KY 605 N (Poplar Flats Rd.)	Beginning of Project east of the Bluegrass Parkway to KY 605 N (Poplar Flats Rd.)	Beginning of Project east of the Bluegrass Parkway to approximately ½ mile east of KY 605 N (Poplar Flats Rd.)	Oak Ridge Road to KY 605 N (Poplar Flats Rd.)	Beginning of Project east of the Bluegrass Parkway to KY 605 N (Poplar Flats Rd.)
 5-LANE URBAN TYPICAL SECTION	KY 605 N (Poplar Flats Rd. to approximately 0.4 miles east of KY 605 N (Poplar Flats Rd.)					KY 605 N (Poplar Flats Rd.) to approximately 0.4 miles east of KY 605 N (Poplar Flats Rd.)

Typical Section	Alternative 1	Alternative 2	Alternative 2A	Alternative 3	Alternative 4	Alternative 5
 3-LANE URBAN TYPICAL SECTION	Approximately 0.4 miles east of KY 605 N to East of the Botland Loop eastern intersection					Approximately 0.4 miles east of KY 605 N (Poplar Flats Rd.) to just east of KY 605 S (Manton Rd.)
 2-LANE PLUS PASSING LANE Sufficient right of way to be acquired to construct four-lane divided section		KY 605 N (Poplar Flats Rd.) to near McIntyre Lane	KY 605 N (Poplar Flats Rd.) to near western end of Avery Loop	Approximately ½ mile east of KY 605 N (Poplar Flats Rd.) to Beech Fork Bridge	KY 605 N (Poplar Flats Rd.) to Beech Fork Bridge	Just east of KY 605 S (Manton Rd.) to Beech Fork Bridge
 2-LANE PLUS PASSING LANE	East of the Botland Loop eastern intersection to Beech Fork Bridge	Near McIntyre Lane to Beech Fork Bridge	Western end of Avery Loop to Beech Fork Bridge			

3.0 ENVIRONMENTAL CONSEQUENCES

The environmental impacts for each of the proposed alternatives have been assessed and documented in this section. For Alternatives 2, 2A, 3, and 4, the alternatives include a number of potential means for making the connection between the alternative, KY 605 (Poplar Flats Road), and existing US 150. The environmental impacts of these connections are all considered to be of the same relative scale. For the purpose of this environmental assessment, the Option A connection has been used to quantify environmental effects for each of these alternatives.

3.1 Air Quality

The Environmental Protection Agency (EPA), under direction of the Clean Air Act (CAA) as amended in 1990, sets limits on known National Ambient Air Quality Standards (NAAQS) for criteria pollutants. The criteria pollutants are ozone, carbon monoxide, nitrogen dioxide, Particulate Matter less than 10 microns in diameter (PM10), Particulate Matter less than 2.5 microns in diameter (PM2.5), and lead. Areas of the country where air pollution levels persistently exceed the NAAQS may be designated "nonattainment." Nelson County does not have violations of the NAAQS nor is it in nonattainment for any of the criteria air pollutants.

In addition to the criteria pollutants, the EPA regulates Mobile Source Air Toxics (MSATs). The CAA Amendments of 1990 listed 188 Hazardous Air Pollutants and addressed the need to control toxic emissions from transportation. In 2001, EPA issued its first MSAT rule, which identified 21 MSAT compounds as being hazardous air pollutants that required regulation. A subset of these MSAT compounds was identified as having the greatest influence on health. More recently, EPA issued a second MSAT Rule (February 2007), which provided additional recommendations of compounds having the greatest impact on health. The current subset of seven MSAT compounds include: benzene, 1,3-butadiene, formaldehyde, acrolein, diesel particulate matter, naphthalene, and polycyclic organic matter. Unlike the criteria pollutants, MSATs do not have NAAQS, making evaluation of their impacts less standard. FHWA and the EPA issued *Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents, October 18, 2016,* to provide guidance on these analyses (see Appendix D). The analysis (and much of the language) contained in this EA is derived directly from that guidance, especially when concerning qualitative discussions of potential changes in air quality.

3.1.1 Carbon Monoxide (CO)

Based on the Kentucky CO Screening Criteria, this project does not meet the criteria requiring a CO project-level analysis and will not produce a projected violation of the CO standards (35 parts per million over a one-hour period or nine parts per million over an eight-hour period).

3.1.2 Lead

Lead has not been a mobile source concern since tetraethyl lead was banned as a fuel additive in 1996. All areas in Kentucky are in attainment for lead.

3.1.3 Nitrogen Dioxide

All areas in Kentucky are in attainment for nitrogen dioxide.

3.1.4 Ozone

This project is not located in an ozone nonattainment or maintenance area and is not a project-level concern.

3.1.5 Sulfur Dioxide (SO_2)

SO_2 is primarily an industrial source concern and not a mobile source concern. All areas in Kentucky are in attainment for sulfur dioxide.

3.1.6 Particulate Matter (PM10 and PM2.5)

This project is not located in a PM2.5 nonattainment or maintenance area and it is not a project-level concern. All areas of Kentucky are in attainment for PM10. The area is in attainment for all transportation-related criteria pollutants; therefore, conformity requirements do not apply.

3.1.7 Mobile Source Air Toxics (MSATs)

The 2007 EPA rule requires controls that will dramatically decrease MSAT emissions through cleaner fuels and cleaner engines. According to an FHWA analysis using EPA's MOBILE6.2 model, even if vehicle activity (vehicle-miles travelled [VMT]) increases by 145 percent as assumed, a combined reduction of 72 percent in the total annual emission rate for the priority MSATs is projected from 1999 to 2050. The project alternatives will not result in appreciable changes in traffic volumes, vehicle mix, or any factors sufficient to cause an increase in MSAT emissions in comparison to the No-Build alternative, because traffic along the proposed roadway would be relocated traffic from the existing roadway.

For the Build Alternatives, the amount of MSAT emitted would be proportional to the VMT, assuming that other variables such as fleet mix are the same for each alternative. Among the Build Alternatives, traffic is presumed to be similar and the overall corridor traffic, including the residual traffic on the existing roadway, is assumed to be consistent with the volume predicted for the existing roadway in the design year. Since Build Alternative lengths (4.9 - 5.2 miles) are slightly less that the existing condition (5.4 miles), MSAT emissions would be predicted to be less with the Build Alternatives than the No-Build condition. Also, regardless of the alternative chosen, emissions will likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce annual MSAT emissions by over 80 percent between 2010 and 2050. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the Study Area are likely to be lower in the future in nearly all cases.

3.1.8 Indirect or Cumulative Impacts to Air Quality

The proposed project would not cause reasonably foreseeable development of the project area such that future traffic volumes could create an air quality impact on NAAQS pollutants or have a meaningful MSAT effect. If trips are attracted to the improved roadway because of the increased safety and decreased travel time, those trips would be relocated trips that were taking place in another part of the region. Since MSAT air quality levels are determined regionally and not on a project-scale, those relocated trips would have no indirect or cumulative impacts as a result of the implementation of any of the proposed project alternatives, including the No-Build.

3.1.9 Air Quality Mitigation

No direct, indirect, or cumulative impacts to air quality resulting from emissions are anticipated as a result of any of the project alternatives; therefore, no mitigation is necessary. This project is included in the 2019 Statewide Transportation Improvement Plan (STIP), page 90 of Exhibit A-5: STIP Projects (see Appendix D).

However, road construction activities have the potential to generate fugitive dust. Fugitive dust consists of particulate matter that becomes airborne directly or indirectly as a result of human activity. Road construction can generate fugitive dust from earth-moving equipment (e.g., bulldozers, graders) and trucks loading and unloading or transporting earthen materials. Wind can cause fugitive dust in areas cleared of vegetation during construction.

The contractor would be required to perform all construction activities in accordance with the KYTC Standard Specifications Section for Road and Bridge Construction (2019) for the prevention of air pollution as the result of burning (if allowed), drilling, blasting, production of materials, hauling, or any other necessary construction operations. Best Management Practices (BMPs) would be implemented to control fugitive dust as required by the Kentucky Division for Air Quality. The contractor would be responsible for complying with applicable local government regulations concerning air quality.

3.2 Noise

The highway traffic noise analysis for this project was conducted in accordance with the KYTC *Noise Analysis and Abatement Policy* (KYTC Noise Policy) effective July 1, 2015, and the FHWA's 23 CFR Part 772 – *Procedures for Abatement of Highway Traffic Noise and Construction Noise*. Copies of the report are provided in Appendix E.

3.2.1 Noise Impact Criteria

Noise levels are measured to establish existing conditions and to develop a model that can predict noise levels that will be recognized with changes in traffic and possible construction of a project. The FHWA has established Noise Abatement Criteria (NAC) for various types of land use (see Table 3). Existing and predicted noise conditions are compared with the NAC to determine whether a traffic noise impact occurs. An impact is considered to occur if the measured or predicted noise level approaches or exceeds the NAC. "Approaches" is defined as being one decibel below the NAC.

Table 3: Noise Abatement Criteria (Hourly A-weighted Sound Level, decibels [dBA])

Activity Category	$L_{Aeq}(h)$	Evaluation Location	Activity Description
A	57	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[1]	67	Exterior	Residential.
C[1]	67	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structure, radio stations, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structure, radio studios, recording studios, schools, and television studios.
E[1]	72	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D, or F.
F	---	---	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	---	---	Undeveloped lands that are not permitted.

[1] Includes undeveloped lands permitted for this activity category. Source: 23 CFR 772, July 2010

An impact is also considered to occur if there is a substantial noise level increase. A substantial increase is considered to exist when, with the Build alternative, the noise level at a receptor exceeds the No-Build condition by 10 dBA or more.

Six noise receptors representing noise-sensitive land uses in the project area were identified in the Study Area and field measurements were conducted in accordance with FHWA and KYTC guidance. Sound levels were obtained by monitoring the dBA L_{eq} for a 15-minute period at each location. Traffic volumes were recorded for the duration of each measurement and were factored to be representative of hourly volumes for FHWA TNM 2.5 validation purposes. The TNM-predicted sound levels at all six monitoring locations were found to be within 3.0 dBA $L_{eq}(h)$ of field-measured levels, validating the noise modeling for this analysis.

3.2.2 Analysis

The noise receptors analyzed are shown in Figure 13. TNM 2.5 analysis identified 15 receptors where sound levels approach, meet, or exceed the FHWA NAC under existing conditions, while 29 receptors meet this criterion under design year (2035) No-Build conditions. All of these receptors were located very near the existing roadway. Impacted receptors in the existing condition all lie within 80 feet of the edge of pavement. With the increased traffic projected for the design year, receptors within 115 feet of the edge of pavement were predicted to experience a traffic noise impact.

To evaluate the potential noise impacts for each alternative, a 125-foot buffer from the alternative's edge of pavement was established. Receptors lying within the buffer that would not be relocated by the proposed alternatives, were identified and considered to be a potential noise impact (see Table 4).

Table 4: Potential Noise Impacts (2035 Design Year)

	Alternatives					
	1	2	2A	3	4	5
Potentially Impacted Receptors	49	2	5	3	2	19

Due to development along the existing road, Alternative 1 would affect the greatest number of potentially impacted receptors. The high number of impacted receptors for Alternative 5 lie primarily within the section where the alignment overlies the existing US 150 corridor. For both of these alternatives, it would be infeasible to construct a sound barrier to mitigate for these effects due to the frequency of entrances required to maintain access to these properties. Regarding Alternatives 2, 2A, 3, and 4, the distance between isolated potentially impacted receptors would also make it difficult to satisfy design goals and acoustic feasibility criteria.

The potential for a substantial noise increase (+10dBA) must also be considered. TNM 2.5 analysis of the existing corridor demonstrates that such increases are not expected for an improvement along the existing alignment. The off-corridor alignments would shift traffic closer to receptors that may have previously been distant from US 150. Where these receptors are isolated, it would be unlikely that any proposed noise barriers would satisfy KYTC acoustic feasibility requirements. The only clustered development proximate to the proposed off-corridor alignments are at Farmaway Drive, which lies less than 500 feet north of Alternatives 2 and 2A east of KY 605 North (Poplar Flats Road), and at Bishop Lane, which lies 320-800 feet south of Alternatives 3 and 4 west of KY 605 South (Manton Road) (see Figure 13). In both cases, the traffic noise that would be experienced at these locations from nearby KY 605 and, in the case of Bishop Lane, US 150, would increase noise levels for the existing condition. As a result, the potential for a 10 dBA increase above these elevated ambient levels is not likely.

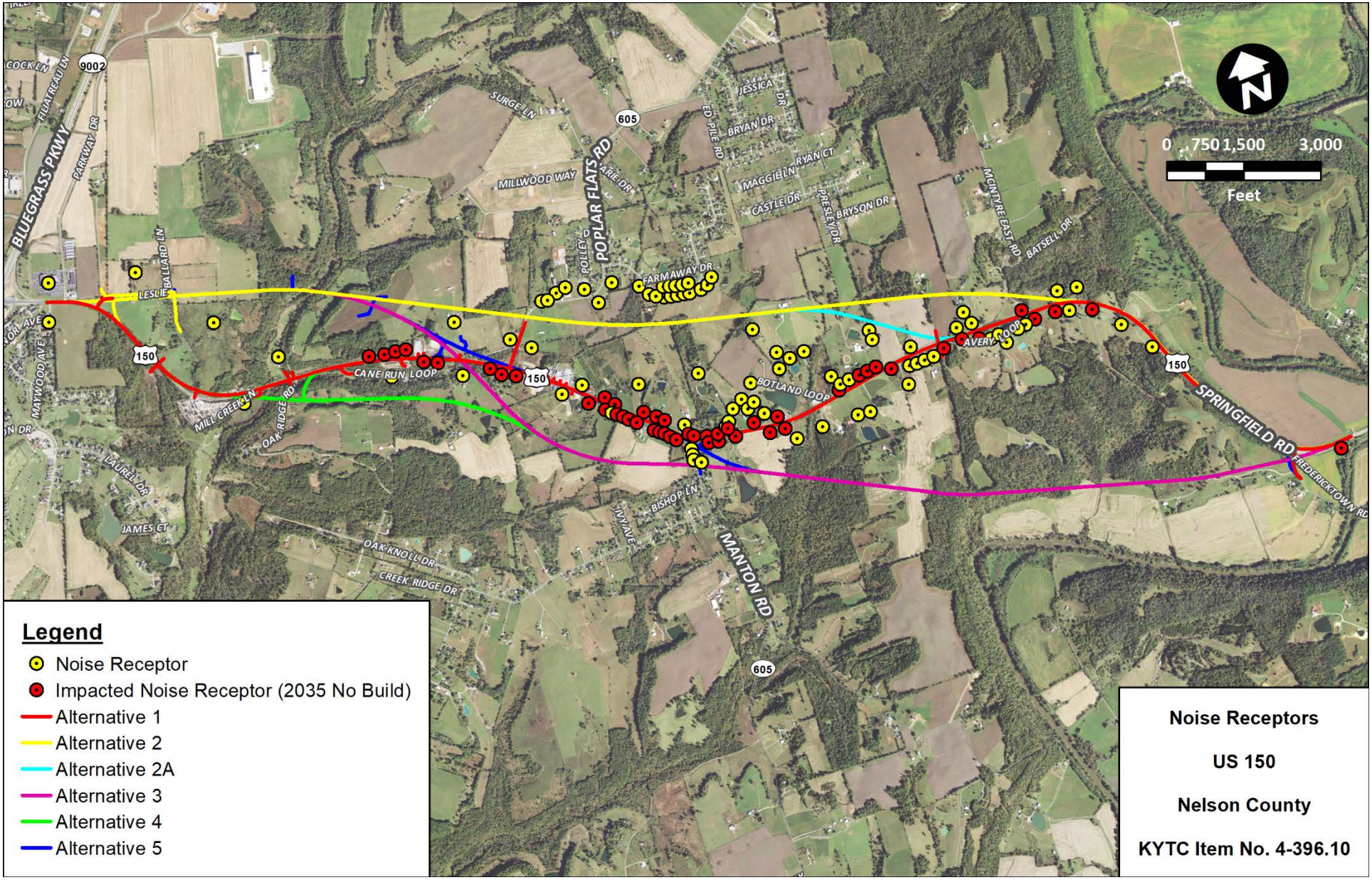


Figure 13: Noise Receptors

3.2.3 Traffic Noise Impacts

Traffic noise impacts currently exist along the existing alignment, affecting 15 residences. With the projected increase in traffic in the design year (2035), 29 residences will experience a traffic noise impact in the No-Build condition. Reconstruction along the existing alignment (Alternative 1) would widen the road, bringing traffic closer to additional residences and potentially affecting as many as 49 receptors. Alternative 5 lies primarily off-corridor but re-joins the existing alignment between the KY 605 intersections. Like with Alternative 1, widening through this part of the corridor would decrease the distance between traffic and numerous receptors and potentially affect as many as 19 receptors. The numerous access points that would be required for these properties would render a noise mitigation barrier infeasible.

The other off-corridor alternatives (Alternatives 2, 2A, 3, and 4) would potentially affect five or fewer receptors. These potentially affected receptors are spread out along the various alignments. Construction of a noise barrier would not be feasible due to the dispersed nature of the properties.

Noise impacts for the Preferred Alternative are discussed in Section 5.0.

3.2.4 Information for Local Officials

Undeveloped land exists along both the existing alignment and the off-corridor alternatives. Information from the noise study developed for the project will be provided to the local city and county officials for their consideration when making planning decisions regarding new development along the corridor. The following information developed from the TNM 2.5 analysis is useful in considering future development in the corridor:

- Of the 19 receptors located less than 100 feet from existing or proposed US 150 edges of pavement, a design year (2035) No-Build or Build condition noise impact (66 dBA or greater) is predicted for 18 receptors (95%);
- Of the 37 receptors located within 120 feet of the existing or proposed US 150 edges of pavement, a design year (2035) No-Build or Build condition noise impact (66 dBA or greater) is predicted for 28 receptors (76%);
- No impacts (66 dBA or greater) are predicted for any receptor located 125 feet from the US 150 edge of pavement or beyond under any project scenario.

This information indicates that the development within 100 feet of the project carries a high probability of a noise impact, with a strong possibility of impact for lands situated between 100 and 120 feet from proposed edges of pavement. TNM 2.5 sound level predictions suggest that while the probability of a design year noise impact at distances greater than 125 feet is relatively low, a buffer distance of approximately 150 feet between any noise-sensitive land use development and proposed edge of pavement is recommended to avoid potential noise impacts.

3.2.5 Construction Noise

Noise and vibration impacts would originate from heavy equipment movement, possible blasting, and construction activities such as pile driving and vibratory compaction of embankments. These impacts will be intermittent, of relatively short duration, and will be largely dependent on the distance to nearby receptors. Construction noise will generally be much less of a nuisance for the off-corridor alignments due to the reduced density of receptors. These effects do not constitute a noise impact as defined by FHWA regulation or the noise policies of the KYTC.

The project construction will be governed by *KYTC Standard Specifications for Road and Bridge Construction* and include requirements for proper maintenance of construction equipment to minimize the nuisance that can be caused by construction noise.

3.3 Ecological Resources

Aquatic and terrestrial features were identified and characterized based on research and a field assessment of the Study Area. Research involved reviewing the following sources: USGS topographic quadrangle maps, aerial photography, floodplain maps, watershed maps, geologic maps, karst areas map, physiographic maps, National Wetlands Inventory (NWI) maps, United States Department of Agriculture (USDA) Soil Survey maps, floral community maps, and mining maps. State and federal agencies were contacted regarding the presence of potential threatened and endangered species, their critical habitat, or other significant natural resources that may occur within the Study Area.

An *Ecological Assessment* report was prepared for the KYTC in 2019 to document ecological conditions in the Study Area and the potential impacts that could occur with construction of the project. The report follows the guidance and requirements of the KYTC for analysis of ecological impacts. A copy of the document is provided in Appendix F.

3.3.1 Agency Coordination

Selected state and federal agencies, and one private group, were contacted regarding the presence of potential threatened/endangered species; their critical habitat; or other significant natural resources, such as caves, that may occur within the Study Area. This section summarizes correspondence with the U.S. Fish and Wildlife Service – Kentucky Field Office (USFWS-KFO), Kentucky Department of Fish and Wildlife Resources (KDFWR), Office of the Kentucky Nature Preserves (OKNP), Kentucky Division of Water (KDOW), and Natural Resources Conservation Service (NRCS). NRCS consultation was accomplished via web-based services. Since the Study Area is located within a known karst area (https://kgs.uky.edu/kgsmap/kgsgeoserver/viewer.asp), the Kentucky Speleological Survey (KSS) was contacted. The proposed Study Area is not within or adjacent to a national park or a state/federal forest; therefore, consultation with the National Park Service (NPS), Kentucky Division of Forestry, and U.S. Forest Service (USFS) was not initiated.

U.S. Fish and Wildlife Service (USFWS)

A Request for Information using the USFWS's Information for Planning and Consultation (IPaC) online system was submitted to the USFWS-KFO on November 19, 2018, during the initial project planning phase and again on May 24, 2019, during the field assessment phase. Species identified were consistent between the two reports. A copy of the most recent IPaC report is provided in Appendix F.

The USFWS noted that the federally-endangered Indiana bat (*Myotis sodalis*), gray bat (*Myotis grisescens*), and running buffalo clover (*Trifolium stoloniferum*) and the federally-threatened northern long-eared bat (*Myotis septentrionalis*) are potentially present within the Study Area. Threatened and endangered species identified by the agencies are listed in Table 5 and known threatened or endangered bat habitats are depicted in Figure 14.

Table 5: Federally-listed Species as Reported by USFWS IPaC Reports and State Listed Species

Scientific Name	Common Name	Federal Status	KY Status	Habitat Present
Mammals				
Myotis sodalis	Indiana bat	E	E	Yes
Myotis grisescens	Gray bat	E	T	Yes
Myotis septentrionalis	Northern long-eared bat	E	E	Yes
Plants				
Trifolium stoloniferum	Running buffalo clover	E	E	Marginal
Juncus filipendulus	Ringseed rush	NA	T	Yes
Lonicera dioica var. orientalis	Wild honeysuckle	NA	E	No
Carex crawei	Crawe's sedge	NA	S	Yes
Viola septemloba var. egglestonii	Eggleston's violet	NA	S	Yes
Birds				
Aimophila aestivalis	Bachman's sparrow	SOMC	E	Marginal
Asio flammeus	Short-eared owl	NA	E	Yes
Chondestes grammacus	Lark sparrow	NA	T	Marginal
Ixobrychus elilis	Least bittern	NA	T	No
Insects				
Calephelis muticum	Swamp metalmark	NA	E	Marginal

E = Endangered; T = Threatened; SOMC = Species of Management Concern; S = Special Concern; NA = Not Applicable

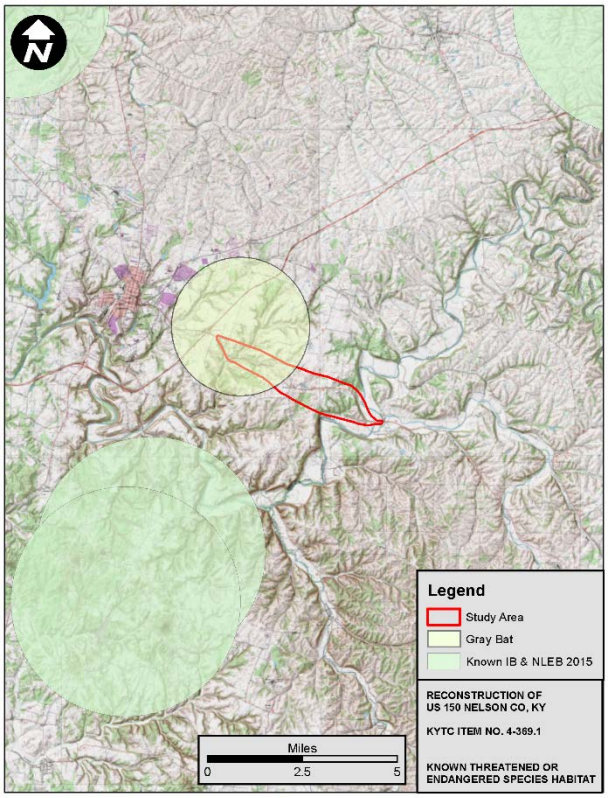


Figure 14: Known Threatened and Endangered Bat Species Habitat

The project is in "potential" Indiana bat and northern long-eared bat habitat as defined by the USFWS. Figure 14 shows the location of known threatened or endangered bat species habitat. The western end of the Study Area overlaps with known gray bat habitat. A gray bat cave is present in the area and monitored by the USFWS. The USFWS office did not report the presence of critical habitat for any listed species in the Study Area.

Kentucky Department of Fish and Wildlife Resources (KDFWR)

A Request for Information letter was emailed to the KDFWR on December 26, 2018. A response letter was issued by the KDFWR on January 4, 2019. The KDFWR indicated that the federally-listed northern long-eared bat and gray bat are known to occur within ten miles of the project alternatives and the state-listed endangered short-eared owl (*Asio flammeus*) is known to occur within one mile of the project alternatives. The KDFWR also recommended contacting the USFWS for guidance related to a cave known to be used by bats in proximity to the project alternatives.

The KDFWR provided a list of BMPs to minimize impacts to streams, such as culverts designed to allow for passage of aquatic organisms, use of natural stream channel design, construction during low-flow periods, replanting disturbed areas, and returning streams to stable condition after construction. They recommend strict erosion control measures be developed and implemented prior to construction to minimize siltation into streams, which may include silt fences, straw bales, brush barriers, sediment basins, and diversion ditches.

Office of the Kentucky Nature Preserves (OKNP)

An electronic data request was submitted to the OKNP on January 2, 2019, requesting information regarding documented occurrences of protected plant or animal species, or exemplary natural communities, within or in the vicinity of the Study Area. The OKNP replied on the same day and identified these species within one mile of the Study Area: one federally-listed species, gray bat; three state-listed endangered species including Bachman's sparrow (*Aimophila aestivalis*), Swamp metalmark (*Calephelis muticum*), and wild honeysuckle (*Lonicera dioica var. orientalis*); three state-listed threatened species including lark sparrow (*Chondestes grammacus*), least bittern (*Ixobrychus exilis*), and ringseed rush (*Juncus filipendulus*); and two state-listed species of concern, Crawe's sedge (*Carex crawei*) and Eggleston's violet

(*Viola septemloba var egglestonii*). The OKNP also identified a cave as a conservation site within one mile of the project alternatives.

3.3.2 Federally-Listed Threatened and Endangered Species

Through consultation with the USFWS office using the IPaC system and communication with the KDFWR, federally-listed threatened and endangered species were identified for consideration during project development. The USFWS identified Indiana bat, gray bat, northern long-eared bat, and running buffalo clover as potentially located in the area. The KDFWR identified the presence of gray bat and northern long-eared bats within ten miles of the Study Area, and noted that "Caves known to be used by bats occur within close proximity to the project site…."

3.3.2.1 Habitat Description and Assessment

The requisite habitat characteristics for each of the threatened or endangered species identified by the resource agencies were considered during office research and field reconnaissance and were used to support conclusions regarding the potential presence of each species.

Indiana Bat

No agency reported the presence of Indiana bats within ten miles of the project. Potential habitat in the Study Area for this federally-endangered species is primarily summer habitat, roost / maternity trees, and rock shelters. Winter hibernacula habitat consists of limestone caves and abandoned mine portals; one limestone cave. but no mine portals, were found in the Study Area. Summer roost / maternity and foraging habitat includes dead trees or live trees with exfoliating bark or cracks located either on upper slopes or along streams (NatureServe 2018). The Study Area includes rock shelters and trees greater than 5-inch dbh with the habitat characteristics suitable for Indiana bat.

Northern Long-eared Bat

The KDFWR reported the presence of northern long-eared bats within ten miles of the project. Potential habitat in the Study Area for this federally-endangered species is primarily summer habitat, roost / maternity trees, and rock shelters. Winter hibernacula habitat consists of limestone caves and abandoned mine portals, of which one was found in the Study Area, a limestone cave. Summer roost / maternity and foraging habitat includes dead trees or live trees greater than 3-inch dbh with exfoliating bark or cracks located either on upper slopes or along streams (NatureServe 2018). Northern long-eared bats have also been documented roosting during the summer in man-made structures such as houses and barns, which are present throughout the Study Area. The Study Area includes rock shelters and trees greater than 3-inch dbh with the habitat characteristics suitable for northern long-eared bat.

Gray Bat

The KDFWR reported the presence of gray bats within ten miles of the project. A limestone cave is located within the Study Area and has been reported as a gray bat maternity cave with approximately 5,000 bats (personal communications with land owner, May 2019). Bridges may also provide summer roosting habitat in the Study Area. The upland woods habitat along streams may be used as foraging habitat for

this species (NatureServe, 2018). The pre-cast concrete bridge over Beech Fork River was inspected for the presence of gray bats and there were no individuals present. Gray bats are presumed to be utilizing riparian stream corridors within the Study Area.

Running Buffalo Clover

The USFWS IPaC listed running buffalo clover as a potential species for this project. Running buffalo clover requires periodic ground disturbance and somewhat open habitat to successfully flourish, but it cannot tolerate full sun, full shade, or severe disturbance. Historically, running buffalo clover was found in rich soils in the area between open forest and prairie (USFWS 2011). It gets its name because this type of habitat was likely maintained by the grazing of buffalo and the disturbance or trampling of vegetation, which preserved the somewhat open habitat the plant requires. Running buffalo clover occurs in mesic habitats and more often in regions underlain with limestone or other calcareous bedrock (USFWS 2007). Today, this plant can be found primarily in the Bluegrass Region of the state in old pastures, moderately grazed fields, along stream banks, in cemeteries, or anywhere that meets its specific habitat requirements. The primary direct threat to running buffalo clover is habitat alteration. Factors that contribute to this threat include natural forest succession and subsequent canopy closure, competition by invasive plant species, and catastrophic disturbance such as development or road construction (USFWS 2011).

Wild Honeysuckle (*Lonicera dioica var orientalis*)

Lonicera dioica is found in mesic woods in thickets or on rocky ledges (Jones 2005). Jones (2005) lists the parent species as rare with unknown distribution in Kentucky. There are three varieties to *Lonicera dioica*; the variety *orientalis* is distinguished from the other varieties by the hypanthium being glandular, and it is the only variety listed as endangered in Kentucky (Jones 2005). The OKNP's last observation of this plant in Nelson County was in 1934 near Rowan Run, located west of Martha Layne Collins Bluegrass Parkway.

Bachman's Sparrow (*Aimophila aestivalis*)

The Bachman's sparrow is primarily a southern U.S. species with a small recorded population along the Tennessee/Kentucky state line (https://birdsna.org/Species-Account/bna/species/bacspa /introduction). The habitat for Bachman's sparrow was primarily open, mature long-leaf pine forest; however, since this forest type has almost been entirely removed due to logging, the species has moved to clearcuts and utility right of way, where the grassy conditions that it secondarily prefers still exist (birdsna.org). The OKNP's last observation of this species in Nelson County was in the 1940s, north of Bardstown.

Short-eared Owl (*Asio flammeus*)

The KDFWR reported the presence of short-eared owls within one mile of the project. The short-eared owl is now primarily a northern U.S. breeding species due to the disappearance of many southern areas where it formerly nested (Udvardy et. al 1994). This owl is found in open country that supports high numbers of small rodents. In winter, which is when they are most likely to be observed in Kentucky, they can be found in stubble fields, small meadows, and shrubby areas (Udvardy et. al 1994).

Lark Sparrow (*Chondestes grammacus*)

The lark sparrow inhabits open country with bushes and trees but generally favors areas with some open bare ground and some taller plants. Included in this habitat are overgrazed pastures, sandy barrens, hedgerows near fallow fields, brushy dry grasslands, and sometimes juniper woods (Udvardy et. al 1994). In recent decades, the lark sparrow has declined or disappeared in some former nesting areas east of the Mississippi River, but it is still fairly common and widespread in the western U.S. The OKNP's last observation of this species in Nelson County was circa 1925.

Least Bittern (*Ixobrychus elilis*)

The least bittern inhabits dense marshes where it climbs on cattails and reeds. Its narrow body allows it to slip through dense, tangled vegetation (Udvardy et. al 1994). Because of its habitat, it often goes unseen except when it flies. In Kentucky, least bitterns breed in the far western portion of the state. In the remainder of the state, it may be seen during migration. There are a few dense cattail ponds in the Study Area that the least bittern could use during migration. The OKNP's last observation of this species in Nelson County was in 1967.

Swamp Metalmark (*Calephelis muticum*)

In the Ohio Valley, the swamp metalmark butterfly inhabits grassland associated with rocky habitats known as barrens. These grasslands are similar to the "Kentucky Mesic Tallgrass Prairie" and the "Unglaciated Mesic Tallgrass Prairie" ecological associations and the Kentucky tallgrass habitat type is considered a Globally Imperiled plant community or ecological association (Bess 2005). The host plants for the butterfly larvae in the Ohio Valley region are tall thistle (*Cirsium altissimum*) and shrub thistle (*C. carolinianum*) (Bess 2005). The OKNP listed this butterfly species as a sensitive element for this project. It was last observed in Nelson County sometime before 1999.

Ringseed Rush (*Juncus filipendulus*)

The ringseed rush inhabits wet areas in cedar glades and can generally be identified from early March until late October. The OKNP's latest observation of this plant was in July 2016 in the cedar glade southwest of US 150 in Nelson County.

Cave / Rock Shelter Surveys

The KDFWR reported the presence of a cave in proximity to the project; the OKNP listed this cave as a conservation site. The limestone cave is found where the geology is characteristically karst. The limestone cave has a large opening, approximately 20 feet wide and 10 feet high. The cavern lies to the northwest of the opening and narrows with distance from the entrance (USFWS-KFO email). An intermittent stream flows in a southeastern direction away from the opening.

Rock shelters were found in the steep elevation areas near the eastern terminus of Alternatives 3 and 4 and along Mill Creek near Alternatives 2, 2A, 3, and 5. The rock shelters are associated with intermittent streams and characterized by waterfalls.

3.3.2.2 Habitat Assessment Conclusions

A Biological Assessment (BA) will be prepared to address federally-listed species prior to funding authorization for right of way. If the status of Bewick's wren, an SOMC, changes to threatened or endangered before construction, then this species will also need to be addressed in the BA. Impacts to federally-listed species and any required minimization or mitigation measures will be addressed through consultation with the USFWS (Table 6). Mitigation for take associated with potential direct, indirect, and cumulative effects to the Indiana and northern long-eared bats resulting from summer habitat loss may be addressed through a contribution to the Imperiled Bat Conservation Fund, following guidance provided in the *Revised Conservation Strategy for Forest-Dwelling Bats in the Commonwealth of Kentucky* (June 2016). Gray bats, if present, should only experience a temporary impact during construction along streams. KYTC *Standard Specifications for Road and Bridge Construction* will require site-specific erosion control measures and BMPs that will minimize adverse impacts to local streams and their macroinvertebrate community.

Table 6: Potential Impacts to Federally Listed Species

Federally-Listed Species	Potential Effects
Indiana bat	Impacts to summer habitat; to be addressed in accordance with *Revised Conservation Strategy for Forest-Dwelling Bats in the Commonwealth of Kentucky* (June 2016)
Northern long-eared bat	Impacts to summer habitat; to be addressed under 4(d) rule
Gray bat	Potential impacts to foraging habitat and winter habitat to be evaluated Erosion and sediment control measures and restrictions on blasting to be considered to minimize impacts.
Running Buffalo Clover	Presence of species unlikely given historical records and results of ecological assessment conducted for project

3.3.3 Surface Waters

The KDOW's online database (http://eppcapp.ky.gov/spwaters/) did not list any streams within the Study Area as Special Use Waters, including Outstanding National Resource Waters, Wild Rivers, and Exceptional or Reference Reach Waters.

The project is almost evenly divided between the Rowan Fork and Short Creek watersheds (see Figure 16). In the Study Area, approximately 63 stream channels have been identified: 12 perennial; 19 intermittent; and 32 ephemeral. Table 7 lists the number of streams and ponds affected by each alternative and Table 8 lists the number of wetlands.

Table 7: Number of Streams and Ponds Affected

Water Resource	Alternatives					
	1	2	2A	3	4	5
Perennial Streams	5	5	5	5	5	5
Intermittent Streams	5	9	8	7	5	4
Ephemeral Streams	8	6	5	15	24	13
Ponds (Jurisdictional and Non-jurisdictional)	0	1	1	3	5	2

Table 8: Wetland Impacts

Water Resource	Alternatives					
	1	2	2A	3	4	5
Wetland (ac)	0.03	0.93	0.93	0	0.22	0

Alternatives 2, 2A, 3, 4, and 5 would impact the full width of the Mill Creek floodplain at their respective crossings, whereas Alternative 1 would impact only the length needed to extend the current culvert (see Figures 17-20). With the exception of Alternative 4, all of the alternatives would also impact the floodplain on Cane Creek. Alternative 5 would have the greatest impact to floodplains (see Table 9 and Figure 16).

Table 9: Floodplain Impacts

	1	2	2A	3	4	5
Impacted Floodplain (acres)	3.29	3.17	3.17	2.91	2.09	2.92

Though these alternatives have some impact on floodplains, none of the impacts would be considered significant. A No Rise Certification, a Conditional Letter of Map Revision (CLOMR), or a Letter of Map Revision (LOMR) will be prepared for the project, as appropriate, consistent with the Memorandum of Understanding (MOU) between FHWA and the Federal Emergency Management Agency (FEMA). The design of the roadway will be consistent with both the MOU and the floodplain management criteria identified in the National Flood Insurance Regulations (NFIR) found in Title 44 of the Code of Federal Regulations (CFR). Furthermore, the design will be consistent with the floodplain management guidelines for implementing *EO 11988* and federal regulations found in 23 CFR 650A.

For the purpose of assessing water quality in the area, three perennial streams (Mill Creek, Cane Run, and Bear Creek) were chosen as representative of streams in the area. In-situ water quality data for water temperature, dissolved oxygen concentration, and pH readings were within expected seasonal ranges of the warm water aquatic habitat standard for all the sample sites. The results of the analytical water quality testing were typical of streams found in a landscape dominated by agriculture, with higher levels of nitrogen and phosphate compounds. Overall, the water quality in the Study Area is consistent with what would be expected, given the surrounding land uses. The complete results of the water quality analyses can be found in the *Ecological Assessment Report* (Appendix F).

Refer to Figures 17-20 for the locations of streams and wetlands identified within the Study Area and where these features would be impacted by the alternatives. A summary of the stream and pond impacts of each alternative is presented in Table 10.

Table 10: Estimated Impacts to Streams and Ponds

Water Resource	Alternatives					
	1	2	2A	3	4	5
Perennial (lf)	1,628	4,021	3,905	2,215	1,781	1,996
Intermittent (lf)	453	1,915	1,515	999	838	952
Ephemeral (lf)	1,349	655	490	1,933	3,177	1,795
Ponds: Jurisdictional and non-jurisdictional	0	1	1	3	5	2

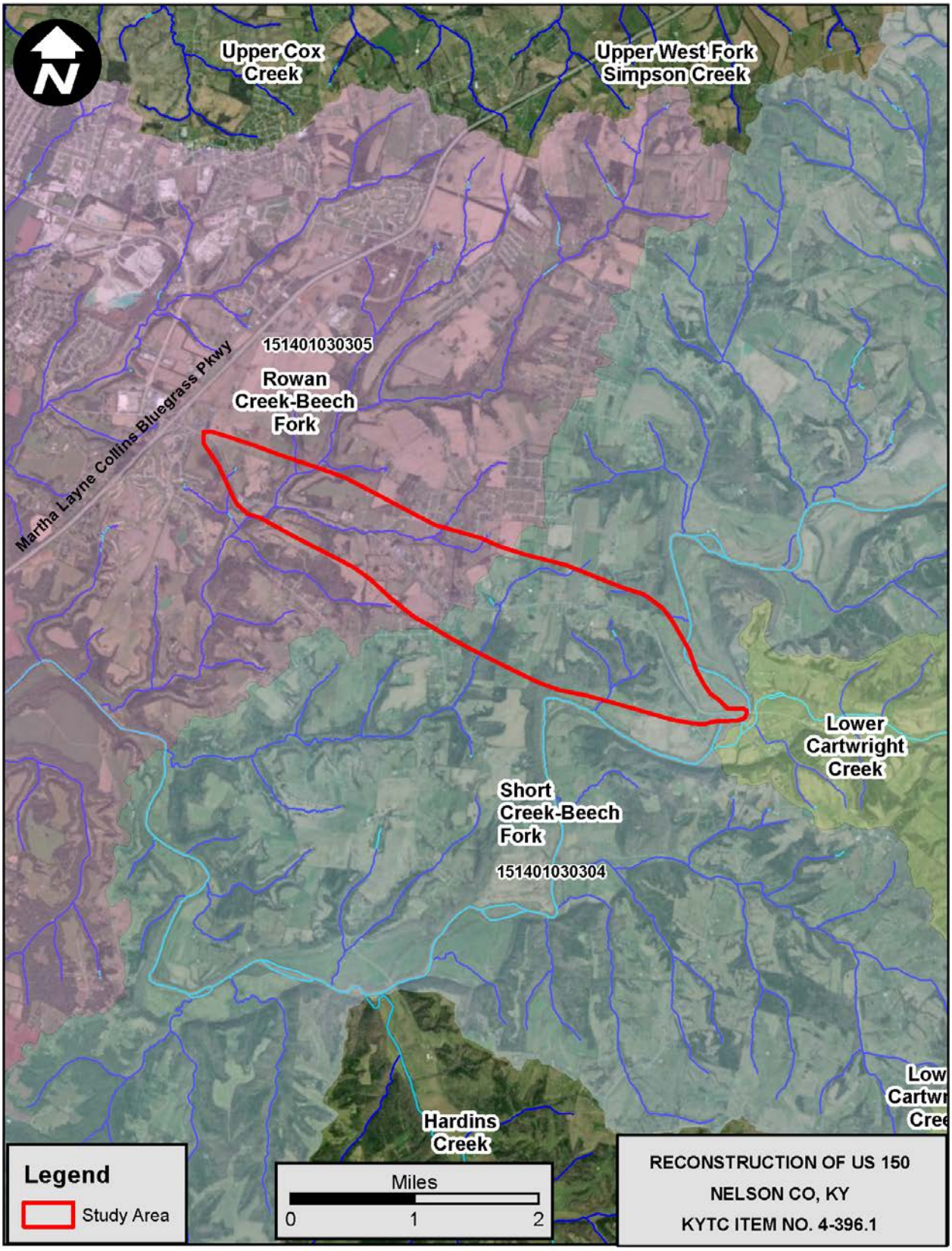


Figure 15: Hydrologic Unit Map

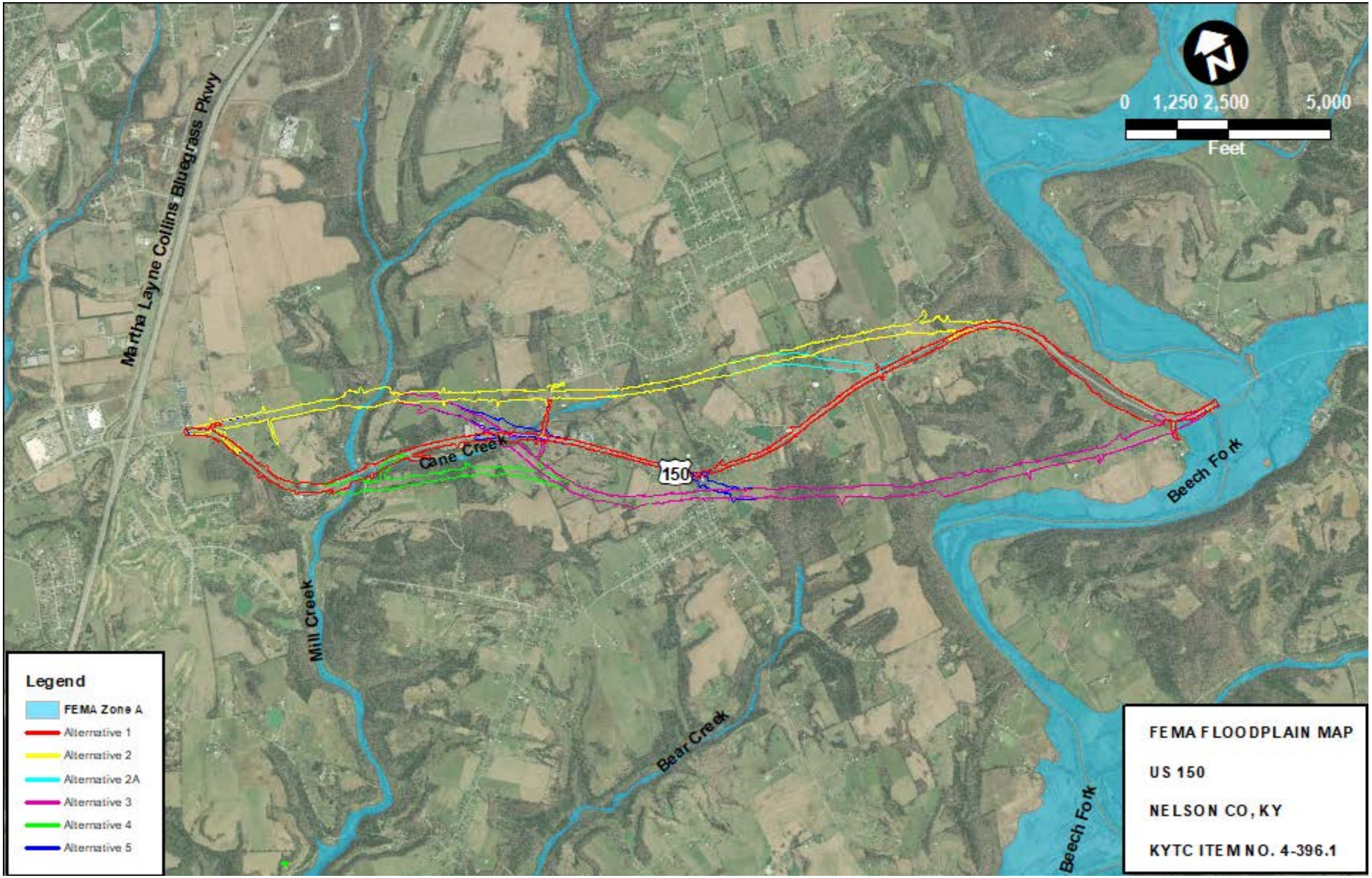


Figure 16: Floodplain Map

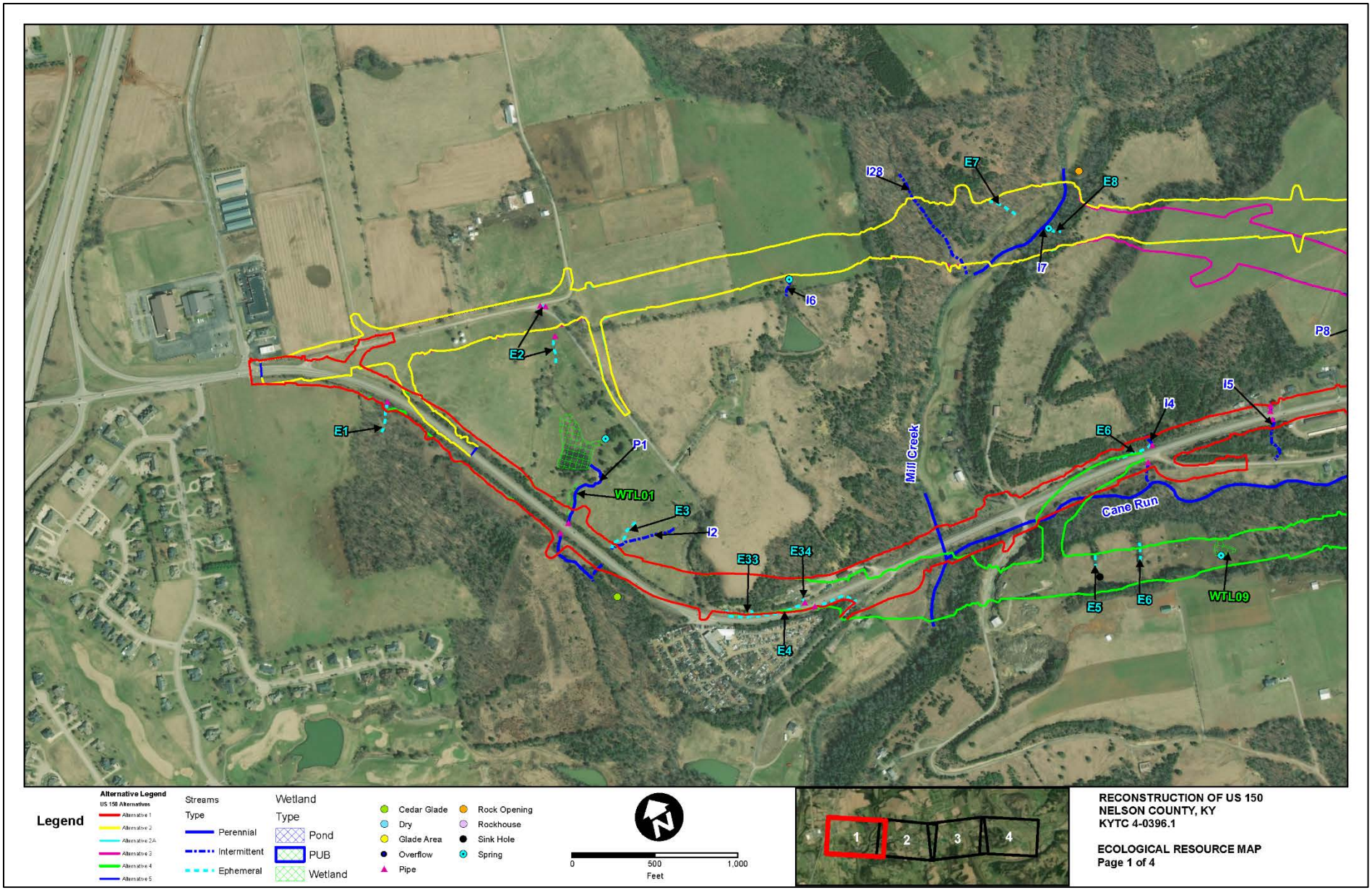


Figure 17: Surface Water Impacts (1 of 4)

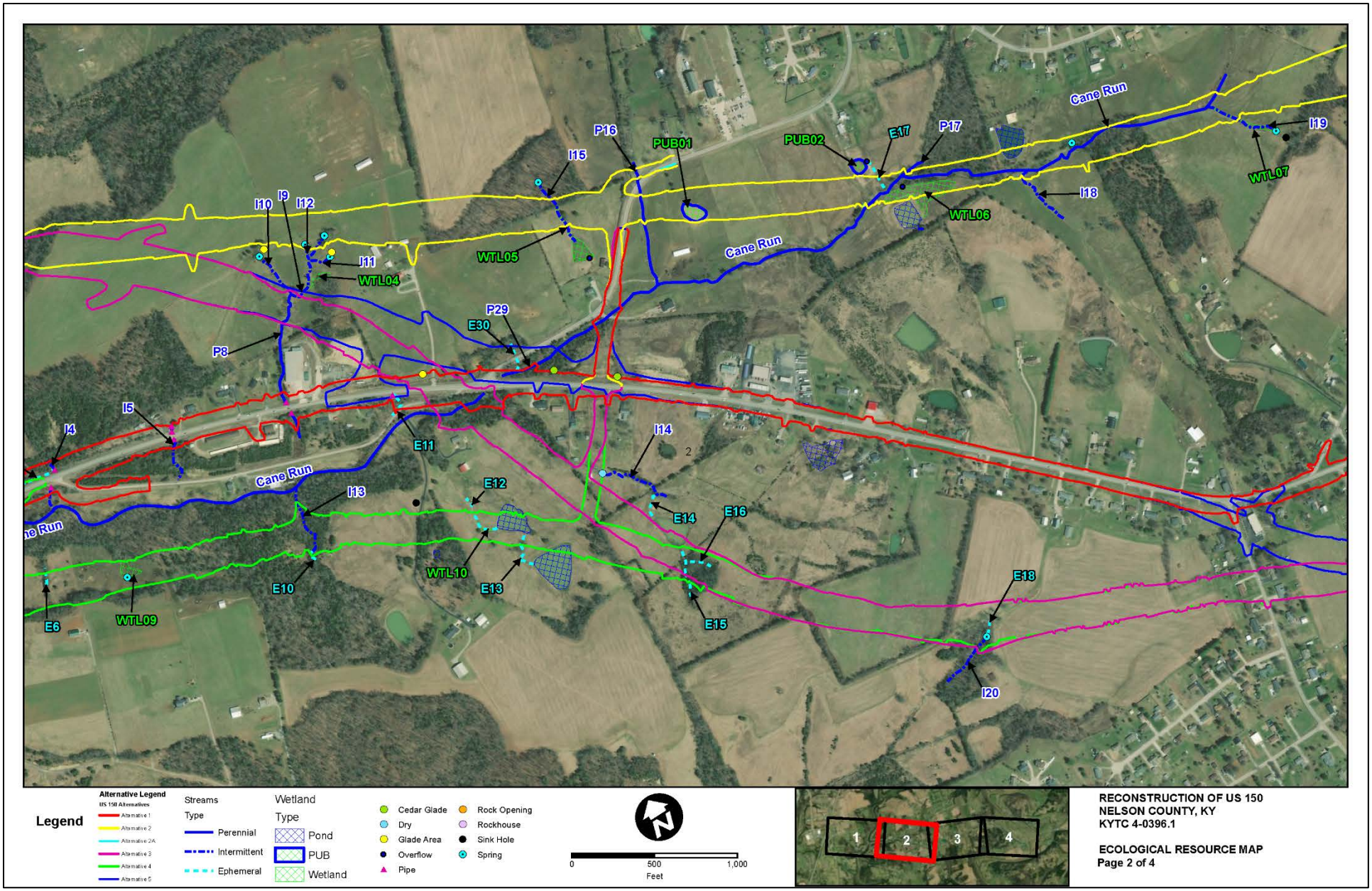


Figure 18: Surface Water Impacts (2 of 4)

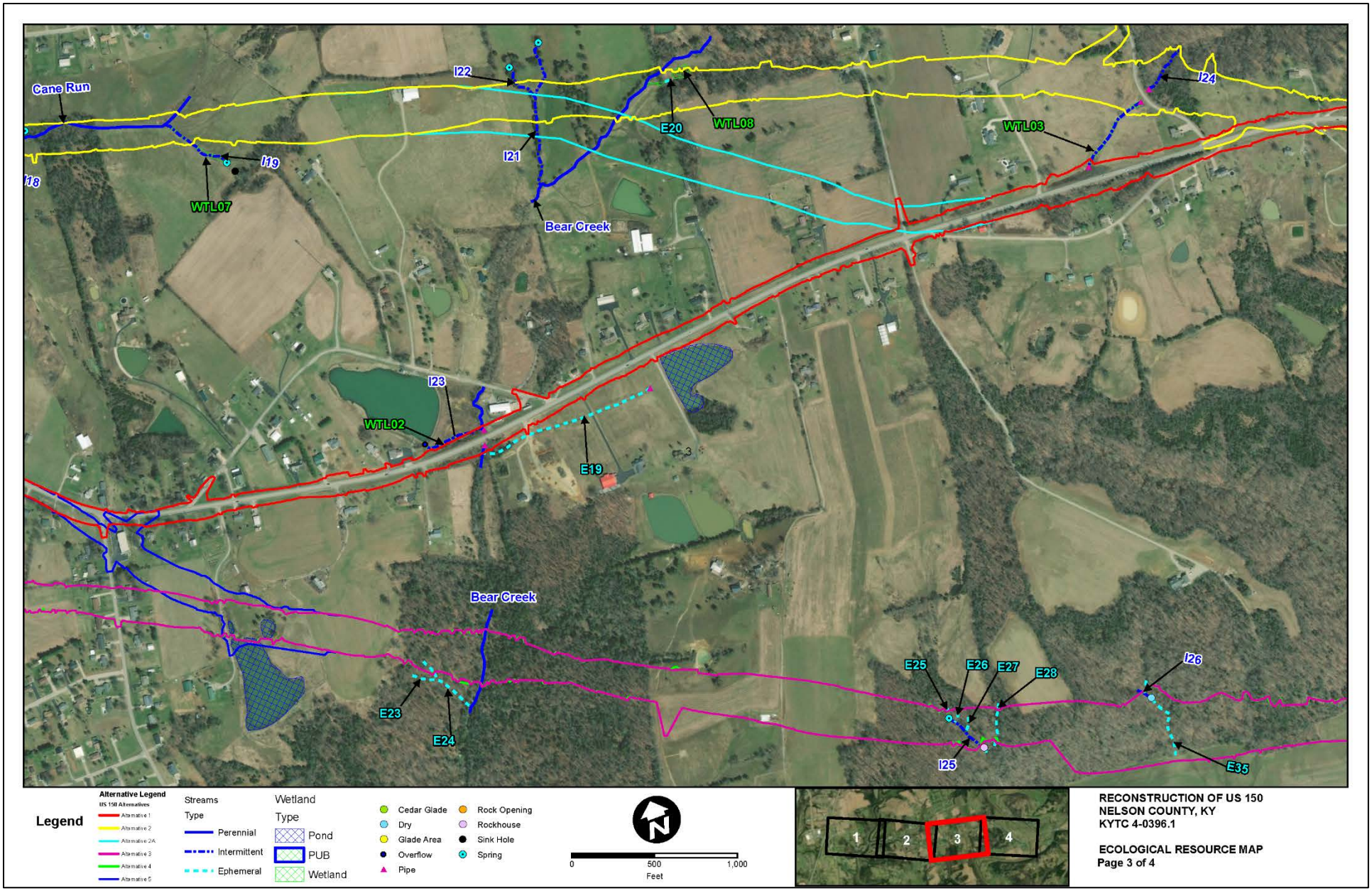


Figure 19: Surface Water Impacts (3 of 4)

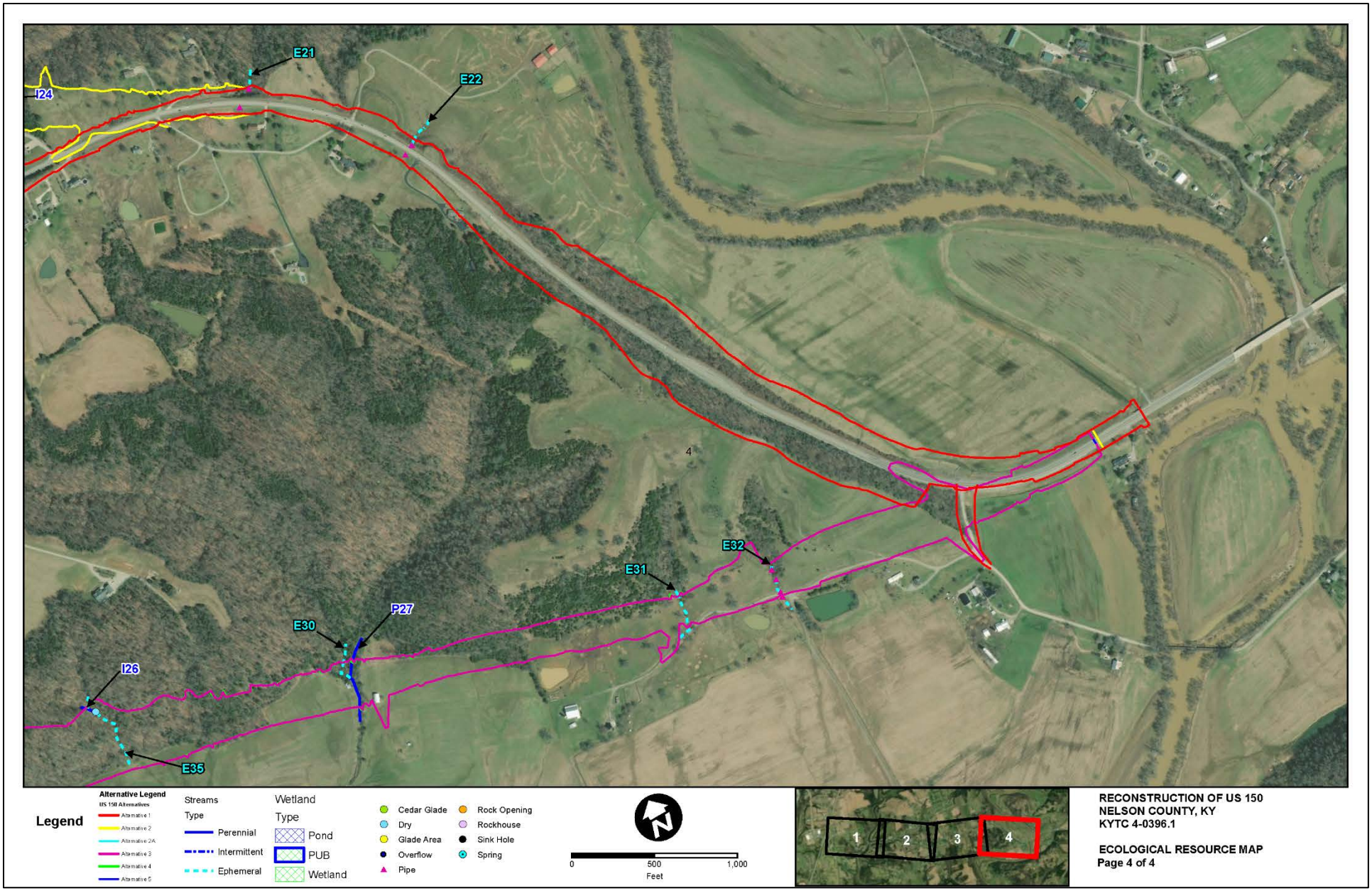


Figure 20: Surface Water Impacts (4 of 4)

3.3.4 Summary

The off-corridor alternatives (Alternatives 2, 2A, 3, 4, and 5) are dominated by pasture land use while the alignment along existing US 150 (Alternative 1) is dominated by transportation right of way and residential, commercial, and open land uses. Waters affected by the various alternatives include perennial stream crossings, intermittent stream crossings, ephemeral stream crossings, and wetlands. Alternatives 2 and 2A would have the greatest impact to perennial streams due to nearly 2,400 linear feet of impacts to Cane Creek that occur near its headwaters. Coordination with USACE and KDOW would be necessary to ensure compliance with the Clean Water Act to fill within waters of the United States. Mitigation for unavoidable wetland and stream impacts would be determined through the permitting process under Section 404 as administered by the USACE and Section 401 of the Clean Water Act, as administered by KDOW. Permits will likely require mitigation for stream and wetland impacts. Mitigation requirements will not likely be satisfied on-site but will more likely take the form of payment to the KDFWR Wetland and Stream Mitigation Fund or the use of commercial bank credits.

Alternative 1 would have the fewest ecological impacts since this alternative would be along the existing corridor; would use existing rights of way to a large degree; and would have a more limited footprint, considering the alternative begins at its western terminus as a five-lane rural typical section then narrows to two lanes with a passing lane. Other alternatives would be either entirely or partially on new alignment and consist primarily of a four-lane rural typical section with a depressed 40-foot median before transitioning to two lanes with a passing lane. Of the off-corridor alternatives, ecological impacts would be relatively similar except for the elevated perennial and intermittent stream impacts associated with Alternatives 2 and 2A. These alternatives would have a single perennial stream (Cane Run) impact of approximately 2,400 linear feet and cross multiple springs with intermittent streams. Alternative 4 ephemeral stream impacts would be greater than for the other alternatives as a result of 24 ephemeral channel crossings (3,177 feet of impact), as compared to 15 that would occur on Alternative 3, the next greatest impact. Alternatives 3 and 4 have the greatest effects on habitat for threatened and endangered bats because they would bisect the large forested tracts located south of US 150.

Habitat for federally-listed species within the alternatives is limited to suitable summer roosting/ maternity habitat for the Indiana and northern long-eared bats and foraging or roosting habitat (bridges) and caves for gray bats. Running buffalo clover may be present in the area, too. Coordination with USFWS will be necessary to ensure compliance with the Endangered Species Act for removal of habitat potentially used by federally-listed bat species. Mitigation for take associated with potential direct, indirect, and cumulative effects to the Indiana and northern long-eared bats resulting from this habitat loss may be addressed through a contribution to the Imperiled Bat Conservation Fund, following guidance provided in the *Revised Conservation Strategy for Forest-Dwelling Bats in the Commonwealth of Kentucky* (June 2016). Gray bats, known to be present in a large cave north of the project area, should only experience a temporary impact during construction along streams. KYTC Standard Specifications for Road and Bridge Construction will require site-specific erosion control measures and BMPs that will minimize adverse impacts to local streams and their macroinvertebrate communities. Impacts to the gray bat maternity

cave could result should blasting be required for construction of Alternatives 2, 2A, 3, or 5. Effects would need to be considered in the BA and would vary depending on the distance between the blasting location and the cave and the type of rock being removed. Generally, one-half mile is sufficient separation to minimize any blasting impacts. No running buffalo clover was observed during field investigations. Habitat availability was considered marginal since the Study Area consists largely of cattle and hay pasture and in the open areas where there was filtered light, the soil was shallow and glade-like. In addition, running buffalo clover was not observed along stream channels.

3.4 Section 106: Cultural Historical and Archaeological Resources

Section 106 of the National Historic Preservation Act of 1966, as amended, and 36 CFR Part 800 (Protection of Historic Properties, Revised 11 January 2001) require that federal agencies or federally-funded projects consider the direct and indirect effects of an undertaking on historic properties listed or eligible for listing in the National Register of Historic Places (NRHP) prior to the issuance of a federal permit or license or the expenditure of funds for construction. As a federal undertaking, the lead federal agency, the FHWA, is required to consult with the State Historic Preservation Officer (SHPO), American Indian tribes, local officials, and others with a demonstrated interest in historic preservation, regarding the effects of the project on historic properties. In accordance with the procedures contained in 36 CFR Part 800, cultural resource assessments, including background research and field surveys, were conducted to locate historic sites and structures that may be affected by the proposed project. Archaeological records were reviewed to identify the location of known archaeological sites and assess the potential for encountering additional sites when conducting a more thorough Phase I evaluation of the preferred alternative. Results of the architectural assessments were presented in the *Cultural-Historic Survey of US 150 in Nelson County, Kentucky, from Near the Martha Layne Collins Bluegrass Parkway to the Washington County Line* (October 24, 2019). Potential impacts to archaeological resources in the project vicinity were assessed in the *Archaeological Overview for the US 150 Reconstruction (Item No. 4-396.1) in Nelson County, Kentucky* (July 11, 2018). The cultural historic report is included in Appendix G and the archaeology report is on file with the KYTC.

3.4.1 Cultural Historic Resources

Properties located within 500 feet of proposed alternatives were considered to be within the Area of Potential Effect (APE) and were evaluated to determine potential eligibility for listing in the NRHP. For those properties determined to be eligible, an assessment of effects was also completed. The assessment resulted in the survey of 64 properties and identification of 11 sites considered eligible for NRHP listing. The location of the 11 sites can be seen in Figure 21.

Prominently located near the middle of the project lies the Botland Rural Historic District. The district is an excellent example of an intact rural turnpike community associated with the Bardstown-Springfield Road. It demonstrates the importance of the turnpike network to Nelson County, and was doubtless, at one time, just one of many such communities. Few of these turnpike communities still exist as an identifiable whole in Nelson County. The combination of dwellings, outbuildings, a church, turnpike toll house, stagecoach stop, and former store, illustrate the sense of community inherent in the district. Given

its symbiotic relationship with the road, all of the dwellings are located and oriented toward US 150 and Botland Loop, which is a section of the old road created by the rerouting of US 150 in 1953.

The Botland Rural Historic District is also associated with the theme of agriculture. Based on farming from its beginning, Botland remains an area with a strong agricultural presence and rural character. While the turnpike gate and stagecoach stop provided economic opportunity for the residents, farming remained their main livelihood. This theme can be readily observed in the deep lots and multiple agricultural outbuildings on most of the parcels within the district. Farming and the turnpike provided the economic base for the district; many Botland men in the 1850-1880 census listed “turnpike worker” as their occupation, as well as “farmer.”

The agricultural theme identified in the Botland area also extends to other properties identified in the area. In addition to the Botland Rural Historic District, eight other agricultural properties, some occupying large tracts of land, have been identified as eligible for the NRHP. Efforts to minimize impacts to these historic properties greatly influenced the location of alternatives considered for the project.

A summary of the properties determined to be eligible for NRHP listing and the determination of effects are shown in Table 11. Concurrence with the identification of NRHP-eligible properties and effects was provided by the SHPO in a letter dated January 7, 2020 (see Appendix G)

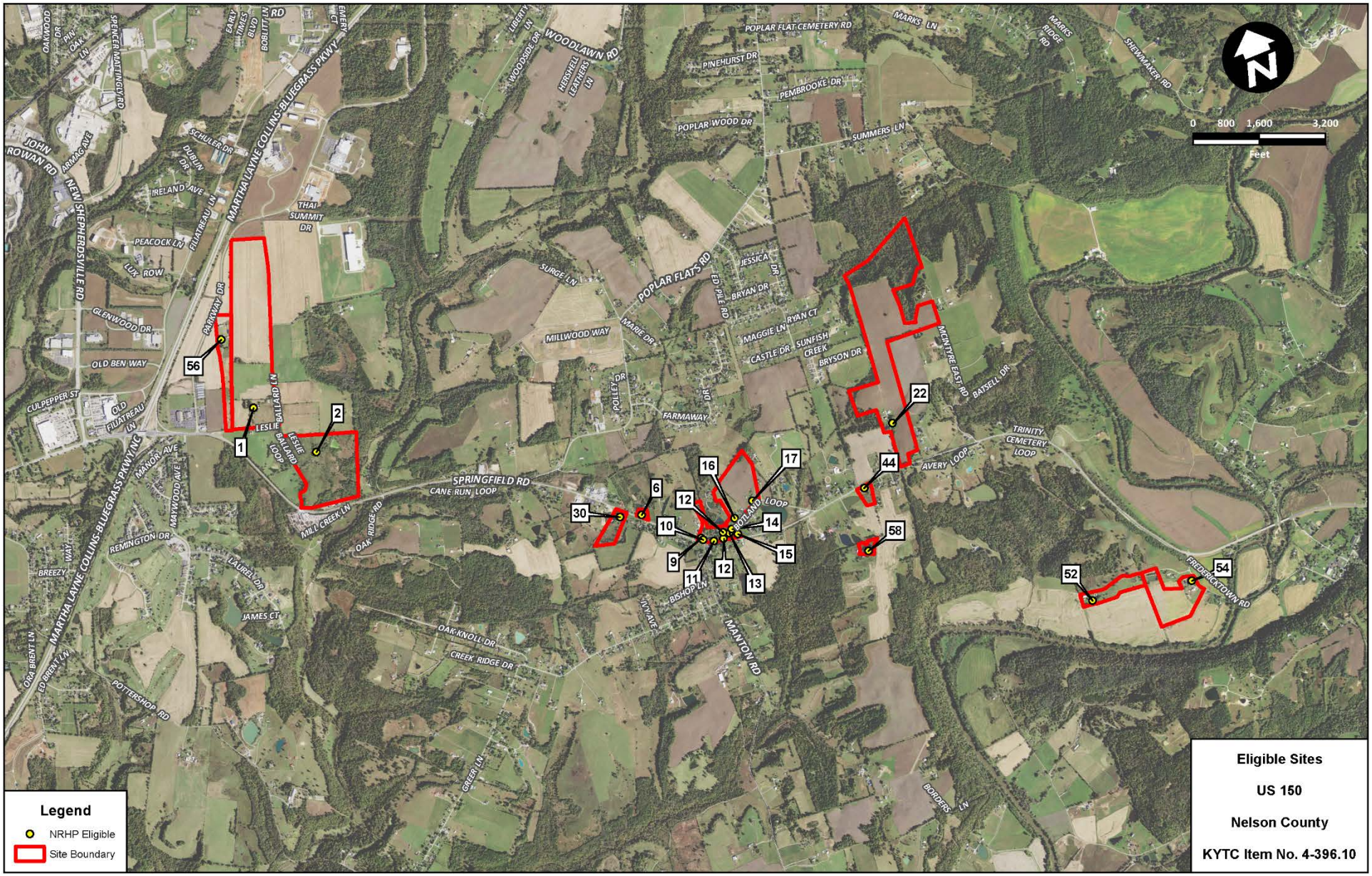


Figure 21: NRHP-Eligible Sites and Boundaries

Table 11: NRHP-Eligible Sites and Summary of Effects

Site Name (Field Site #)	Alternative					
	1	2	2A	3	4	5
Botland Rural Historic District (FS 9 - FS 17) (NE-126-127 and NE 633-639						
Crozier/Ballard Farm (FS 1) (NEB 569)						
Blanford Farm (FS 2) (NE 133)						
Allen House (FS 6) (NE 128)						
Parrott Farm (FS 22) (NE 644)						
Eddleman Farm (FS 30) (NE 575)						
Crume House/Outbuildings (FS 44) (NE 125)						
Nally Farm (FS 52) (NE 670)						
Farm (FS 54) (NE 672)						
Farm (FS 56) (NE 673						
Log House/Outbuildings (FS 58) (NE 675)						

= No Effect = No Adverse Effect = Adverse Effect

The Crozier/Ballard Farm (FS 1) successfully represents a late-nineteenth/early-twentieth-century diversified farm in Nelson County, Kentucky (see Figure 22). As such, this property is eligible under Criterion A for its significance under the context: *Agriculture in Nelson County, 1880-1970*. The Crozier/Ballard farm retains a circa 1875 farm house, built for Thomas Crozier. The farm also has three historic domestic outbuildings and five historic agricultural outbuildings that all date to the early twentieth century and the Ballards' purchase and tenure on the farm. There are no buildings that date post-1950 on the farm. The landscape, viewshed, and fence lines all contribute to the farmland's overall integrity of setting.

Figure 22: Crozier/Ballard Farm (FS 1) (NEB-569)

The Blanford Farm (FS 2) successfully represents a late-nineteenth/early-twentieth-century diversified farm in Nelson County, Kentucky (see Figure 23). The Blanford farm retains a circa 1860 farm house. The farm also has two historic domestic outbuildings and two historic agricultural outbuildings that all date to the late

Figure 23: Blanford Farm (FS 2) (NE-133)

nineteenth/early twentieth century. There are no buildings that date post-1950 on the farm. The landscape, viewshed, and fence lines all contribute to the farmland's overall integrity of setting. As such, this property is eligible under Criterion A for its significance under the context: *Agriculture in Nelson County, 1880-1970.*

Alternatives 2, 2A, 3, and 5 would all require minor strip takings from the Crozier/Ballard Farm (FS 1) and the Blanford House (FS 2). As these strip takings are small, they would not destroy, alter, or otherwise impede the characteristics that qualify these properties for NRHP listing and it was concluded that there would be No Adverse Effect (direct) (see Figures 27 and 28). However, the introduction of the improved roadway into the viewshed impacts the integrity of setting for these farm properties and is considered an Adverse Effect (indirect).

The Parrott Farm (FS 22) is an excellent example of a mid-twentieth-century farm associated with the rehabilitation efforts of the Farm Security Administration (FSA) loan program in Kentucky. The farm is eligible under Criterion A with a significant theme of Agriculture. The farm represents the work of FSA in the 1930s and 1940s as they partnered with local tenant farmers to create more efficient, scientifically-based farms and modern farm architecture. The farm retains agricultural outbuildings specified by the FSA, including the chicken and brooder houses, the root cellar, and the meat house. In addition, the farm has been maintained by four generations of the Parrott family.

Figure 24: Root cellar, Parrott Farm

Figure 25: Nally Farm (FS 52)(NE-670)

Alternative 1 would require a very minor strip taking along the roadside frontage of the property; this taking was determined to be No Adverse Effect. Alternative 2 would split the farm and result in an adverse effect. To minimize impacts to the historic property, Alternative 2A was developed. It returns the new alignment to the existing roadway corridor near the southwestern corner of the property, and requires approximately 0.62 acres from within the historic boundary. The driveway will be slightly realigned to connect to Alternative 2A on the western property line. As this strip taking is small and located far from the main building cluster, it would not destroy, alter, or otherwise impede the characteristics that qualify this property for NRHP listing and it was concluded that there would be No Adverse Effect as a result of Alternative 2A.

The Nally Farm (FS 52) (NE-670) is eligible under Criterion A for its association with changes in agriculture in the first half of the twentieth century and the growth of burley tobacco as a cash crop for small farms

(see Figure 25). The farm retains a historic dwelling, domestic outbuildings, an agricultural outbuilding, and a multi-purpose barn that was used for dairy cattle.

Alternatives 3, 4, and 5 share an alignment in proximity to the Nally Farm. There is a small strip taking of 0.77 acres proposed from this historic property's northeast corner (see Figure 29). This taking will remove approximately 794 feet of the current farm road. Access to the proposed alternatives will be provided by a 12-foot-wide and 261-foot-long paved entrance. The proposed entrance would lie approximately 705 feet from the farmhouse. A temporary easement of 0.442 acres is needed to construct the new entrance. The strip taking and associated temporary easement are small and occur a distance from the main house; however, the strip taking does remove approximately 794 feet of the historic farm road. In spite of removal of a portion of this feature, the proposed new entrance does not alter the remaining farm road's materials, location/orientation, nor its overall design. As a result, the SHPO has concurred that this strip taking will have No Adverse Effect.

This property is nestled between a ravine and open farmland down a narrow winding farm road, a far distance (2,110 feet) from existing US 150. There will be visual effects introduced that impact the integrity of setting on this historic farm, an important element for a rural farm property. These effects may alter the characteristics that qualify the property for NRHP listing. The SHPO concurred that Alternatives 3, 4, and 5 would result in an indirect Adverse Effect to the property.

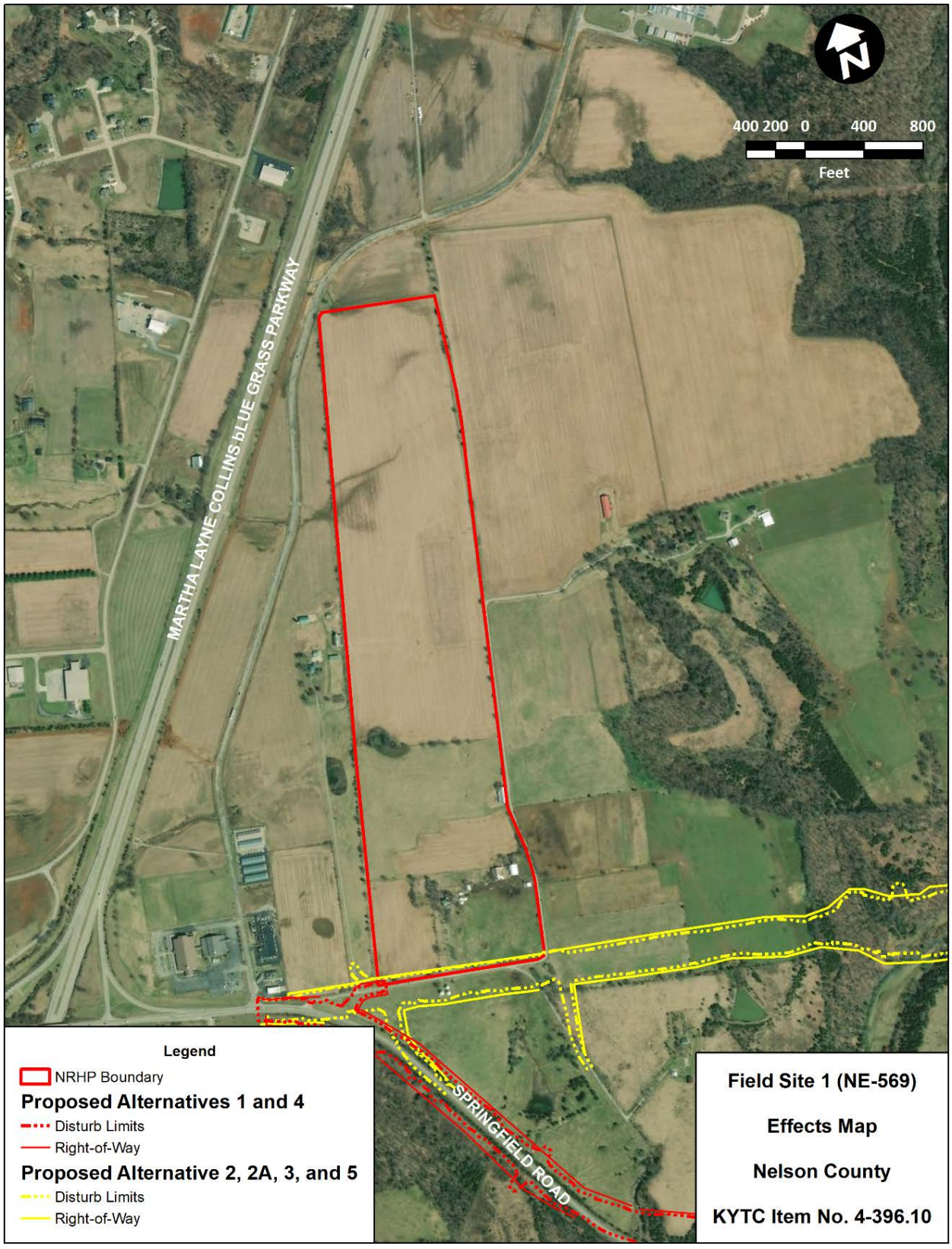


Figure 26: Crozier/Ballard Farm (FS 1) Effects Map

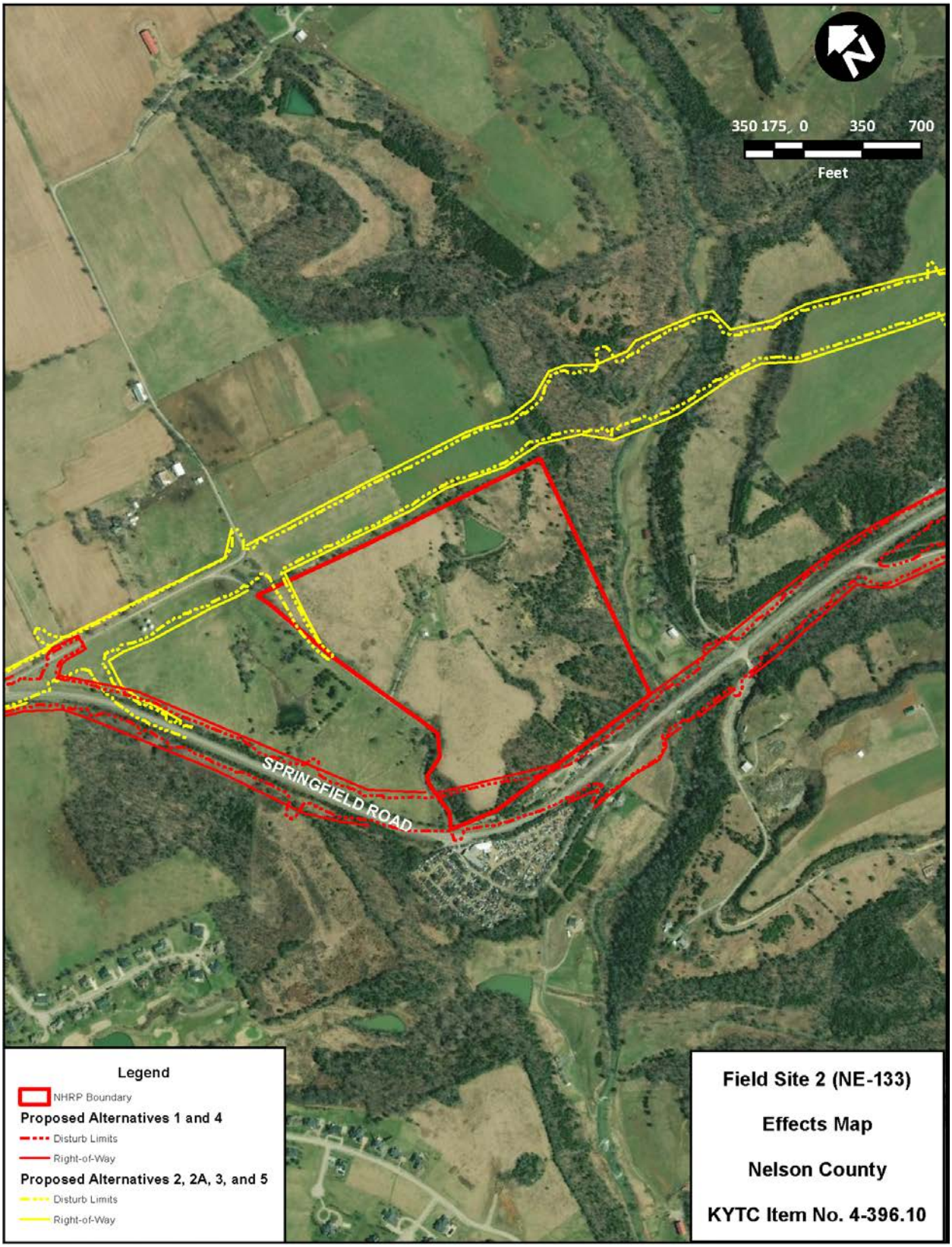


Figure 27: Blanford Farm (FS 2) Effects Map

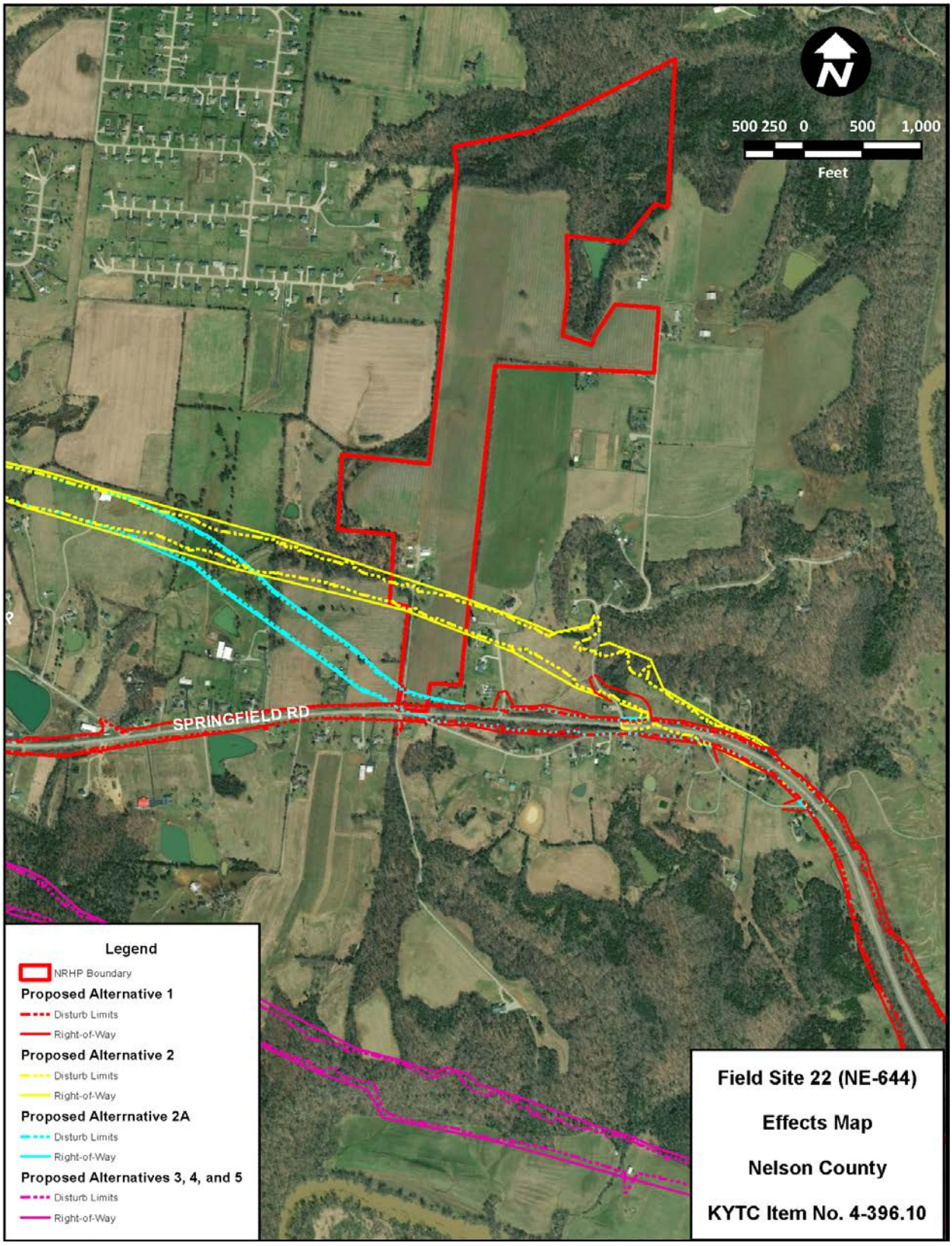


Figure 28: Parrott Farm (FS 22) Effects Map

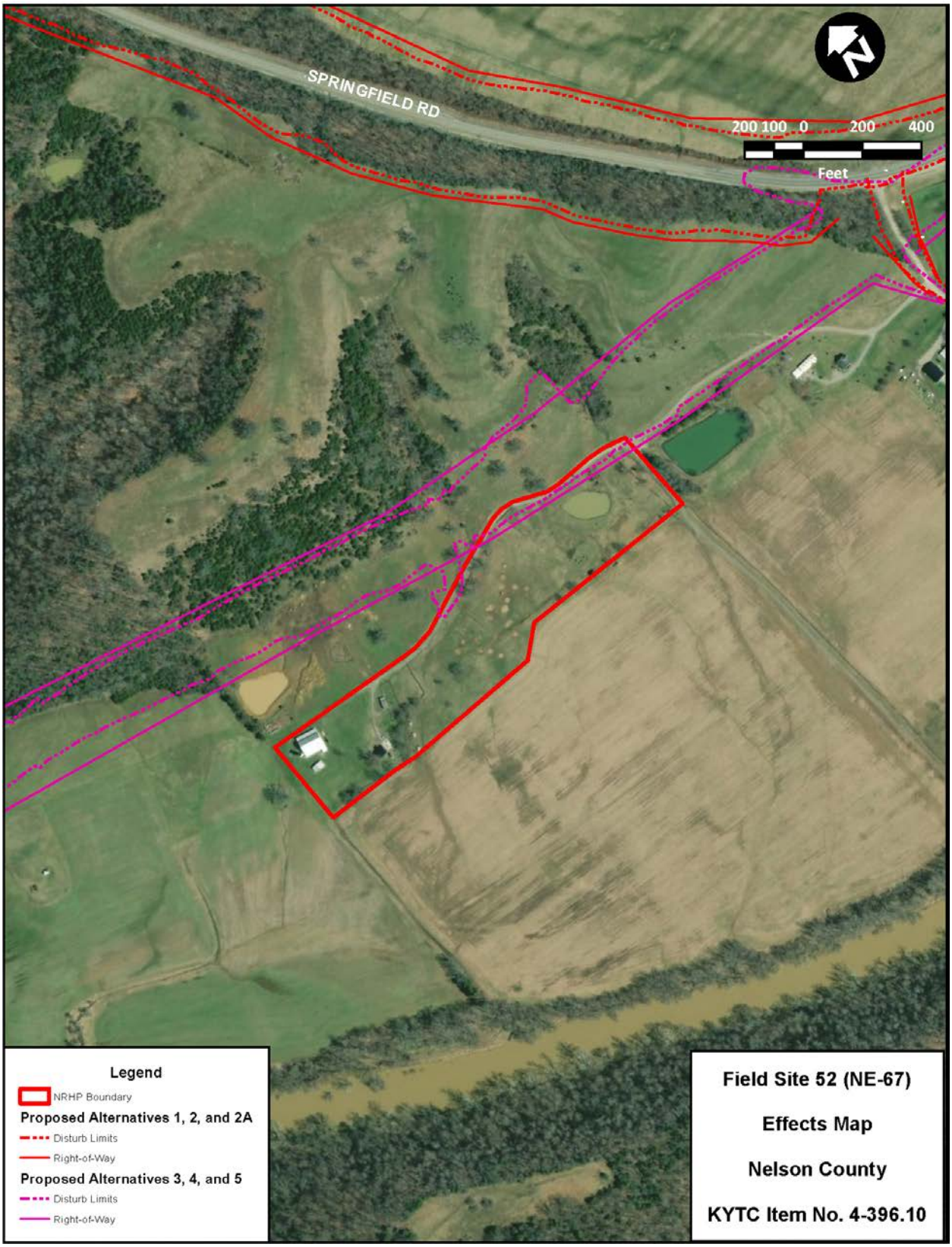


Figure 29: Nally Farm (FS 52) Effects Map

Additional eligible properties are scattered across the landscape throughout the APE. It was determined that the proposed alternatives would have No Effect on the Allen House (FS 6) and the Log House/Outbuildings (FS 58). Though minor property takings were required for several other historic properties, these intrusions were determined to be minor and it was concluded that there would be No Adverse Effect to the properties. Those properties include: Eddleman Farm (FS 30) (Alternatives 1, 3, 4, and 5); Crume House/Outbuildings (FS 44) (Alternative 1); Nally Farm (FS 52) (Alternatives 3, 4, and 5); and two unnamed farms, (FS 54) (Alternatives 3, 4, and 5) and (FS 56) (Alternatives 1, 2, 2A, 3, 4, and 5).

3.4.2 Archaeological Resources

An archaeological overview was conducted for the Study Area to review available literature and evaluate the potential for encountering archaeological properties that may be eligible for listing in the NRHP. The project lies within the Salt River Management Area, which, despite being one of the smallest in the state, contains nearly 3,000 archaeological sites – higher than all other management areas except the Upper Kentucky/Licking area. The literature review indicates a large portion of US 150 has been previously surveyed. Vast portions of the Study Area, however, have never been surveyed for the presence of or probability for archaeological resources.

The literature review indicated multiple archaeological sites were surveyed and located in the 2.0 km (1.24 mi) archaeological study area; however, none of those are directly impacted by or adjacent to the proposed alternatives. A large extent along US 150 itself was previously surveyed for water transmission lines in the 1970s, while a smaller area that extended into the project area was surveyed for the Botland cellular tower. The latter reported a house, three barns, a well, and a grain silo. The third survey was completed for the Fredericktown cellular tower located on Botland Loop. No sites have been previously identified within the archaeological study area, although five prehistoric spot finds were recovered within the archaeological study area, and one additional spot find lies close by.

As part of the ongoing environmental review and prior to a final decision regarding location of the project, a Phase I survey of the preferred alternative will be completed to determine whether archaeological resources exist within the footprint of the project. Where practicable, these sites will be avoided. Should Phase I investigations identify sites that cannot be avoided, Phase II testing will be conducted to further assess those sites and determine eligibility for listing in the NRHP. Consultation will be conducted pursuant to 36 CFR 800.6 to resolve adverse effects to any NRHP-eligible archaeological sites that cannot be avoided and that do not warrant preservation in place.

The project area consists of three different ecological zones: rolling upland, incised drainage, and the Beech Fork valley; the findings are presented within these zones. Historical archaeological materials are expected to be present in every zone; farm/resident complexes are expected along the historic roadways in the rolling uplands. Other site types are expected at Botland, and site types related to Civil War movement and turnpike development are expected. Only one cemetery, located within the rolling upland zone, lies in the vicinity of Alternatives 1, 2, and 2A: Holy Trinity Cemetery, which was founded in 1893. While this is expected to be a cultural-historic resource, avoidance and a 9.1-meter (30-foot) buffer is recommended for potential unmarked interments outside of the marked lot. None of the alternatives will

directly impact the cemetery. Additional unmarked burials within the project area could be present and related to Native American, African American, and European American land use. These could occur in all zones.

For cemeteries located near but not known to be directly affected by proposed alternatives, archaeological investigators recommended that the boundaries of the cemeteries should be delineated and a 100-foot exclusion buffer should be established around the defined limits. If cemeteries cannot be avoided, grave relocations will be completed in conformance with applicable laws, policies, and procedures, archaeological recovery as described above notwithstanding. Procedures authorized under the authority of 600 KAR 3:020 and 901 KAR 5:090, as outlined in the *KYTC Right of Way Manual*, Chapter 1200, will be followed. The KYTC District Office grave relocation agent will attempt to contact all next of kin to make them aware of the potential disinterment of the remains. The Cabinet will contract with a funeral director licensed by the Commonwealth of Kentucky to disinter and reinter the remains at a nearby cemetery, under the supervision of the District Office grave relocation agent.

Locations of buildings such as residences, barns, and outbuildings that are no longer present or extant and over 50 years of age could occur throughout the project area. The areas along the old turnpike route, including the loops, are some of the most likely locations for those sites. Archaeological remnants of residences, slave quarters, barns, other outbuildings, privies, cisterns, middens, a blacksmith shop, and the Botland post office may still lie within the project vicinity. Civil War forces on the way to Perryville – after the October 4, 1862 defeat in Bardstown and before the Battle of Perryville on October 8, which occurred further east along US 150 – may have left remnants of their land use in the project vicinity. Historic archaeological sites are expected to have a prehistoric component as well.

Prehistoric sites, especially NRHP-eligible ones, are expected primarily along the Beech Fork valley, although other site types might be identified on uplands, within incised drainages, and, if rockshelters are present, along the bluff lines.

3.5 Section 4(f) and Section 6(f)

3.5.1 Section 4(f)

Section 4(f) of the U.S. Department of Transportation Act of 1966 (1966 USDOT Act) provides protection for publicly owned parks, recreation areas, and wildlife or waterfowl refuges; historic properties that are listed in or eligible for inclusion in the NRHP; and archaeological sites listed in or eligible for the NRHP and of such importance to warrant "preservation in place." Approval of a project impacting a resource protected under Section 4(f) may only occur if:

i) There is no feasible or prudent alternative to the use of the property; and

ii) The action includes all possible planning to minimize harm to the property resulting from such use; or

iii) The agency determines that the use of the property, including any measure(s) to minimize harm (such as any avoidance, minimization, mitigation, or enhancement measures) committed to by the applicant, will have a *de minimis* impact on the property.

Section 4(f) protection is afforded to properties where some use of the property is required. Most commonly, this use involves permanent incorporation of some or all of the property into a transportation facility. Temporary occupancy required for construction of the project may also be considered a use if it is determined to be adverse. Constructive use of the property may occur when there is no actual physical use of the property but proximity impacts result in substantial impairment to the property's activities, features, or attributes that qualify the property for protection under Section 4(f).

There are no publicly owned parks, recreation areas, or wildlife or waterfowl refuges impacted by the project; however, several of the proposed alternatives affect historic properties listed in or eligible for inclusion in the NRHP. Where a Section 4(f) use of these properties will occur and the SHPO has concurred that there will be No Adverse Effect to the property, a finding that the use is *de minimis* may be made after satisfying notification requirements to both the SHPO and the public.

In a *Memorandum of Understanding Among the Federal Highway Administration, the Kentucky State Historic Preservation Office and the Kentucky Transportation Cabinet* (February, 2018), it was programmatically stipulated that "the FHWA is hereby notifying the SHPO of FHWA's intent to determine Section 4(f) *de minimis* use(s) (when applicable) for those projects in which the SHPO has previously concurred with a finding that the project will have No Adverse Effects or that there are No Historic Properties Affected and that this agreement satisfies the notification requirements specified in 23 CFR 774." The Section 106 consultation satisfies the notification requirements for the SHPO. Requirements for notification of the public will be addressed through publication of this EA and the Public Hearing to be conducted prior to concluding the environmental process.

Table 12 identifies the Section 4(f) use associated with each historic property. With only one exception, (Parrott Farm; Alternative 2), all of these uses are the result of minor strip takings for which the SHPO has concurred that there are no direct Adverse Effects. For these uses, a *de minimis* Section 4(f) finding may be appropriate, if one of these alternatives were to be selected. With notification of the public of the intent to make a Section 4(f) *de minimis* finding, all criteria for such a finding will have been satisfied.

It should be noted that though there are no adverse effects related to the direct use of the Crozier/Ballard Farm (FS 1) or the Blanford Farm (FS 2) for Alternatives 2, 2A, 3, and 5, there is an indirect adverse effect as a result of the intrusion of the improved roadway into the setting of these properties. These intrusions do not substantially impair the features or attributes that qualify the property for protection under Section 4(f); therefore, there is no constructive use.

Table 12: Section 4(f) Use (acres)

Site Name (Field Site #)	Alternative					
	1	2	2A	3	4	5
Botland Rural NRHP District (FS 9 - FS 17)	0.06					
Crozier/Ballard Farm (FS 1)	0.06	1.08	1.08	1.08	0.06	1.08
Blanford Farm (FS 2)		0.82	0.82	0.82		0.82
Allen House (FS 6)						
Parrott Farm (FS 22)	0.07	3.67	0.62			
Eddleman Farm (FS 30)	0.06			0.10	0.10	0.06
Crume House/Outbuildings (FS 44)	0.02					
Nally Farm (FS 52)				0.77	0.77	0.77
Farm (FS 54)				0.76	0.76	0.76
Farm (FS 56)	0.01	0.18	0.18	0.18	0.01	0.18
Log House/Outbuildings (FS 58)						

Alternative 2 would have an adverse effect on the Parrott Farm (FS 22), severing this historic property near the main building cluster and requiring the use of approximately 3.67 acres from near the middle of the property. The alternative would result in removal of at least two historic buildings, the Parrott Farmhouse (NE-644) and the Parrott/White House, and would have a *Direct Adverse Effect* on this historic property. Furthermore, Alternative 2 would also result in an *Indirect Adverse Effect*, as it would render the property unusable as a farm, leading to an alteration in use that would destroy, alter, impede, or encourage neglect to the characteristics that qualify this property for NRHP listing. With the availability of a reasonable and prudent avoidance alternative, Alternative 2 was dismissed from further consideration due to Section 4(f) impacts. An alternative with the advantages of the Alternative 2 corridor that minimized impacts to the Parrott Farm was developed as Alternative 2A.

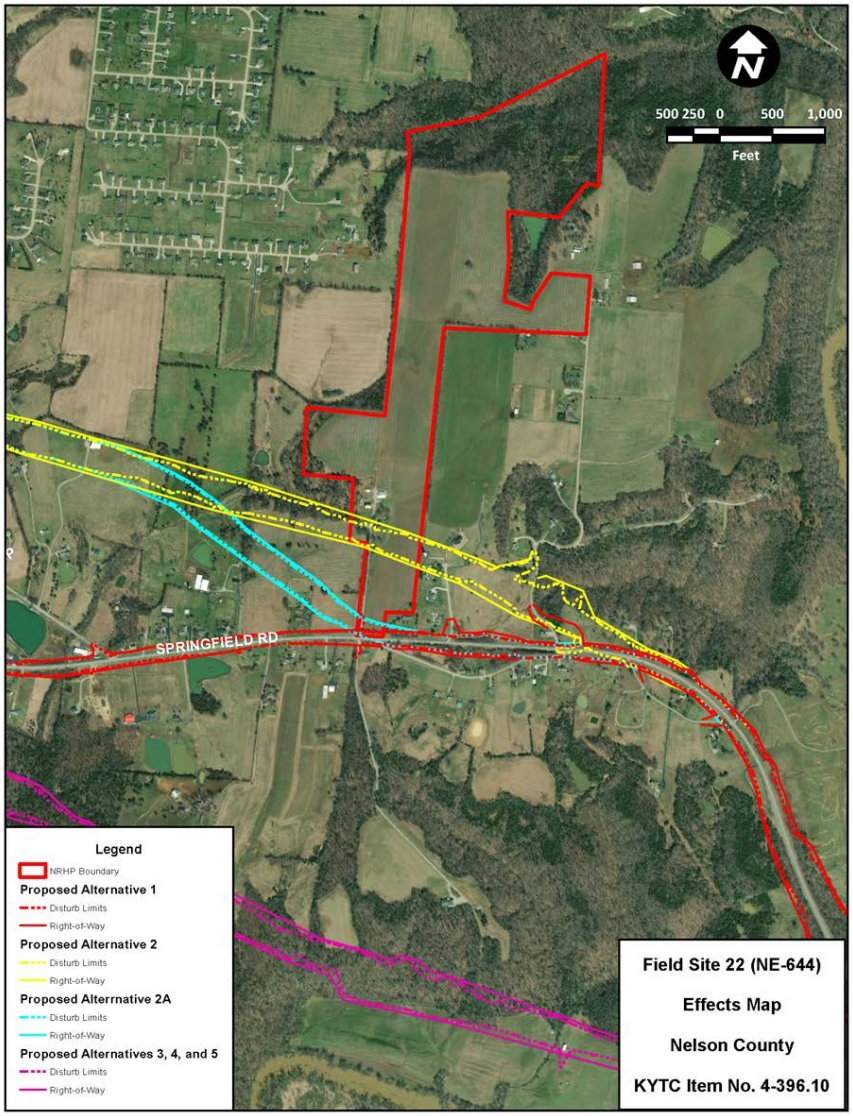


Figure 30: Parrott Farm (FS 22) Impacted by Alternative 2

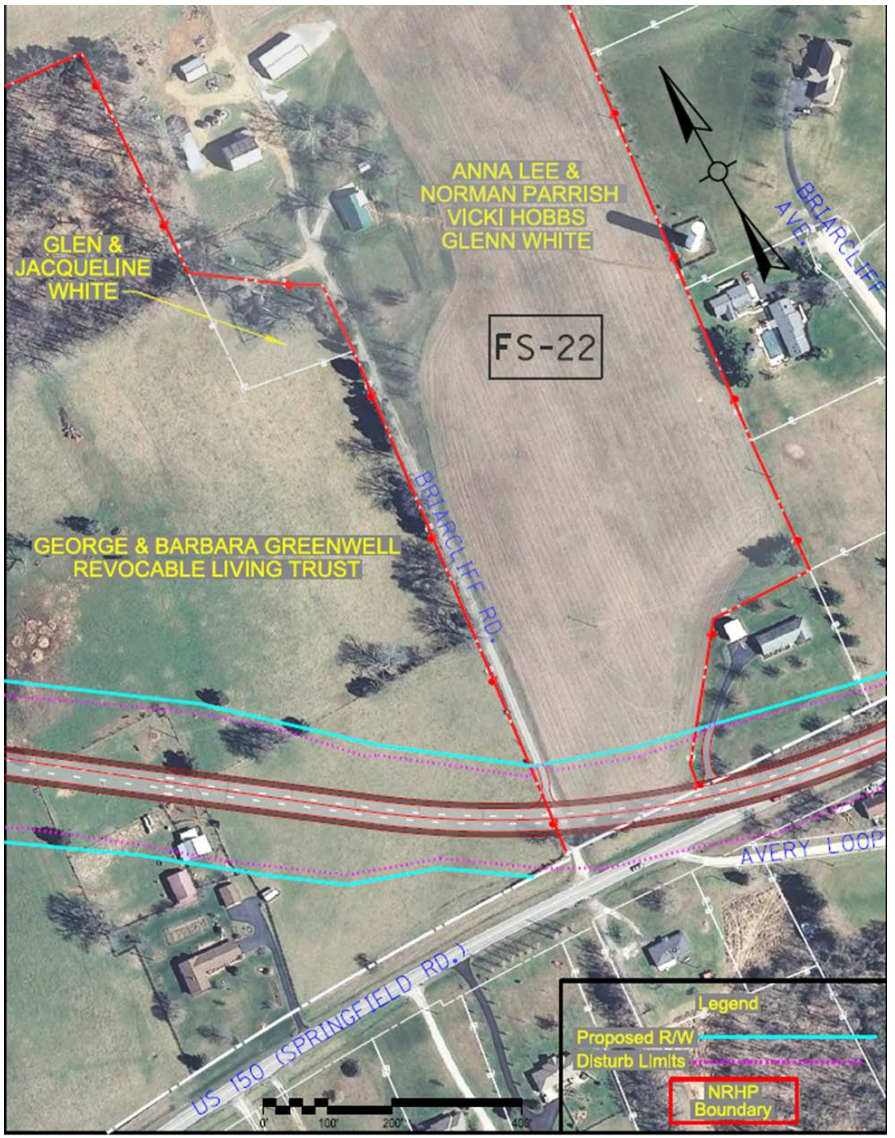


Figure 31: Parrott Farm (FS 22) Strip Taking from Alternative 2A

3.5.2 Section 6(f)

Federal Land and Water Conservation Act (LWCF) funds are often used to purchase or improve lands that are used for parks, conservation, recreation, or similar purposes. Those purchases and improvements are protected under Section 6(f) of the act and any impacts require an in-kind replacement and approval from the Secretary of the Interior. Field reconnaissance did not identify any recreational properties in proximity to the alternatives where LWCF funds might have been used. A database review (October 3, 2019) of all LWCF grants issued for Nelson County (https://www.lwcfcoalition.com) did not reveal any properties purchased or improved with LWCF funds that would be impacted by any alternatives associated with this project. LWCF grants have been used at several locations in Nelson County but none that are proximate to any of the proposed alternatives. The closest use occurred at Bardstown Community Park, which is located approximately three miles east of the project area. A complete list of the properties in the area where LWCF grants have been used can be found in Appendix H.

3.6 Land Use and Economic Base

Land uses in Nelson County are predominantly agricultural and rural residential. Existing and historical land uses in the Study Area were determined by analyzing historic aerial photographs. This analysis showed that the Study Area was once rural/wooded and residential; changes from relatively passive land uses to more intensive land uses began in the late 1980s. Nelson County ranks 28th in the state of Kentucky for land area, with approximately 418 square miles. Population density for Nelson County is approximately 104 people per square mile. An Agricultural District is located near the western end of the project area.

In 2016, 961 business establishments were listed in Nelson County. Retail trade accounted for the largest percentage (16.13%) of business, followed by health care and social assistance (14.57%). Construction comprised 12.59% of business establishments, while the following industries each comprised less than 10% of the business establishments: agriculture, forestry, fishing, and hunting; mining, quarrying, and oil and gas extraction; transportation and warehousing; utilities; manufacturing; wholesale trade; information; finance and insurance; real estate and rental and leasing; professional, scientific, and technical services; management of companies and enterprises; administrative and support and waste management and remediation services; arts, entertainment, and recreation; accommodation and food services; other services (except public administration); and industries not classified. As of 2016, there were 4,383 persons working in manufacturing, which accounted for 28.70% of the workforce. Retail Trade employed 1,933 persons (12.66%); 1,793 persons (11.75%) were employed in Information; 1,350 persons (8.84%) were employed in Health Care and Social Assistance; 1,281 persons (8.39%) were employed in Accommodation and Food Services; 1,121 persons (7.34%) were employed in Construction; 1,008 (6.60%) were employed in Administrative and Support and Waste Management and Remediation Services. Less than 5% of employees were employed in each of the following industries: Wholesale Trade; Transportation and Warehousing; Finance and Insurance; Professional, Scientific, and Technical Services; Real Estate and Rental and Leasing; Arts, Entertainment, and Recreation; Utilities; Educational Services;

Other Services (except Public Administration); and Industries Not Classified. The Management of Companies and Enterprises category and the Mining, Quarrying, and Oil and Gas Extraction category are estimated between 20-99 employees each.[2]

3.7 Community Impacts

No impacts to community resources, public facilities, institutions, or major employers are anticipated as a result of the proposed project. This section provides detail regarding the impacts to the community that may occur as a result of the project. The *Social and Economic Impact Analysis* for this project is located in Appendix I.

3.7.1 Socioeconomic and Demographic Characteristics

3.7.1.1 Industry

Nelson County is home to several businesses and industries, including American Fuji Seal, Inc.; Armag Corporation; Ballard, Inc.; Chris's Custom Cabinets; FET Engineering, Inc.; Flowers Foods, Inc.; Heaven Hill Distilleries, Inc.; INOAC Packaging Group, Inc.; Johnan America, Inc.; Mago Construction Co., LLC; Mitsuba Bardstown, Inc.; NPR of America, Inc.; ORBIS Corporation; Polyair Corporation; Sazerac Distillers, LLC; Tower International, Inc.; Toyota Boshoku Kentucky, LLC; and Trade Winds Transit, Inc. As of June 2019, American Fuji Seal, Inc. was the largest employer in Nelson County, with 593 employees. Tower International, Inc., which manufactures metal and automotive stampings and assemblies, is the second-largest employer, with 536 employees.[4]

Businesses in the Study Area include a Dollar Store, the Quick Stop gas station and food mart, an Amish furniture shop, Bardstown Wine and Spirits, several storage-building facilities, and various automotive businesses.

From 2014-2018, the unemployment rate in Nelson County was below or equal to that of Kentucky; it was equal to or below the national unemployment rate until 2018 (see Table 13).

Table 13: County, State, and National Unemployment Rates 2014 - 2018[3]

Year	Nelson County	Kentucky	United States
2014	6.1%	6.5%	6.2%
2015	5.1%	5.4%	5.3%
2016	4.5%	5%	4.9%
2017	4.4%	4.9%	4.4%
2018	4.3%	4.3%	3.9%

[2] United States Census Bureau, 2016 County Business Patterns. http://factfinder.census.gov.

[3] www.thinkkentucky.com

3.7.1.2 Population

According to U.S. Census information, Nelson County had a population of 43,437 in 2010 (see Table 14). From 2000 to 2010, Nelson County experienced a 16% increase in population.[4] The Study Area lies wholly within and is represented by Census Tract 9305, Block Group 1 (formerly Census Tract 9905, Block Group 1), which had a population of 4,003 in 2010. Population for the state and projections for the labor market are shown in Tables 15 and 16. Census Tracts are outlined in Figure 32.

Table 14: Population History of Census Tract Block Groups, County, and Kentucky[5]

Area	2000	2010
Census Tract 9305*, Block Group 1	2,699	4,003
Nelson County	37,477	43,437
Kentucky	4,041,769	4,339,367

* In 2000, this Census Tract Block Group was numbered 9905.

Table 15: Population History of the Study Area Development District (ADD)[6]

	1980	1990	2000	2010
KRADD	217,666	219,101	243,202	269,117

Table 16: Population Projections for ADD, County, and State of Kentucky[7]

Area	2020	2025	2030	2035	2040
Nelson County	47,473	49,702	51,695	53,337	54,752
LTADD	280,073	288,060	295,050	300,860	305,801
Kentucky	4,533,464	4,634,415	4,726,382	4,808,682	4,886,381

3.7.1.3 Ethnic Characteristics

According to the 2010 Census, of the 43,437 people in Nelson County, 3,505 (8.07%) were non-white. In 2010, Census Tract data show 3,788 (94.63%) individuals were White, 109 (2.72%) were Black, 4 (0.10%) were American Indian or Alaska Native, 29 (0.72%) were Asian, and 73 (1.82%) were of other races. The largest minority population in Nelson County is Black (5.03%). Persons of Hispanic origin comprise 2.04% of the population of the county. While Hispanic persons are counted among Census demographic reports, "Hispanic" does not refer to a specific race, and thus is not a minority racial classification.

The Study Area Census Tract Block Group has a low minority percentage and is within three percentage points of the county's ethnic composition (see Table 17). A notable difference between county and Census

[4] Kentucky Decennial Census Data; U.S. Census Bureau, Population Division. http://ksdc.louisville.edu.
[5] United States Census Bureau 2013-2017 American Community Survey. http://quickfacts.census.gov
[6] Kentucky Decennial Census Data; U.S. Census Bureau, Population Division. http://ksdc.louisville.edu.
[7] Population Projections 2015-2040. http://ksdc.louisville.edu.

Tract Block Group data is the Black population in Census Tract 9305, Block Group 1. The Block Group has a Black population of 2.72% compared with 5.03% in the county as a whole.

Table 17: Year 2010 Populations by Race & Hispanic Origin[8]

Category	Nelson County		Census Tract 9305 Block Group 1	
	TOTAL	%	TOTAL	%
White	39,932	91.93%	3,788	94.63%
Black	2,183	5.03%	109	2.72%
American Indian and Alaska Native	54	0.12%	4	0.10%
Asian	218	0.50%	29	0.72%
Native Hawaiian and Other Pacific Islander	9	0.02%	2	0.05%
Some Other Race	338	0.78%	16	0.40%
Two or more Races	703	1.62%	55	1.37%
Total All Races	43,437	100.00%	4,003	100.00%
Hispanic or Latino	888	2.04%	55	1.37%

3.7.1.4 Per Capita Personal and Household Income

According to 2013 – 2017 U.S. Census Data, the median household income for Census Tract 9305, Block Group 1, was $65,313 (see Table 18). Census Tract 9305, Block Group 1, had higher median household and per capita incomes than the county and state.

Table 18: Census Tract, County, and State Per Capita and Median Household Income[9]

Income	Census Tract 9305 Block Group 1	Nelson County	Kentucky
Per Capita	$34,559	$28,156	$25,888
Median Household	$65,313	$55,182	$46,535

[8] 2000 and 2010 U.S. Census Data. www.factfinder2.census.gov

[9] 2013-2017 American Community Survey 5-Year Estimates. www.factfinder2.census.gov

The 2013-2017 Census data showed that individuals living in Census Tract 9305, Block Group 1, were less likely to be impoverished than the remainder of Nelson County, with a poverty rate of 5.2% (see Table 19).

Table 19: Percentage of Individuals Living in Poverty[10]

Area	%
Kentucky	18.3%
Nelson County	11.4%
Census Tract 9305 Block Group 1	5.2%

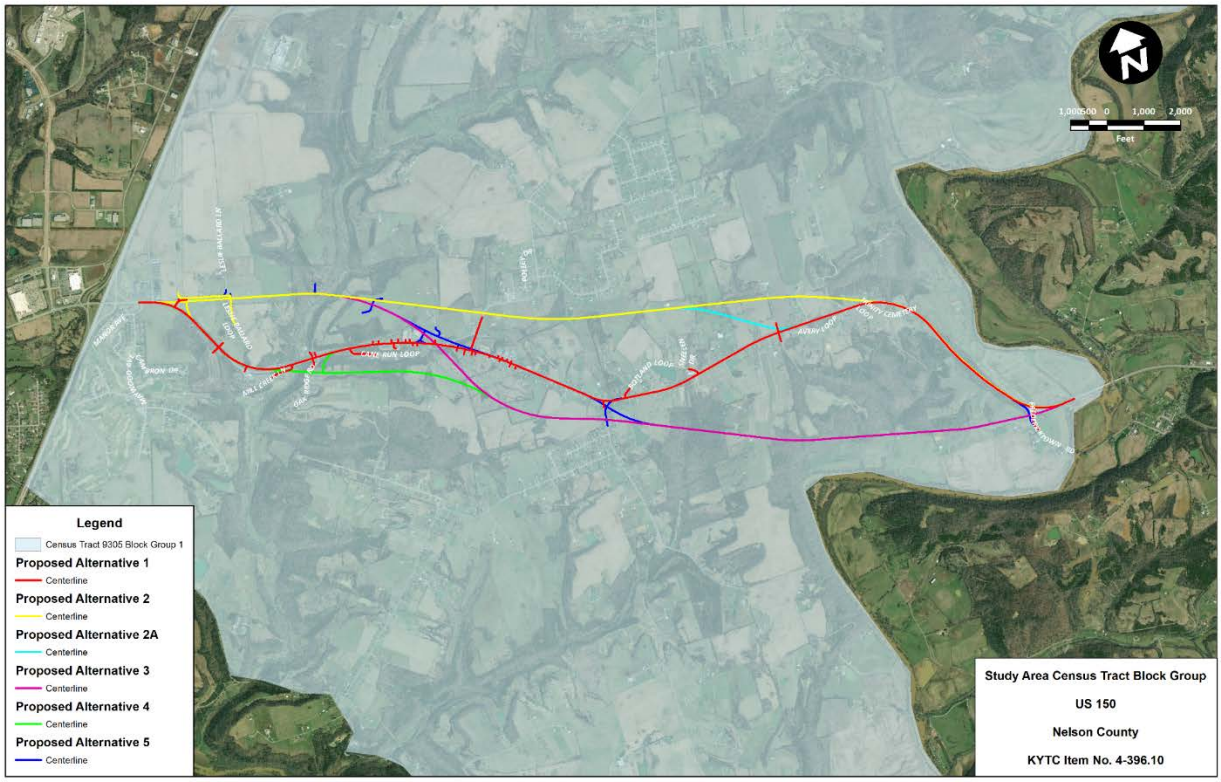


Figure 32: Census Tract 9305, Block Group 1

3.7.2 Right-of-Way Requirements, Relocations, and Displacements

Construction of the roadway will necessitate the conversion of lands currently in agricultural, residential, commercial, and other uses, to transportation use. The right of way required for each alternative is detailed in Table 20. Due to terrain, constructability, and other engineering considerations, relocations are unavoidable, though efforts will be made throughout the project development process to minimize the required relocations to the extent practicable.

[10] 2013-2017 American Community Survey

Table 20: Right-of-Way Requirements

	Alternatives					
	1	2	2A	3	4	5
Right of Way	56 ac; 119 parcels	133 ac; 60 parcels	133 ac; 60 parcels	191 ac; 54 parcels	182 ac; 60 parcels	167 ac; 64 parcels

3.7.2.1 Residential and Business Relocations

Residential relocations are spread throughout the Study Area. When compared to KYTC projects of a similar scale, the number of residential relocations are relatively low. Depending on the alternative, one to seven relocations will be required for project construction.

As of the time of the Social and Economic Impact Analysis, supplemental housing data indicated that 194 single-family homes were for sale within Nelson County. Specific housing surveys of the local housing market, as represented in internet real estate listings, indicated that adequate, decent, safe, and sanitary replacement housing within owners' financial means will be available in Nelson County. It is expected that families will be able to relocate within the same communities, should they so desire. There is a high degree of certainty that displacees' needs can be addressed in a normal manner without any undue hardship. One of the residences affected by Alternative 2A is a mobile home and could potentially be physically relocated.

Some residents, especially those affected by the off-corridor alignments that impact sizeable agricultural properties, may have the opportunity to relocate on sufficient remainders of their parcels. Last Resort Housing measures will be made available for use on a case-by-case basis, as necessary.

Alternatives 1 and 4 would impact the same business, Bardstown Auto Repair, and Alternatives 1 and 5 would impact the Bardstown Wine and Spirits liquor store (Table 21). None of the other alternatives have any business impacts. These businesses are located so close to the existing roadway that the widened roadway would impact their structures. Some businesses along the corridor are destination services; however, there are several, such as a gas station, that have greater reliance on drive-by traffic for their customers.

Table 21: Residential and Business Relocations

	Alternative 1	Alternative 2	Alternative 2A	Alternative 3	Alternative 4	Alternative 5
Relocations	23	2	4	5	7	0
Business	9	0	0	0	1	1

Interviews with businesses along the US 150 corridor were undertaken in the spring and summer of 2019. The owner of a gas station was concerned that the loss of traffic would negatively affect their business and employees. They rely on customers who drive by to purchase gas or convenient store items.

Diversion of traffic to the new off-corridor alignment may have the effect of decreasing visibility to some businesses located along the existing alignment. However, the new route would also open opportunities for new development that would potentially offset these impacts. Because a large portion of KY 605 traffic is traveling to either Bardstown or the Bluegrass Parkway, Alternatives 2 and 2A leave a larger residual traffic flow past the local businesses on the portion of existing US 150 that will remain as a local road. The improvements to US 150 will provide safer, more efficient travel, which may provide positive indirect impacts to the businesses in the Study Area.

3.7.2.2 Relocation Assistance

To minimize the unavoidable effects of right-of-way acquisition and displacement of people, the KYTC offers a Relocation Assistance Program in accordance with the *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970* (Public Law 91-646), as amended in 1987. Housing and relocation resources would be available to all residential and business relocatees without regard to race, creed, color, national origin, or economic status, as required by Title VI of the *Civil Rights Act of 1964*. In accordance with *Environmental Justice Executive Order 12898*, an analysis was conducted to identify any geographic areas containing disproportionately high concentrations of minority or low-income households. The potential relocatees' housing was observed to include a mobile home and single-family dwellings of varying ages and sizes. Real estate databases were consulted for the *Social and Economic Impact Analysis* and for this EA to confirm that comparable housing is available in proximity to the Study Area. It appears that an ample amount of comparable replacement housing is available to accommodate the potential relocations on this project.

3.8 Environmental Justice

The purpose of Executive Order 12898, Federal Actions to Address Environmental Justice (EJ) in Minority and Low-Income Populations, is to focus Federal attention on the environmental and human health condition in minority and low-income communities, to promote non-discrimination in Federal programs affecting human health and the environment, and to provide minority and low-income communities access to public information and an opportunity to participate in matters relating to the environment and human health. The KYTC's *2014 Guidance Developed for Environmental Justice Analysis* was followed to identify EJ populations that might be impacted by the proposed alternatives.

As discussed above, 91.93% of individuals in Nelson County are white with minorities representing the remaining 8.07% of the population. The entire project Study Area is located within a single census tract consisting of a single block group (Census Tract 9305 Block Group 1). Comparing the affected block group with Nelson County as a whole, ethnic characteristics vary slightly with the block group's percentage of White population at 94.63%, while the county's White population is 91.93%. A notable difference between county and census tract block group data is the Black population. In the block group, the Black population represents only 2.72% of that area, whereas the Black population of the whole county is 5.03%.

Windshield surveys and interviews did not identify any areas where low-income or minority populations are predominantly located; those populations appear to be dispersed throughout the area. None of the

alternatives will impact any businesses or organizations that provide services or support to EJ populations. Impacts to the EJ populations will not substantially differ from those effects to be realized by the remaining population. Benefits of the project in the form of improved safety and reduced travel times will be recognized by all area residents and travelers.

Based on the above discussion and analysis, the US 150 reconstruction project is not expected to cause disproportionately high and adverse effects on any minority or low-income populations in accordance with the provisions of Executive Order 12898 and FHWA Order 6640.23.

3.9 Agricultural Impacts

Nelson County makes a considerable contribution to Kentucky's agricultural industry. In 2017, Nelson County ranked 29 of the total 120 Kentucky counties in the total value of agricultural products sold. Nelson County's top crop item was "Corn for grain" and its top livestock inventory item was "Cattles and calves inventory."

The total market value of agricultural products sold by Nelson County farms increased 4.1% from $64,439,000 in 2007 to $67,099,000 in 2012. Livestock sales accounted for 35% of agricultural products sold, while crop sales constituted 65%.[11]

Table 22 shows a slight decrease in the number of farms in Nelson County during the past 100+ years, while the average size of farms has increased. Total farm acres in Nelson County has increased slightly in the last 40 years.

Table 22: Historical Farm Numbers and Acreages[12]

Year	Number of Farms	Total Farm Acres	Average Farm Size
1909	1,752	228,650	130
1919	1,869	228,932	122
1929	2,081	225,014	108
1939	1,968	232,073	118
1949	1,987	243,720	123
1959	1,586	234,860	184
1969	1,548	232,707	150
1978	1,416	199,123	141
1987	1,369	202,339	148
1992	1,423	191,002	134
1997	1,401	185,507	132
2002	1,407	189,104	134
2012	1,326	187,755	142
2017	1,434	213,534	149

[11] www.agcensus.usda.gov.

[12] National Agricultural Statistics Service. www.nass.usda.gov.

A small Agricultural District is located at the western end of the Study Area (See Figure 33, Map 1 of 4). Participating in the Agricultural District program is voluntary and does not affect right of way or other processes associated with the proposed project.

Mapping of the build alternatives, with corresponding right-of-way requirements, was submitted to the Nelson County Natural Resources Conservation Services (NRCS) offices for a Land Evaluation and Site Assessment (LESA).The assessment is intended to protect farmland and assess factors that are important about the affected land other than its agricultural value alone. These criteria are scored and impacts resulting in scores of 160 or less are given a minimal level of consideration for protection. As a part of this scoring, the LESA form identifies prime and/or unique farmland located within the project impact area (see Appendix J).

A summary of the prime farmland impacts and LESA scores is presented in Table 23. These impacts are anticipated to be minor and do not require additional mitigation. If design modifications result in substantially greater impacts to farmland, further coordination with the NRCS will be undertaken to consider the effects of those modifications.

Table 23: Prime Farmland Impacts (Acres/LESA Score)

	Alternatives					
	1	2	2A	3	4	5
Prime Farmland Impacts (ac)	0.1	10.1	9.1	10.9	5.0	6.7
LESA Score	62	106	128	132	89	102

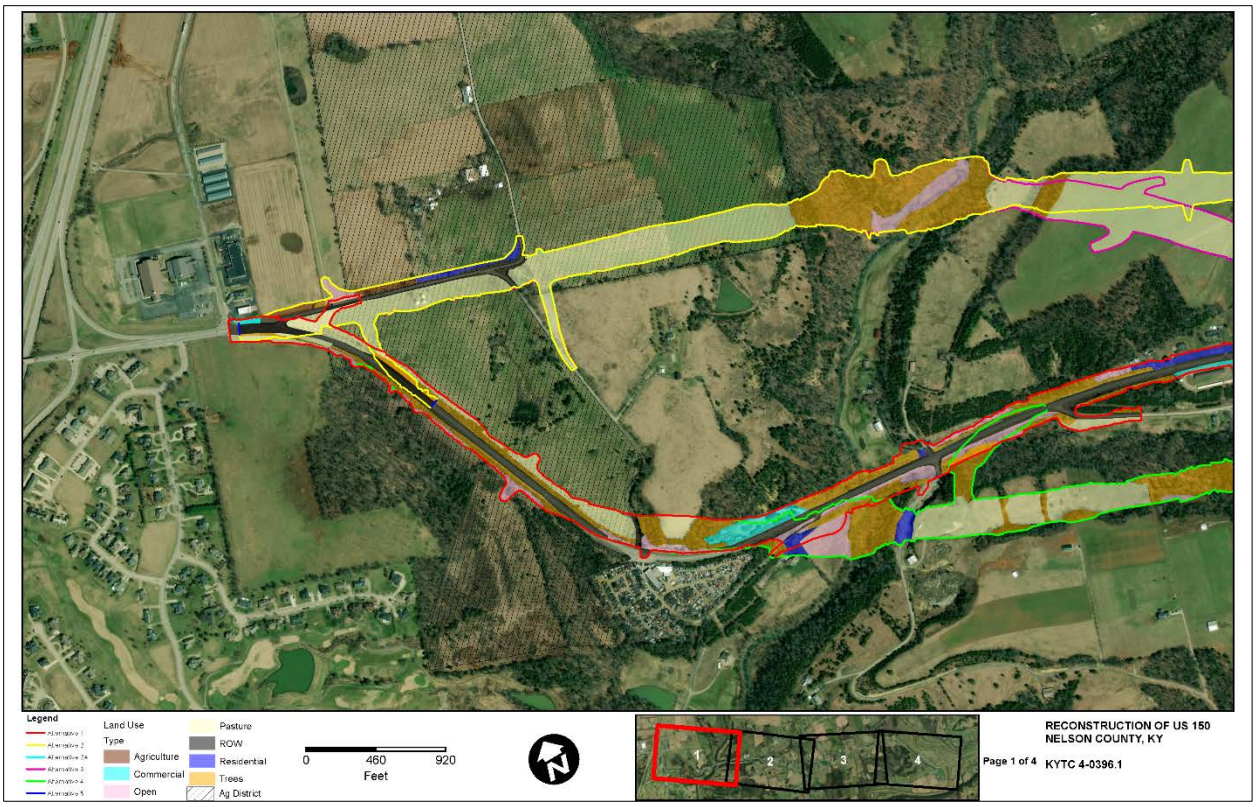


Figure 33: Land Use Map (1 of 4)

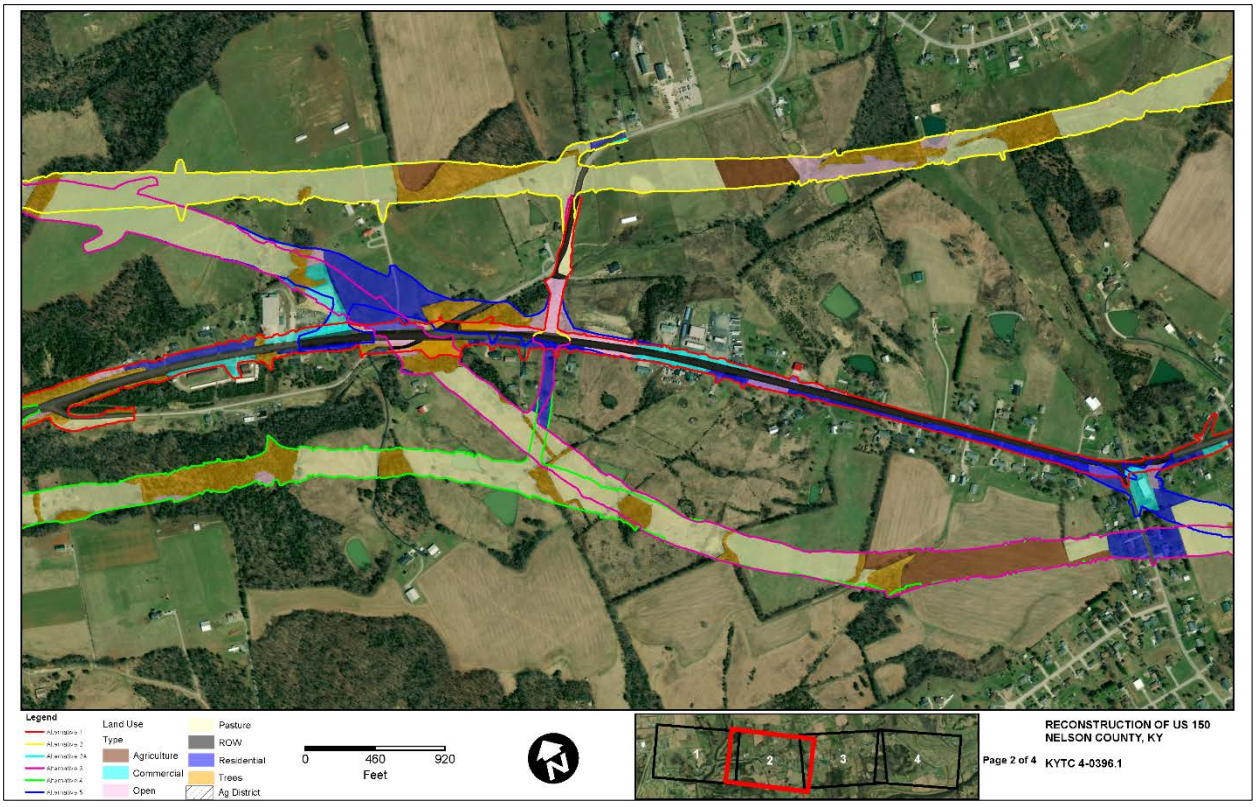


Figure 34: Land Use Map (2 of 4)

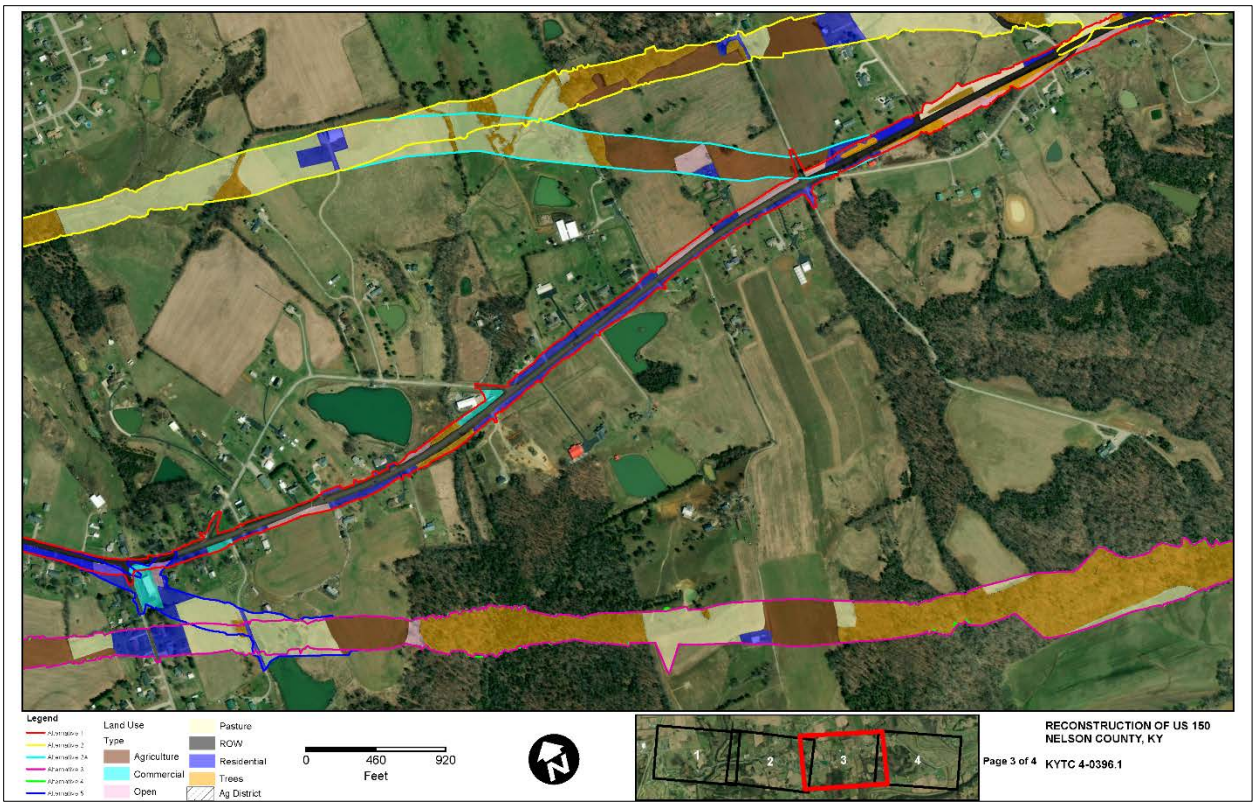


Figure 35: Land Use Map (3 of 4)

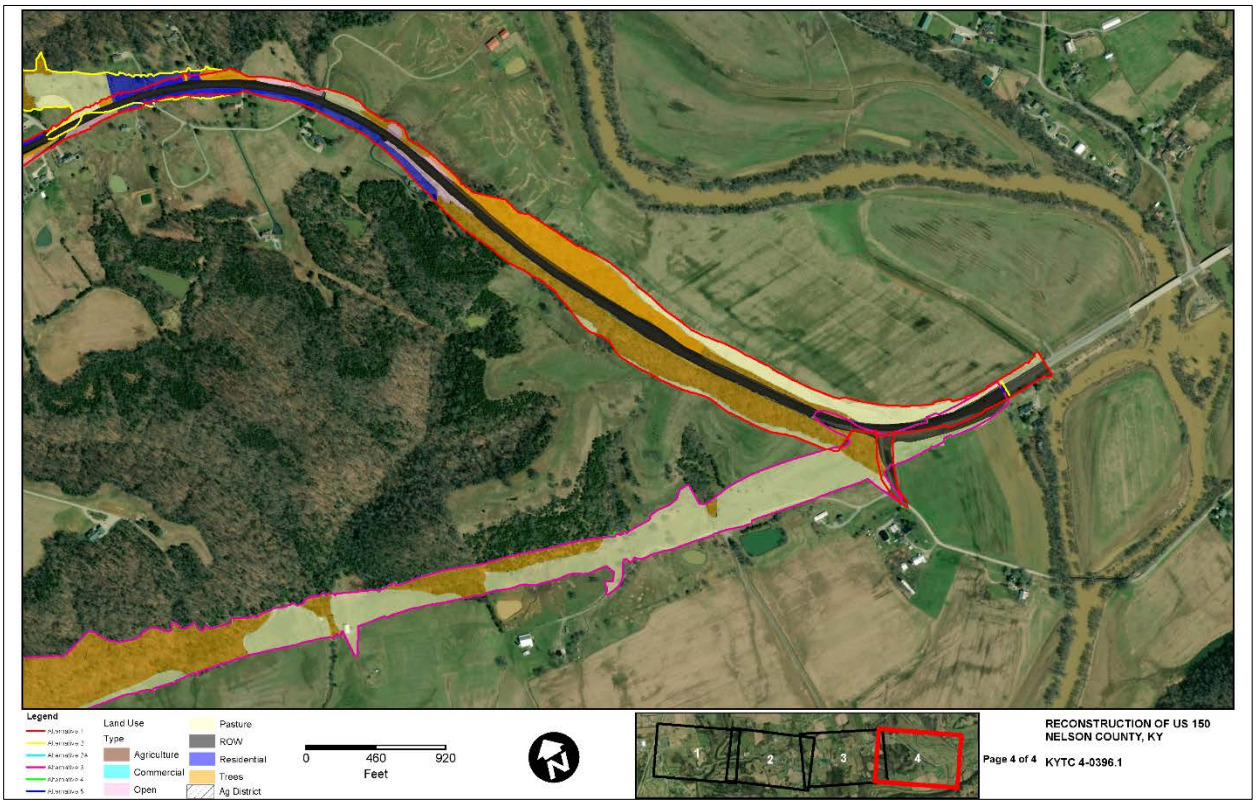


Figure 36: Land Use Map (4 of 4)

3.10 Pedestrian and Bicycle Facilities

Bicycle and pedestrian facilities do not currently exist on US 150, on other roads being crossed by US 150 in the Study Area, or on roads in the areas surrounding the project. The LTADD's 2019 Comprehensive Economic Development Strategy recommends accommodation of bicycles and pedestrians by the project. The 2019 Nelson County Traffic Forecast (Appendix C) developed for the project by the KYTC, includes various measures for accommodating bicycle and pedestrian traffic. These range from inclusion of a multi-use path to modifying rumble strip configurations on the shoulders.

With the exception of the most urban sections on Alternatives 1 and 5, eight-foot paved shoulders will be constructed throughout the corridor. These will accommodate pedestrians and cyclists who may choose to use this route. This option follows the recommendation in the 2019 Traffic Forecast to provide "Good" accommodation for these other travel modes. This design is compliant with the FHWA Bicycle and Pedestrian Design Guidance and with the KYTC Pedestrian and Bicycle Travel Policy. Pedestrian and bicycle safety and mobility would not be improved under the No-Build Alternative.

3.11 Hazardous Materials

Hazardous materials are substances that have or would have, when combined with other materials, a harmful effect on humans or the natural environment. Hazardous materials are regulated under the Resource Conservation and Recovery Act (RCRA) of 1976, as amended; the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980; and the Superfund Amendments and Reauthorization Act (SARA) of 1986. Additionally, asbestos is regulated under the CAA through the National Emission Standards for Hazardous Air Pollutants.

Several resources were utilized during the Phase I Environmental Site Assessment (ESA) conducted for the proposed project, including regulatory databases; coordination with state, local, and federal environmental agencies; aerial photographs and topographic maps; Sanborn information; and on-site field investigations. A database report provided by Environmental Data Resources, Inc. (EDR) of Shelton, Connecticut, identified 13 reported references with potential environmental concerns. Data from this report was reviewed with consideration of the alternative alignments to identify locations for field review. In total, 21 potential hazardous material sites were evaluated along the proposed alternative corridors. Seven sites with potential environmental concerns were located within or adjacent to the build alternatives during field reconnaissance. The Phase I ESA is included in Appendix K.

Several 55-gallon drums and other potential hazardous materials containers were observed at private residences, farms, and businesses during site reconnaissance. Dump sites that are located at businesses, farms, and private residential property may contain hazardous waste. These sites could pose an issue during construction due to the potential for contaminated soils. Several agricultural structures (barns, sheds, etc.) were observed and it is expected that fertilizers, insecticides, and herbicides have likely been used in farming practices and may have been stored at these locations. Figure 37 shows the location of the identified sites with potential Recognized Environmental Conditions (RECs).

Table 24 identifies these sites and the alternative(s) that could be affected by the past use of these properties. Alternative 1 impacts the greatest number of sites of concern (7) due to the development and historic use of properties along the existing corridor. All of the alternatives have a potential minimal impact on the Maywood Gas Station, the only property with an REC that is impacted by Alternatives 2, 2A, and 3. Alternatives 4 and 5 each impact a total of four properties with RECs.

Based on the review of the aforementioned records and site reconnaissance, a Phase II investigation may be advisable prior to right-of-way acquisition or construction affecting properties of concern, if impacted by the selected alternative. In addition, as noted in the Environmental Overview included in the 2015 Scoping Study, provisions should be considered during detailed design to treat runoff from exposed New Albany Shale rock cuts, if any are left by the construction. This finding, however, does not constitute a REC for the property as defined by ASTM-E1527-13.

Asbestos survey and sampling will be completed, as appropriate, for structures to be demolished for the road construction. Asbestos sampling should also be considered for any bridges to be removed along the selected alternative. In addition, in the event that hazardous substances/wastes are encountered within the proposed right of way, their disposition shall be subject to the applicable sections of RCRA of 1976, as amended and CERCLA of 1980, as amended.

Spills on highways are also a potential source of water quality degradation and a possible public health hazard. The Kentucky Division of Emergency Management and the Kentucky Division of Waste Management have responsibilities and authority for coordination of state and local agencies during accidents involving hazardous materials.

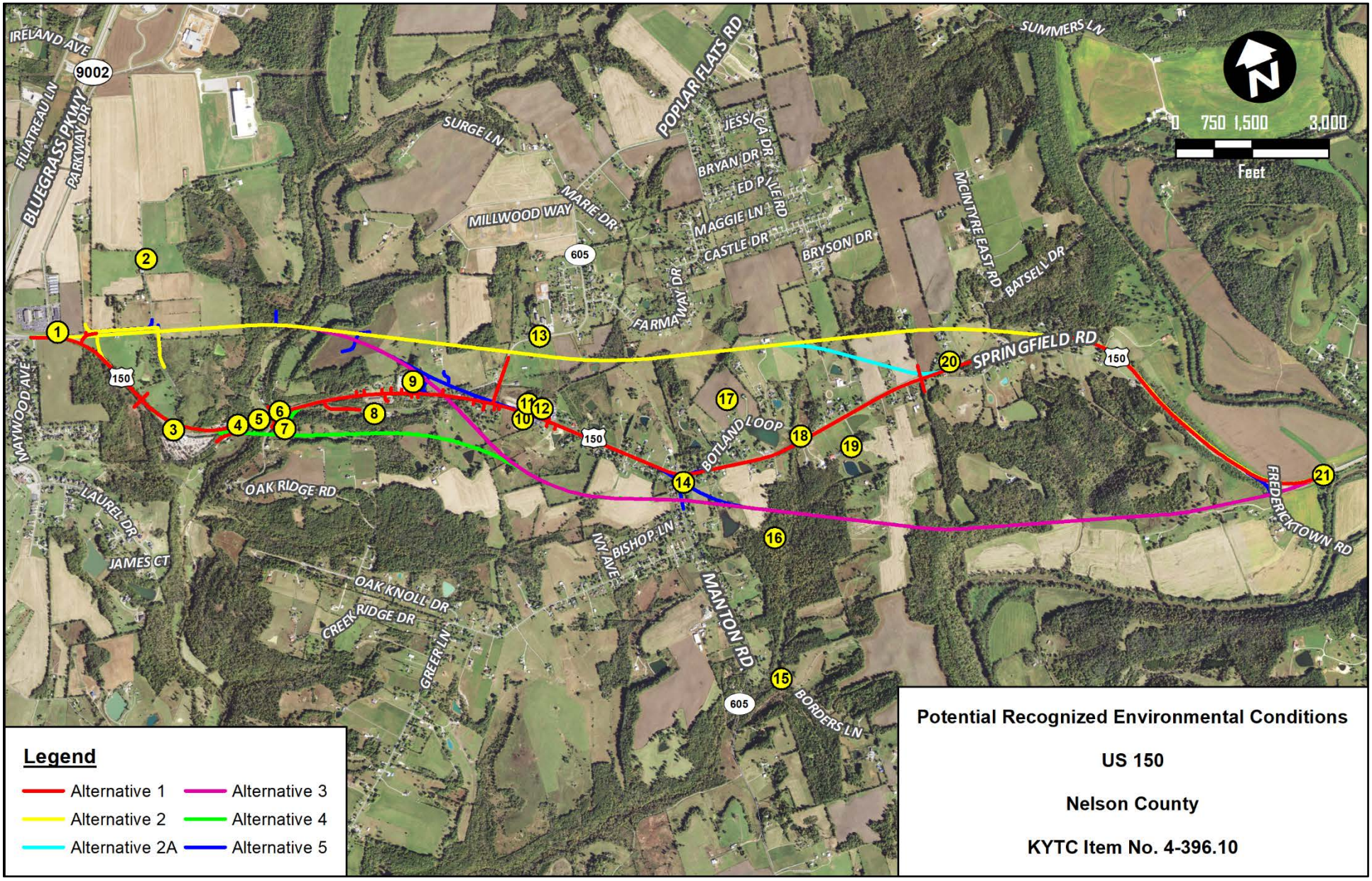


Figure 37: Locations of Potential Recognized Environmental Conditions

Table 24: Potential Hazardous Material Sites

Site Name	Alternatives Impacting Site	Identification Source	Recognized Environmental Condition
Site 1 – Maywood Gas Station	Alternatives 1, 2, 2A, 3, 4, 5	EDR Area/Corridor Report	Yes
Site 2 – Residence	N/A	Site reconnaissance	No
Site 3 – Bardstown Auto Wreckers	Alternatives 1, 4, 5	EDR Area/Corridor Report	Yes
Site 4 – Bivens Automotive	Alternatives 1, 4	EDR Area/Corridor Report	Yes
Site 5 – Overturned Concrete Truck Spill	Alternatives 1, 4	Site reconnaissance	No
Site 6 – Flooding Concerns	Alternatives 1, 4	Site reconnaissance	No
Site 7 – Excavation Site	Alternatives 1, 4	Site reconnaissance	No
Site 8 – Farm	N/A	Site reconnaissance	No
Site 9 – Taylor Welding and Fabricating	Alternatives 1, 3, 5	EDR Area/Corridor Report	Yes
Site 10 – Bardstown Dollar General	Alternatives 1, 3, 4, 5	Site reconnaissance	No
Site 11 – Burkhead Collision Center	Alternatives 1, 2, 2A, 3, 4, 5	Site reconnaissance	No
Site 12 – Quick Stop Gas Station	Alternatives 1, 5	EDR Area/Corridor Report	Yes
Site 13 – Mill Creek Baptist Church	Alternatives 2, 2A	Site reconnaissance	No
Site 14 – Botland Liquors, Former Gas Station	Alternatives 1, 4, 5	EDR Area/Corridor Report	Yes
Site 15 – Bear Creek Drums	N/A	Site reconnaissance	No
Site 16 – Farm	N/A	Site reconnaissance	No
Site 17 – AT&T Mobility	N/A	Site reconnaissance	No
Site 18 – Hutchins Bros. Trucking/Allied Plumbing	Alternative 1	EDR Area/Corridor Report	Yes
Site 19 – Runoff from Dairy Operation	N/A	Site reconnaissance	No
Site 20 – Bardstown Water Tower	Alternatives 1, 2A	Site reconnaissance	No
Site 21 – US 150 Bridge	Alternatives 1, 2, 2A, 3, 4, 5	Site reconnaissance	No

3.12 Visual

In the Study Area, the existing US 150 corridor is dominated by agricultural, light residential, and commercial land uses with interspersed forested areas. The view from the existing road varies from agricultural and dispersed residential/commercial development on the eastern and western ends of the Study Area to a more compactly developed area in the Botland vicinity. In-filling of additional residential and commercial development along the existing corridor might be expected with selection of Alternative 1, which would improve along the existing corridor.

The off-corridor build alternatives would largely convert rural residential and agricultural land uses to transportation right of way. The off-corridor alignments would alter the existing viewshed by removing trees, fields, and houses; however, there are few homes and businesses that would remain adjacent to the proposed build alternatives, and therefore, any visual impacts would affect few residents and businesses. Travelers using the relocated section of US 150 would, at least initially, experience a more rural viewshed with very little development along the corridor, when compared to the existing US 150. It is unknown whether the viewshed would evolve over time; immediate development along the new corridor is not expected.

Overall, although the build alternatives will have visual effects, those effects would not be adverse.

3.13 Construction Impacts

The proposed project is anticipated to produce a beneficial, short-term economic impact by stimulating the local economy in terms of construction-related jobs, sales, income, government revenue, and expenditures. Highway construction activities would have minimal and temporary air, water quality, noise, traffic circulation, and associated impacts in the area. Adherence to the KYTC's *Standard Specifications for Road and Bridge Construction* (*KYTC's Standard Specifications),* and conditions of required permits will minimize these temporary impacts.

Air Quality: The air quality impact would be temporary, and primarily in the form of diesel-powered construction equipment emissions and dust from exposed earth. Air pollution associated with mobilized airborne particles would be effectively controlled through the use of watering or the application of calcium chloride in accordance with the KYTC's *Standard Specifications,* as directed by the KYTC Resident Engineer. All equipment shall be maintained to a satisfactory condition to minimize pollutant emissions. Structures will only be removed after completion of an assessment for the presence of asbestos and appropriate notification of regulatory agencies, as applicable.

Noise: Vibration and noise impacts would originate from the movement of heavy equipment, blasting, pile driving, and vibratory compaction of embankments. Noise control measures, as outlined in the KYTC's *Standard Specifications*, will be enforced by the KYTC Resident Engineer. The KYTC will be responsible for assessing construction noise and notifying the contractor of excessive noise levels.

Traffic Circulation: Construction sequencing and maintenance of traffic would be planned and scheduled to minimize traffic delays. Coordination with local fire, EMS, hospitals, etc. would occur prior to construction to assure adequate accessibility for emergency vehicles is maintained. Signs would be used,

as appropriate, to provide notice of road closures and other pertinent information to the traveling public. The local news media would be notified in advance of road closings and other construction-related activities that could excessively inconvenience the local residents, allowing motorists to plan travel routes in advance. Property access would be maintained to the maximum extent practicable throughout construction. Traffic delays would be controlled to the maximum extent practicable where multiple construction operations are in progress simultaneously.

Water Quality: Sediment and Erosion Control Plans, as required by the KYTC's *Standard Specifications*, would identify measures for ensuring that water quality is maintained, such as: temporary placement of sod, mulching, sandbagging, slope drains, sediment basins, sediment checks, artificial coverings, and berms. Enhanced erosion control measures would be specified in areas characterized by karst geology. Storm water discharges will be managed in accordance with the Kentucky Pollutant Discharge Elimination System (KPDES) storm water permit. A Storm Water Pollution Prevention Plan would be developed in accordance with permit requirements, the KYTC's *Standard Specifications*, and in support of the required KPDES storm water construction permit. Inspections would be routinely conducted to ensure that control measures are properly functioning and effective. Where control measures are ineffective, measures would be corrected or improved prior to additional work occurring in the area.

Wetlands: Impacts to wetlands will only occur after securing appropriate permits from the regulatory agencies with jurisdiction. Impacts will be limited to those required for the construction and identified in the permits. Erosion control measures will be implemented to minimize impacts to wetlands adjacent to the project.

Waste Disposal: Solid wastes generated during the construction will be managed in accordance with applicable regulatory requirements and the KYTC's *Standard Specifications*. Wastes and hazardous materials will be stored in a manner that protects them from on-going construction activities and prevents accidental spills. Should hazardous materials be encountered in the construction area, the Contractor shall handle and dispose of the materials in accordance with applicable state and federal regulations.

Archaeological Sites: Should an unknown archaeological site be discovered during construction, the work in the area shall cease and the KYTC Resident Engineer will notify the KYTC Division of Environmental Analysis, as appropriate. No further work will be conducted at the site until necessary consultation requirements with the SHPO, as necessary, and American Indian Tribes has been completed.

3.14 Indirect and Cumulative Effects

Indirect effects are defined as those effects "which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems" (40 CFR 1508.8). Though most indirect effects related to a highway project are related to induced changes in growth (rate or location), other indirect effects may include storm water runoff impacts to receiving streams or wetlands which, over time, can degrade water quality downstream.

Cumulative impacts are defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions… [and] can result from individually minor but collectively significant actions taking place over a period of time” (40 CFR 1508.7). The understanding of what are past, present, and reasonably foreseeable future actions is key to the assessment of these impacts. The affected environment or existing conditions in the Study Area are the result of the collective impacts of past human actions that have altered the environment – e.g., farming, the construction of existing US 150, and residential and commercial development. Impacts from present actions include ongoing construction of any projects in the area, whether they be public or private, such as residential and commercial development. Reasonably foreseeable future actions are other planned and programmed transportation projects and other planned development that is likely to occur in the immediate area. In this analysis, the subject project is treated as a reasonably foreseeable project. Impacts from past, present, and reasonably foreseeable actions are important to this assessment if they impact the same resources as those affected by this project.

There is no planning or zoning in the unincorporated areas of Nelson County. Nelson County continues to experience growth; however, much of the growth has occurred west of the Study Area in Bardstown and this trend is expected to continue. Traffic volumes have been increasing and are expected to increase with or without the project. The KYTC is currently working on a design to improve US 150 from the Nelson/Washington County line to west of Springfield (Item No. 4-396.20), with construction programmed for 2024. Another additional adjacent project, “Improve US 150 from KY 245 through the Bluegrass Parkway Interchange to east of Leslie Ballard Lane” (4-8309.10), has funding for construction in the summer of 2021. Both of these projects are considered reasonably foreseeable actions. Table 25 summarizes the cumulative effects of the US 150 project.

Table 25: Summary of Cumulative Effects

Resource/ Impacts from Past and Present Actions	Impact from Proposed Project	Foreseeable Future Action	Cumulative Effects
Farmland			
Minor residential and other land use changing development has occurred east of Bardstown, but at a slow pace. Outside the US 150 corridor, the area is predominantly agricultural and undeveloped.	Right-of-way impacts of up to 191 acres with prime farmland impacts of as much as 10.9 acres will occur with a selection of a build alternative. Off-corridor alignments would split several farming properties.	No other future actions have been identified in this area. The road is not anticipated to result in significant changes in land use in the surrounding area	Some additional farmland conversion may occur, but the cumulative effects on this resource are expected to be low.
Water Quality			
Highway construction, residential and commercial development, development of public utilities, agricultural land uses, etc. have contributed to some diminishment of water quality in the area.	Selection of a build alternative will result in potential impacts to 5,910 linear feet of streams, and 0.93 acres of wetlands. Temporary impacts to water quality would occur during construction.	Future land use around the corridor within the County is likely to remain in agricultural and light residential and including light industrial uses. This trend is expected to continue regardless of whether the project is constructed.	Continued growth in the Bardstown area and possible expansion of that growth eastward is expected to occur regardless of whether the project is constructed and will be expected to have some minor additional impact on water quality in the area. There are no formal plans for development in the Study Area.
Threatened and Endangered Species			
Construction of US Highway 150 and the connector roads and bridges, residential and commercial development, development of public utilities, clearing for agricultural purposes, etc. have affected listed species and their habitats	Running buffalo clover was not observed in the project area; however, habitat does exist and will need to be surveyed during the permitting phase. Potential impacts to Indiana bat, northern long-eared, and gray bat. Minimization measures such as seasonal tree cutting restrictions may be imposed to reduce project effects. Project impacts will not jeopardize the continued existence of the species.	Continued development within the region could reduce or further fragment forested bat habitat and further degrade water quality important to foraging habitat. Continued highway improvements eastward on US 150 to connect the region to I-75 are planned and will potentially have additional impacts.	Continued development around Bardstown, and possible expansion of that growth eastward, will likely result in some further loss or fragmentation of endangered species habitat This development is expected to occur regardless of whether the project is constructed.

Resource/ Impacts from Past and Present Actions	Impact from Proposed Project	Foreseeable Future Action	Cumulative Effects
Air Quality			
The region is relatively undeveloped and there have been no violations of NAAQS; Conformity does not apply.	The project is included in the Kentucky STIP. During construction, some minor impacts to air quality may occur. KYTC Standard Specifications will be enforced to minimize these effects.	Traffic is expected to grow but not at a rapid pace, and it should not impact local or regional air quality. Bardstown will be expected to continue to grow. Should that growth come in the form of heavy industry, some additional air quality impacts may occur.	Growth around Bardstown is expected, regardless of whether the project is constructed. Continuing improvements in vehicle and fuel technology and resulting cleaner emissions will more than offset adverse effects from increases in volumes of vehicles. Since 1980, emissions associated with the six common pollutants (CO, lead, NOx, VOC, PM, and SO2) have decreased 63% while VMT has increased 94%. Cumulative effects on this resource are expected to be low.
Noise			
Receptors are primarily located along the existing corridor. 29 receptors adjacent to the existing corridor will experience traffic noise impacts in the future in the No-Build scenario.	Receptors experiencing traffic noise impacts are proximate to the existing road, several of which would be relocated if the road were widened. Widening along the existing alignment would introduce noise impacts to an even greater number of adjacent properties. Off-corridor alternatives would impact very few receptors.	Traffic is expected to increase but growth is moderate and typical for rural projects. Noise is expected to increase but most increases are slight.	Cumulative effects as they relate to noise impacts, especially if an off-corridor alignment is selected, are expected to be low due to distance of receptors from the project and traffic volumes projected.

3.15 Permits

The construction of the project will require permits, approvals, or additional consultation with a number of state and federal agencies prior to construction. The following may not be an all-inclusive list but represents the future actions, identified to-date, which will be required for the approval of the construction.

USACE Section 404 Permit: Required for placement of fill material, including culverts, into a Water of the United States (WOUS). A permit for impacts to waters under the jurisdiction of the USACE, including wetlands, will be required prior to construction.

Kentucky Section 401 Water Quality Certification: A Section 401 Water Quality Certification, the companion state permit to the Section 404 USACE permit, must be approved by the Kentucky Division of Water (KDOW) prior to issuance of the Section 404 permit.

Kentucky Pollutant Discharge Elimination System (KPDES) Stormwater Construction Permit: Permit from the KDOW is required prior to land disturbance of one acre or more.

3.16 Summary of Impacts

Through the alternative screening process, Alternatives 1, 2, 2A, 3, 4, and 5 emerged as those that satisfied the purpose and need for the project and represented a full range of alternatives. The anticipated environmental impacts for these proposed build alternatives have been considered and are summarized in Table 26.

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Table 26: Summary of Impacts

Category Impacts	Alternative 1	Alternative 2	Alternative 2A	Alternative 3	Alternative 4	Alternative 5
Length (mi)	5.2	4.9	4.9	4.9	4.9	4.9
Air Quality	No effects; Low potential for MSAT emissions	No effects; Low potential for MSAT emissions	No effects; Low potential for MSAT emission	No effects; Low potential for MSAT emission	No effects; Low potential for MSAT emissions	No effects; Low potential for MSAT emission
Noise Assessment	Estimated 49 potentially impacted receptors; Walls do not meet KYTC policy criteria	Estimated two potentially impacted receptors; Walls do not meet KYTC policy criteria	Estimated potentially five impacted receptors; Walls do not meet KYTC policy criteria	Estimated potentially three impacted receptors; Walls do not meet KYTC policy criteria	Estimated two potentially impacted receptors; Walls do not meet KYTC policy criteria	Estimated 19 potentially impacted receptors; Walls do not meet KYTC policy criteria
Significant Ecological Resources	None	None	None	None	None	None
Macroinvertebrates	No Significant Difference	No Significant Difference	No Significant Difference	No Significant Difference	No Significant Difference	No Significant Difference
Fishes	No Significant Difference	No Significant Difference	No Significant Difference	No Significant Difference	No Significant Difference	No Significant Difference
Flora	No Significant Difference	No Significant Difference	No Significant Difference	No Significant Difference	No Significant Difference	No Significant Difference
Birds, Mammals, Amphibians, Reptiles	No Significant Difference	No Significant Difference	No Significant Difference	No Significant Difference	No Significant Difference	No Significant Difference
Perennial	1,628	4,021	3,905	2,215	1,781	1,996
Intermittent	453 linear feet; (none of excellent quality)	1,915 linear feet; (none of excellent quality)	1,515 linear feet; (none of excellent quality)	999 linear feet; (none of excellent quality)	838 linear feet; (none of excellent quality)	952 linear feet; (none of excellent quality)
Ephemeral	1,349 linear feet	655 linear feet	490 linear feet	1,933 linear feet	3,177 linear feet	1,795 linear feet
Ponds (no.)	0	1	1	3	5	2
Wetlands	0.03 acres	1.10 acres	0.92 acres	0 acres	0.22 acres	0 acres
Land Use Impacts						
Forested	23 acres	32 acres	36 acres	46 acres	50 acres	44 acres
Pasture/Agricultural	12 acres	67 acres	66 acres	77 acres	69 acres	59 acres
Open	10 acres	6 acres	9 acres	3 acres	6 acres	5 acres
Commercial	4 acres	6 acres	1 acres	3 acres	1 acres	2 acres
Residential	10 acres	7 acres	5 acres	6 acres	4 acres	6 acres
Existing Right of Way	37 acres	14 acres	18 acres	8 acres	13 acres	16 acres
Total	96 acres	132 acres	134 acres	143 acres	143 acres	132 acres
State and Federal T&E Species	Minor habitat impacts to listed species; BA required for gray bat, Indiana bat, and northern long-eared bat	Minor habitat impacts to listed species; BA required for gray bat, Indiana bat, and northern long-eared bat	Minor habitat impacts to listed species; BA required for gray bat, Indiana bat, and northern long-eared bat	Minor habitat impacts to listed species; BA required for gray bat, Indiana bat, and northern long-eared bat	Minor habitat impacts to listed species; BA required for gray bat, Indiana bat, and northern long-eared bat	Minor habitat impacts to listed species; BA required for gray bat, Indiana bat, and northern long-eared bat
Historic Resources	*No Adverse Effect* or *No Effect* findings (direct and indirect) for all NRHP-eligible properties.	*Adverse Effect* findings (direct and indirect) on the Parrot Farm; *Adverse Effect (*indirect) Crozier/Ballard and Blanford; *No Adverse Effect* or *No Effect* findings (direct and indirect) for remaining NRHP-eligible properties.	*Adverse Effect (*Indirect) Crozier/Ballard and Blanford; *No Adverse Effect* or *No Effect* findings (direct and indirect) for all other NRHP-eligible properties.	*Adverse Effect (*Indirect) Crozier/Ballard, Blanford and Nally; *No Adverse Effect* or *No Effect* findings (direct and indirect) for all other NRHP-eligible properties.	*Adverse Effect (*Indirect) Nally; *No Adverse Effect* or *No Effect* findings (direct and indirect) for all other NRHP-eligible properties.	*Adverse Effect (*Indirect) Crozier/Ballard, Blanford and Nally; *No Adverse Effect* or *No Effect* findings (direct and indirect) for all other NRHP-eligible properties.
Archaeological Resources	Low potential to moderate impact National Register eligible sites	Low to moderate potential to impact National Register eligible sites	Low to moderate potential to impact National Register eligible sites	Low to moderate potential to impact National Register eligible sites	Low to moderate potential to impact National Register eligible sites	Low to moderate potential to impact National Register eligible sites
Environmental Justice	No adverse and disproportionate impacts	No adverse and disproportionate impacts	No adverse and disproportionate impacts	No adverse and disproportionate impacts	No adverse and disproportionate impacts	No adverse and disproportionate impacts
Right of Way	56 acres; 119 parcels	133 acres; 60 parcels	133 acres; 60 parcels	191 acres; 54 parcels	182 acres; 60 parcels	167 acres; 64 parcels
Relocations	23 residences; 9 business	2 residences; 0 business	4 residences; 0 businesses	5 residences; 0 businesses	7 residences; 1 business	0 residences; 1 business
Replacement Housing	194 Housing units available	194 Housing units available	194 Housing units available	194 Housing units available	194 Housing units available	194 Housing units available

Category Impacts	Alternative 1	Alternative 2	Alternative 2A	Alternative 3	Alternative 4	Alternative 5
Community Resources	Improved access	Improved access	Improved access	Improved access	Improved access	Improved access
Roadway Safety	Improved horizontal and vertical geometrics and accessibility	Improved horizontal and vertical geometrics and accessibility	Improved horizontal and vertical geometrics and accessibility	Improved horizontal and vertical geometrics and accessibility	Improved horizontal and vertical geometrics and accessibility	Improved horizontal and vertical geometrics and accessibility
Entrance/Intersection Safety	Access would be by permit leaving high numbers of potential conflict points along the route	Improved safety because of controlled access	Improved safety because of controlled access	Improved safety because of controlled access	Improved safety because of controlled access	Improved safety because of controlled access
Land Use	Irreversible land use changes but not as great as with other off-corridor alternatives	Land converted to road use is irreversible; few additional anticipated changes	Land converted to road use is irreversible; few additional anticipated changes	Land converted to road use is irreversible; few additional anticipated changes	Land converted to road use is irreversible; few additional anticipated changes	Land converted to road use is irreversible; few additional anticipated changes
Farmland Impacts (Prime Acres)	0.01	10.1	9.1	10.9	5.0	6.7
Pedestrian & Bicycle Facilities	No designated lanes, but improved, wider, paved shoulders	No designated lanes, but improved, wider, paved shoulders	No designated lanes, but improved, wider, paved shoulders	No designated lanes, but improved, wider, paved shoulders	No designated lanes, but improved, wider, paved shoulders	No designated lanes, but improved, wider, paved shoulders
UST/Hazardous Materials	7 sites of environmental interest that may require additional investigation	1 site of environmental interest that may require additional investigation	0 sites of environmental interest that may require additional investigation	1 site of environmental interest that may require additional investigation	0 sites of environmental interest that may require additional investigation	1 site of environmental interest that may require additional investigation
Visual Impacts	Irreversible commitment of land for facility	Irreversible commitment of land for facility	Irreversible commitment of land for facility	Irreversible commitment of land for facility	Irreversible commitment of land for facility	Irreversible commitment of land for facility
Construction Activities	Best Management Practices (BMPs) will be implemented	Best Management Practices (BMPs) will be implemented	Best Management Practices (BMPs) will be implemented	Best Management Practices (BMPs) will be implemented	Best Management Practices (BMPs) will be implemented	Best Management Practices (BMPs) will be implemented
4(f) and 6(f) Resources	*De minimis* Section 4(f) impact to historic property/properties); No impact to Section 6(f) properties	Section 4(f) use of historic property/properties); No impact to Section 6(f) properties	*De minimis* Section 4(f) impact to historic property/properties); No impact to Section 6(f) properties	*De minimis* Section 4(f) impact to historic property/properties); No impact to Section 6(f) properties	*De minimis* Section 4(f) impact to historic property/properties); No impact to Section 6(f) properties	*De minimis* Section 4(f) impact to historic property/properties); No impact to Section 6(f) properties

4.0 Agency Coordination and Public Involvement

The project has been developed with the input of stakeholders including local officials, state and federal resource agencies, and the public. The KYTC's 2015 Scoping Study included a public involvement and outreach program that included one Public Information Meeting, two meetings with local officials, and outreach to a wide range of state and federal regulatory agencies. With the initiation of preliminary design and environmental work for the current project in 2018, re-engaging the public and stakeholders was identified as a priority.

4.1 Local Officials

A group of local officials and stakeholders was formed in 2015 to coordinate efforts for the advancement of the project. It consisted of local officials, industry leaders, law enforcement, the county engineer, educators, residential property owners, business owners, and elected officials. On January 29, 2015, the KYTC met with this group to present an update of ongoing efforts to initiate preliminary design and environmental review of the project (see Appendix A). Local officials and stakeholders continued in their efforts to advance the project, meeting again on May 26, 2015, in advance of the public meeting for the Scoping Study held on May 28, 2015.

Throughout project development, KYTC representatives have met with local officials to keep them apprised of progress. In many cases, local official updates have occurred through ongoing communication with individuals rather than through formal group meetings.

Local officials were formally briefed on the project on the afternoon of April 23, 2019, prior to the public meeting that followed that evening. The group was presented with a summary of project progress and details of the information that was to be presented for public comment. Support for the project was again clearly expressed by the group to KYTC officials.

4.2 Public Engagement

Early in the current project development, a mailing list was developed to identify residents in the area who may be affected by studies to be conducted for the project. Notification letters were sent to nearly 200 households, advising them that the project was underway and that project representatives might be seen in the area gathering information for ongoing studies.

In the Spring of 2019, a public meeting was scheduled to provide information regarding the ongoing project development and to solicit input from the community. Prior to this meeting, a local business owner circulated a petition, "To keep Hwy. 150 where it is. The State has proposed 4 options for this area. We feel alternative #1 would be in the best interest for our community." The petition was signed by 194 persons and provided to the KYTC for consideration during further development of the project.

Figure 38: April 23, 2019 Public Meeting

An informal, open-format public meeting for the project was held at the Parkway Baptist Church on April 23, 2019, in Bardstown. Approximately 182 attendees are documented on a sign-in sheet that was available as the public entered the venue. A brief, continuous-play PowerPoint presentation was shown on loop throughout the evening to provide details of the work completed on the project, as well as an explanation of what could be expected as the project advanced. The alternatives under consideration (Alternatives 1, 2, 3, and 4) were shown on large display boards spread throughout the venue, each manned by project representatives available to answer questions and listen to input provided by the public (see Figure 38). An informational packet, including a comment form, was provided to each attendee as they entered the meeting. A copy of all materials presented at the meeting are provided in the meeting summary, which can be found in Appendix L.

The meeting resulted in the receipt of 58 comment forms, which provided crucial input from the community. The respondents were largely residents of the area and expressed a concern with safety on the existing roadway, traffic delays, and turning into driveway entrances. There were 35 people who indicated that the project might create a personal hardship. The majority of these concerns were related to property loss and/or other right-of-way issues. Five respondents expressed concern with safety at the KY 605 intersections. Four respondents wanted to preserve as much farmland as possible. Of those who identified a preference for an alternative, Alternative 2 was selected by a small margin over the other alternatives. At the time of the meeting, the adverse effects impacts of Alternative 2 on the historic Parrott Farm had not yet been identified and Alternative 2A had yet to be developed.

Some participants at the public meeting who were aware of the petition to select Alternative 1, suggested an additional alternative that would lie north of existing US 150 between the western terminus and KY 605 North then return to the existing alignment before departing to the south of the existing corridor. This same concept was again mentioned at the Consulting Party Meeting on June 18, 2019. This conceptual alignment was considered to be beneficial to existing business on US 150 where traffic would be maintained along store fronts. Based upon this public input, the KYTC initiated preliminary design of an additional alignment (Alternative 5) that has been considered in this EA.

4.3 Agency Coordination Letters

Early agency coordination letters were sent on January 29, 2018, to numerous state and federal agencies to solicit comment on the proposed project. Copies of the letters and the agency's responses received are provided in Appendix M. Agencies such as the KDFWR, KDOW, and OKNP, identified the potential need for future agency approvals for project construction. The USFWS, KDFWR, and OKNP provided input

regarding rare, threatened, and endangered species that may be present in the area. The Kentucky Division of Oil and Gas, KSS, NRCS, SHPO, and U.S. Environmental Protection Agency (EPA) also provided input regarding resources in the area. These responses were used to guide field assessment of the project and consideration of effects.

4.4 Section 106 Consulting Parties

In accordance with the requirements for consultation detailed in the National Historic Preservation Act, local officials, organizations with a recognized interest in historic preservation, and the public, including all owners of properties identified as eligible for the NRHP, were invited to participate in the evaluation and review of historic properties for the project. Invitation letters were sent to 31 identified local officials historic preservation organizations and owners of potentially historic properties (see Appendix G). The notice provided instructions for applying for Consulting Party status and contact information if there should be any questions. Hard copies of the Consulting Party application forms were made available at the public meeting as was the opportunity to submit the application online. Twelve Consulting Parties participated in the consultation for the project.

The results of the historic properties eligibility and effects assessments developed for the project were provided to the Consulting Parties for review and comment. A meeting of those participating was held on June 18, 2019, at the Bardstown City Council Chambers. A summary of the meeting, presentation materials, and other relevant documents are also provided in Appendix G.

A presentation discussing the eligibility and effects recommendations was presented to the attendees of the Consulting Parties meeting. For properties where adverse effects were identified, potential mitigation was also a topic of discussion. All participants were provided with a form for submittal of written comments; four comments were received. Comments identified a preference for remaining on the existing alignment or Alternative 2 and a suggestion by the Nelson County Engineer to minimize the width of the Fredericktown Road connection to the project due to the low volume of traffic on the road. One party requested that her property (Parrott Farm; FS 22) be re-evaluated to reconsider its potential eligibility. After a subsequent field visit and additional analysis, the property was determined to be eligible for the NRHP, leading to the dismissal of Alternative 2 and design of Alternative 2A as a minimization alternative. If the preferred alternative will have adverse effects on historic properties, the Consulting Parties will be re-engaged, prior to a final decision on project location, to seek input and comment on measures to mitigate the adverse effects.

Consultation with appropriate American Indian tribes will also be conducted for the project should prehistoric archaeological sites be identified by Phase I Archaeological Survey of the preferred alternative. The KYTC and the FHWA Division Office will coordinate consultation with federally-recognized tribes that have expressed an interest in projects in Nelson County, Kentucky. These tribes are: The Cherokee Nation, Eastern Band of Cherokee Indians, United Keetoowah Band of Cherokee Indians, Absentee Shawnee Tribe of Indians of Oklahoma, Eastern Shawnee Tribe of Oklahoma, and Shawnee Tribe. Consultation will be undertaken in accordance with established KYTC and FHWA Kentucky Division procedures.

The FHWA will await the results of the Phase I archaeological survey before initiating tribal consultation. If archaeological sites are identified that relate to pre-European occupation, summaries of the report will

be provided to the tribes for review and comment. Comments from the tribes will be considered in the execution of additional studies or other work on the project.

5.0 IDENTIFICATION OF THE PREFERRED ALTERNATIVE

A preferred alternative was identified after considering how well the various alternatives satisfied the project purpose and need; the environmental impacts of each alternative, as presented in Section 3.0; and the estimated costs, including environmental mitigation, acquisition of right of way, relocation of utilities, and construction.

5.1 Alternative Comparison

For off-corridor alternatives, where a four-lane typical section is specified, an analysis was developed that compared the Level of Service (LOS) and travel time that would be achieved for construction of the four-lane roadway or a 2+1 configuration. The results of the analysis are presented in Table 27.

Table 27: Performance of 2+1 vs. Four Lane Typical Section

2+1								
Segment	Description	Length (ft)	LOS		Travel Time (min)		Avg. Speed (mph)	
			2019	2040	2019	2040	2019	2040
1	BG Parkway to KY 605 N	7,760	D	E	1.57	1.62	56.0	54.4
2	KY 605 N to KY 605 S	5,280	D	D	1.05	1.08	56.9	55.7
3	KY 605 S to Beech Fork	13,700	C	C	2.68	2.73	58.1	57.0
Total		26,740			5.30	5.43	57.3	56.0
4-Lane								
Segment	Description	Length (ft)	LOS		Travel Time (min)		Avg. Speed (mph)	
			2019	2040	2019	2040	2019	2040
1	BG Parkway to KY 605 N	7,760	A	B	1.49	1.49	59.2	59.2
2	KY 605 N to KY 605 S	5,280	A	B	1.01	1.01	59.5	59.5
3	KY 605 S to Beech Fork	13,700	A	A	2.63	2.63	59.3	59.3
Total		26,740			5.12	5.12	59.3	59.3
Traffic								
Segment	Description	Length (ft)	2019			2040		
			ADT	DHV	60/40	ADT	DHV	60/40
1	BG Parkway to KY 605 N	7,760	13,900	1,500	900	17,000	1,850	1,110
2	KY 605 N to KY 605 S	5,280	12,300	1,350	810	15,000	1,650	990
3	KY 605 S to Beech Fork	13,700	9,100	1,100	660	11,000	1,300	780

The LOS analysis concluded that a four-lane roadway would provide LOS A or B throughout the corridor during the design year. A 2+1 typical section would provide an undesirable LOS D and E for sections west of the KY 605 South intersection. However, when travel time through the corridor is considered, the difference between the performance of the two typical sections is minimal. In the design year (2040), the four-lane section would provide only a minimally improved travel time (5.12 minutes vs. 5.43 minutes) and an only slightly higher travel speed (59.3 mph vs. 56.0 mph). In the current year, these differences are even lower.

Alternative 2 was determined to split and adversely affect the Parrott Farm (FS 22), a property that is eligible for the NRHP and protected under Section 4(f). The eligibility and adverse effect associated with

Alternative 2 was confirmed in consultation with the SHPO. The alternative requires a Section 4(f) use of the property. Since several alternatives are being considered that have no Section 4(f) use, or only a *de minimis* use, Alternative 2 was dismissed due to Section 4(f) impacts. Though Alternatives 1 and 2A require a minor use of the Parrott Farm, these impacts are considered to be *de minimis*.

A summary of the costs for implementing the project are provided in Table 28. All costs are presented in 2019 dollars.

Table 28: Summary of Initial Costs ($1,000s)

	Alternatives				
	1	2A	3	4	5
Stream Mitigation	$600	$1,500	$900	$730	$825
ROW/Util.	$6,340	$5,000	$5,990	$6,880	$5,130
Construction w/ 25% Contingency	$40,730	$40,488	$46,188	$45,090	$45,488
Subtotal	**$47,670**	**$46,988**	**$53,078**	**$52,700**	**$51,443**
2+1 Initial Savings	0	-$5,700	-$5,340	-$3,310	-$5,098
Total Initial Costs	**$47,670**	**$41,288**	**$47,738**	**$49,390**	**$46,345**

A Preliminary Line and Grade Meeting was held on August 12, 2019, to evaluate the engineering and environmental information developed for the alternatives. The performance benefits of a four-lane typical section vs. two lanes with a passing lane (2+1) were considered in conjunction with the costs. For the off-corridor alignments, the additional cost of initially constructing the four-lane section ($3.3-$5.7M) for the minimal benefits to travel time and travel speed through the corridor were not considered to be a prudent expenditure. It was decided that constructing a 2+1 typical section on four-lane right of way would provide improved performance to address the current transportation needs and flexibility for expanding the roadway in the future when traffic demand increases. Acquisition of the additional right of way needed for an expansion will be much more cost effective today than in the future, after development along the new roadway has occurred.

Regarding Alternative 1, access by permit would be required along its entire length. The potential conflict points that would remain after construction were considered to be too many to meet safety improvement goals and satisfy the purpose and need. A minor strip taking from the Parrott Farm is not considered to be adverse and has been evaluated as a *de minimis* Section 4(f) use; however, this and other historic properties adjacent to the corridor would potentially limit or increase the complexity of future widening in some areas. Since the widened roadway is to be constructed on the existing alignment and consists of a three-lane section rather than four or five lanes, its ecological impacts were much fewer than other alternatives; however, it also would affect 119 parcels and require 23 residential and 9 commercial relocations, resulting in right-of-way costs nearly triple those of the other alternatives, as well as considerably greater disruption of the community. Alternative 1 would also present the most difficult maintenance of traffic issues during construction. For these reasons, Alternative 1 was eliminated.

To minimize the historic property impacts of Alternative 5, a three-lane urban typical section would be created for approximately 3,200 feet where it rejoins the existing alignment between the KY 605 intersections. This section would be posted at 45 mph or less, require numerous access points, and introduce a typical section that would be inconsistent with the improved roadway east and west of this location, which was considered a hindrance to the regional traffic flow in the corridor. When considering future expansion opportunities, adjacent historic properties would present a challenge and numerous residences would be required to relocate. For these reasons, Alternative 5 was eliminated.

Alternatives 3 and 4 are coincidental east of the KY 605 North intersection. The alternatives have comparable costs but Alternative 3 would require a crossing of existing US 150 and the greatest amount of excavation among the alternatives. Unlike Alternative 4, Alternative 3 would not have the benefit of using the proposed improvements from KY 245 to east of Leslie Ballard Lane, projected to go to letting in 2020. There being no obvious advantages when compared with Alternatives 2A and 4, Alternative 3 was eliminated.

When comparing Alternatives 2A and 4, Alternative 2A has fewer relocations (four residential vs. seven residential and one commercial). It is the least expensive of the alternatives, nearly $8M less costly than Alternative 4. A 2+1 typical section or better can be constructed throughout the entire length of both Alternatives 2A and 4. Though there will be some complexity maintaining traffic on the steep grades of Fredericktown Hill for Alternative 2A, these concerns were overshadowed by the significant cost savings. Alternative 4 requires large quantities of excavation, similar to Alternative 3, and results in the greatest volume of excess excavation. The intersection of KY 605 South (Manton Road) with Alternative 4 could potentially introduce a difficult or dangerous intersection and may result in more relocations than are currently expected. In addition, since a large portion of KY 605 South (Manton Road) traffic is traveling to Bardstown or the Bluegrass Parkway, Alternative 2A leaves a larger residual traffic flow on the portion of existing US 150 that will remain as a county road adjacent to the local businesses, addressing a concern raised during public involvement. Alternative 2A leaves remnants of existing US 150 that are both shorter and better connected than can be achieved with Alternative 4, which will reduce future maintenance costs for Nelson County. Alternative 2, modified as Alternative 2A, was identified by the public as its preferred alternative by a slight margin in questionnaires collected following the project public meeting. Lastly, the construction will not require blasting within one-half mile of the identified gray bat hibernaculum located north of the project. For these many reasons, Alternative 2A was identified as the Preferred Alternative. Where it lies off-corridor and a four-lane divided typical section is proposed, it is planned that the construction will be phased to initially construct a 2+1 typical section, which will be widened to the ultimate design when needed to meet traffic demand.

With Alternative 2A, several opportunities were studied for connecting the alternative with KY 605 North (Poplar Flats Road) and existing US 150. Since the greater traffic volume will be on KY 605, a free-flow movement from KY 605 to existing US 150 was considered preferable to a T-intersection. Of the three free-flow options (Options E, F, and G), Option E was preferred since it created an offset intersection with Poplar Flats Road and would reduce the potential need to signalize an intersection on the mainline. Diversion of traffic from the business fronts along existing US 150 had also been raised as a concern during

public involvement. Option 5 would maintain traffic along the frontage of the Quick Mart better than the other options.

5.2 Additional Study of the Preferred Alternative 2A

5.2.1 Value Engineering Study

A Value Engineering Study (VE Study) was drafted that provided recommendations to be considered during design of the project (see Appendix N). Many of the recommendations were related to variations in the typical section to be considered as cost-saving measures. With the identification of Alternative 2A as the Preferred Alternative and the decision that a 2+1 typical section would be initially constructed throughout, the recommendations of the VE Study were reviewed to identify those that should be incorporated within the project.

The VE Study recommended reduction of the paved shoulders from eight feet to four feet. This recommendation was rejected primarily due to the heavy truck traffic in the corridor. The wider shoulders will also provide safer opportunities for pedestrian and bicycle traffic and movement of farm equipment in the corridor.

The recommendation to reduce the typical section to 2+1 west of the KY 605 North intersection was accepted for initial construction. Sufficient right of way will be acquired for ultimate construction of a four-lane divided highway when traffic demand increases.

It was also recommended that the roadside ditch slopes be reduced from the proposed 18 foot, 6:1 slopes. It was decided that a 30-foot clear zone consisting of a 10-foot graded shoulder (8-foot paved), 18-foot slope at 6:1 grade and a two-foot ditch was preferred.

5.2.2 Traffic Noise Impacts

There were 135 noise sensitive receptors identified in the vicinity of the existing US 150 corridor or the Alternative 2A alignment. Using TNM 2.5, traffic noise effects were analyzed to determine whether traffic noise impacts will result from construction of the Preferred Alternative.

Under design year (2035) build conditions for the Preferred Alternative, TNM 2.5 identifies one receptor (Receptor R119) with a predicted noise level that approaches, meets, or exceeds the FHWA NAC and predicts substantial increase impacts at another two receptors (Receptors R93 and R107) (see Figure 39). The predicted substantial increase impacts occur where the Preferred Alternative is on new alignment, effectively moving traffic noise much closer to these impacted receptors under project build conditions. One of the two receptors (R107) predicted to experience a substantial increase impact is anticipated to be displaced by the Preferred Alternative.

In accordance with KYTC Noise Analysis and Abatement Policy (July 1, 2015), structural noise abatement was considered for receptors with TNM 2.5-predicted design year (2035) build-condition noise impacts. KYTC policy outlines feasibility criteria which must be met by potential noise abatement measures to warrant further consideration for implementation. Among these criteria is the requirement that a proposed noise barrier must provide a minimum 5 dBA reduction for at least three impacted receptors to be considered acoustically feasible. The TNM 2.5 analysis conducted for this project predicts noise impacts

for a total of three receptors under project build conditions, and one of these three receptors (Receptor R107) is anticipated to be displaced by the project. Since the anticipated displacement leaves only two receptors (Receptors R93 and R119) with predicted noise impacts under project build conditions, structural noise abatement for the mitigation of these impacts cannot meet the acoustic feasibility requirements outlined in KYTC noise policy.

5.2.3 Environmental Justice

In accordance with KYTC Environmental Justice Guidance (September 2014), Environmental Justice (EJ) surveys were conducted for each of the four residences anticipated to be relocated by construction of the Preferred Alternative. In August 2019, interviews were conducted and hard-copy surveys were completed in person with two of the affected households. Of those, one household indicated a low-income, elderly and disabled status, but a willingness to relocate for construction of the project. The second resident is elderly and, though she understands the traffic concerns, expressed an unwillingness to relocate. The resident expressed dependency on a son who lives nearby and cares for the farm. The third resident indicated that no one in his household belonged to a protected group; in addition, the resident voiced support for the project and for personal relocation, if necessary. The fourth resident, living in a mobile home, was determined to be the daughter of the parcel owner, who lives on the same property. No interdependencies were identified and the resident was not identified as a member of an EJ population.

Reconnaissance in the area did not identify any areas where low-income or minority populations are predominantly located. These populations are dispersed throughout the Study Area. Alternative 2A will not affect any businesses or organizations that provide support to EJ populations. Minority and low-income persons in the area will realize the benefits of the improved transportation network, such as improved safety and travel time, and effects to these populations will not substantively differ from impacts to the rest of the population. Only one identified member of an EJ population was opposed to being relocated.

Based on this assessment, it is concluded that the Reconstruction of US 150 in Nelson County (KYTC Item No. 4-396.10) will not have an adverse or disproportionate effect on low-income or minority populations. In addition, the project will not have an adverse or disproportionate effect on the other protected groups that the KYTC recognizes (i.e., disabled, elderly, limited English proficiency, or zero-car household).

The residence that involves a person with disabled status should be appropriately addressed during the right-of-way process to assure that needs are accommodated.

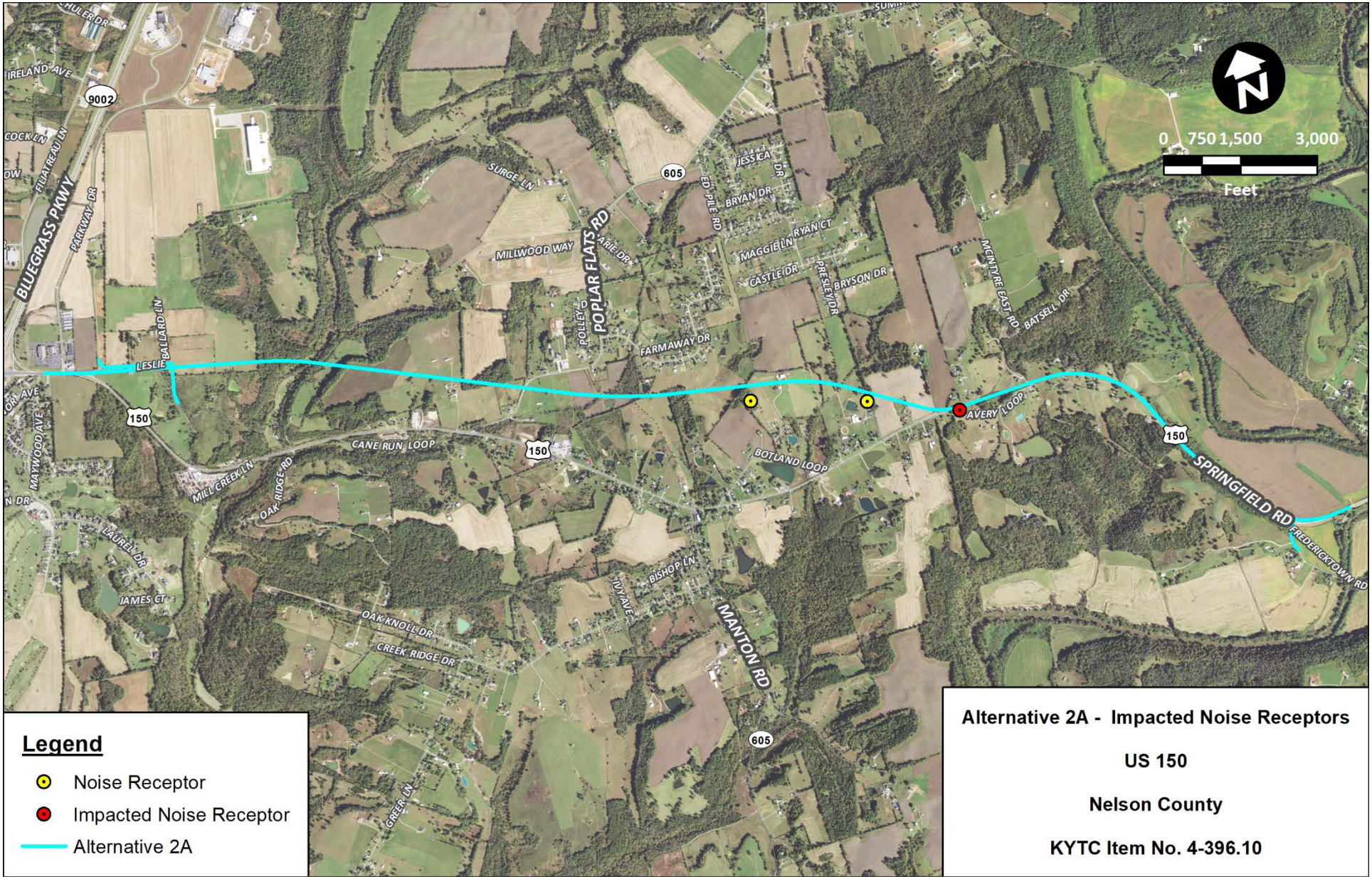

Figure 39: Alternative 2A – Impacted Noise Receptors