

**APPENDIX C: TRAFFIC
FORECASTING
TECHNICAL
MEMORANDUM**

To:	Jayalakshmi Balaji, PE	From:	Graham Winchester, PE
	KYTC Division of Planning		Stantec Consulting Services
File:	Turkey Neck Bend Bridge Feasibility Study - Traffic Forecasting Technical Memorandum	Date:	December 22, 2022

**Reference: Turkey Neck Bend Traffic Forecasting Technical Memorandum
KYTC Item No. 3-80200**

PROJECT DESCRIPTION

As part of the Turkey Neck Bend Bridge Feasibility Study in Monroe County, Stantec was tasked with developing traffic forecasts to assist in the development and evaluation of improvement concepts. Historical traffic data, population trends, and the Kentucky Statewide Travel Demand Model (KYSTM) were used to develop the forecasts for the Turkey Neck Bend study corridor. **Figure 1** displays the study corridor highlighted in red at the Turkey Neck Bend Ferry on KY 214.

The objective of the study is to evaluate an array of alternatives for connecting KY 214 across the Cumberland River. This evaluation may include a variety of strategies, ranging from elimination of the ferry and severing the KY 214 connection, to replacing the ferry with a permanent bridge. This study does not evaluate improvements to the overall KY 214 corridor but instead focuses on the river crossing.

STUDY AREA

The study corridor is 0.4 miles and extends between milepoints 1.5 and 1.9 on KY 214 in Monroe County. The Turkey Neck Bend Ferry was acquired by KYTC in 1968 and is the only free KYTC operated ferry open 24 hour per day. It connects KY 214 across the Cumberland River and transports an average of 220 vehicles per day (VPD) across the river. Other roadways adjacent to the study corridor include KY 100, KY 2439, KY 216, Big Sulfur Road, and Meredith Creek Road. The nearest river crossing to the north is 27 roadway miles from the western bank of the Turkey Neck Bend crossing in Burkesville, KY and requires an estimated 37 minutes to drive. The nearest river crossing to the south is 25.5 roadway miles from Turkey Neck Bend in Celina, TN and requires an estimated 34 minutes to drive.

HISTORICAL DAILY TRAFFIC VOLUMES

Stantec analyzed counts from KYTC traffic count stations in Monroe County to estimate historical traffic trends for the study corridor and adjacent roadways. The most recent existing traffic data is displayed in **Figure 2**. Average daily traffic on KY 214 ranges between 150 and 250 VPD while daily traffic on the surrounding roadways ranges between 20 to 600 VPD.

Historical traffic volumes and annual growth rates, between 2000 and 2021, are summarized in **Table 1** and shown graphically in **Figure 3**. Station 253 on KY 214, to the west of Cumberland River, has shown a decline in daily traffic, decreasing at a rate of 0.97 percent per year between 2002 and 2017. Station 280 on KY 214, to the east of the Turkey Neck Bend, is the only station

Reference: Turkey Neck Bend Traffic Forecasting Technical Memorandum

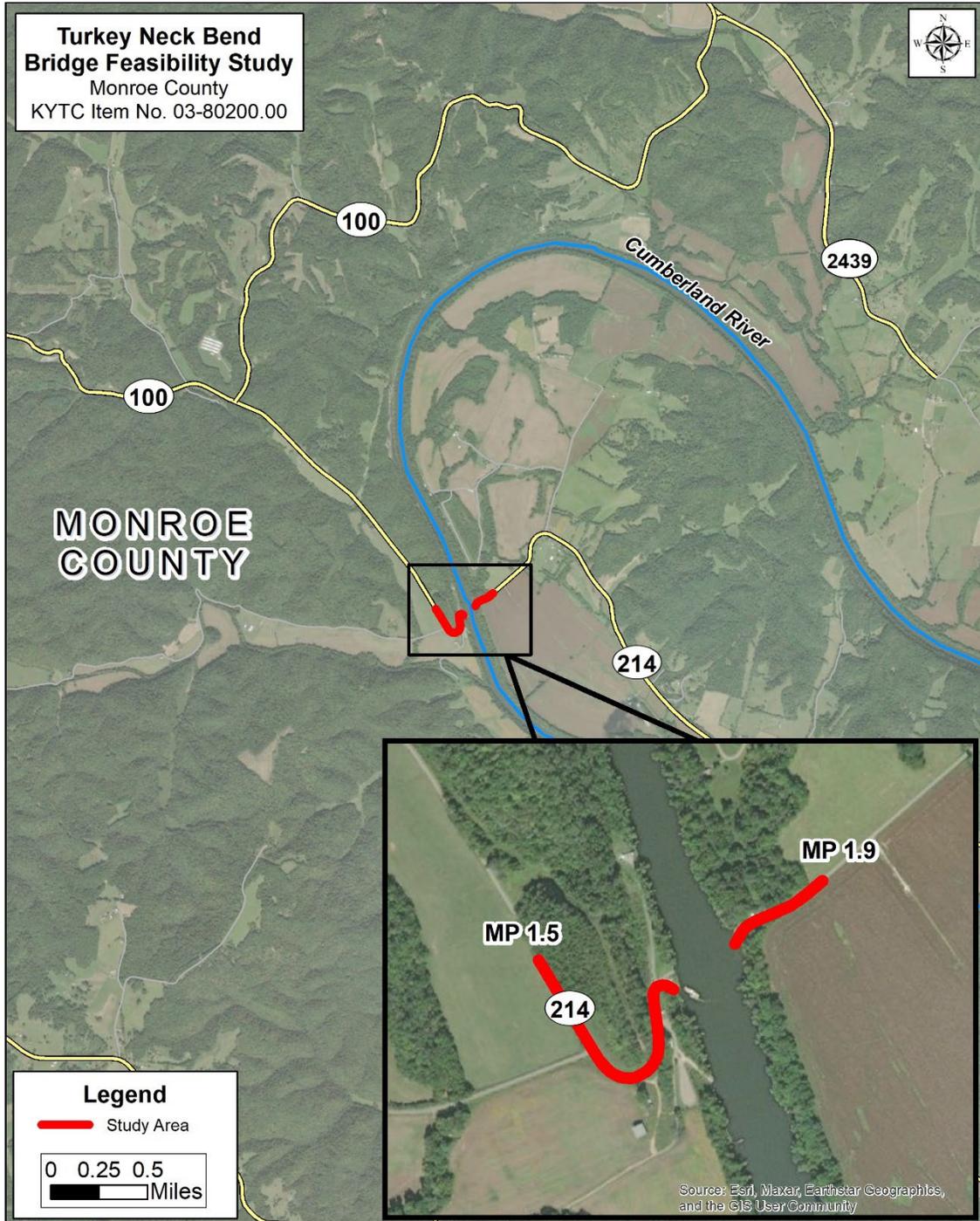


Figure 1: Turkey Neck Bend Study Area

Reference: Turkey Neck Bend Traffic Forecasting Technical Memorandum

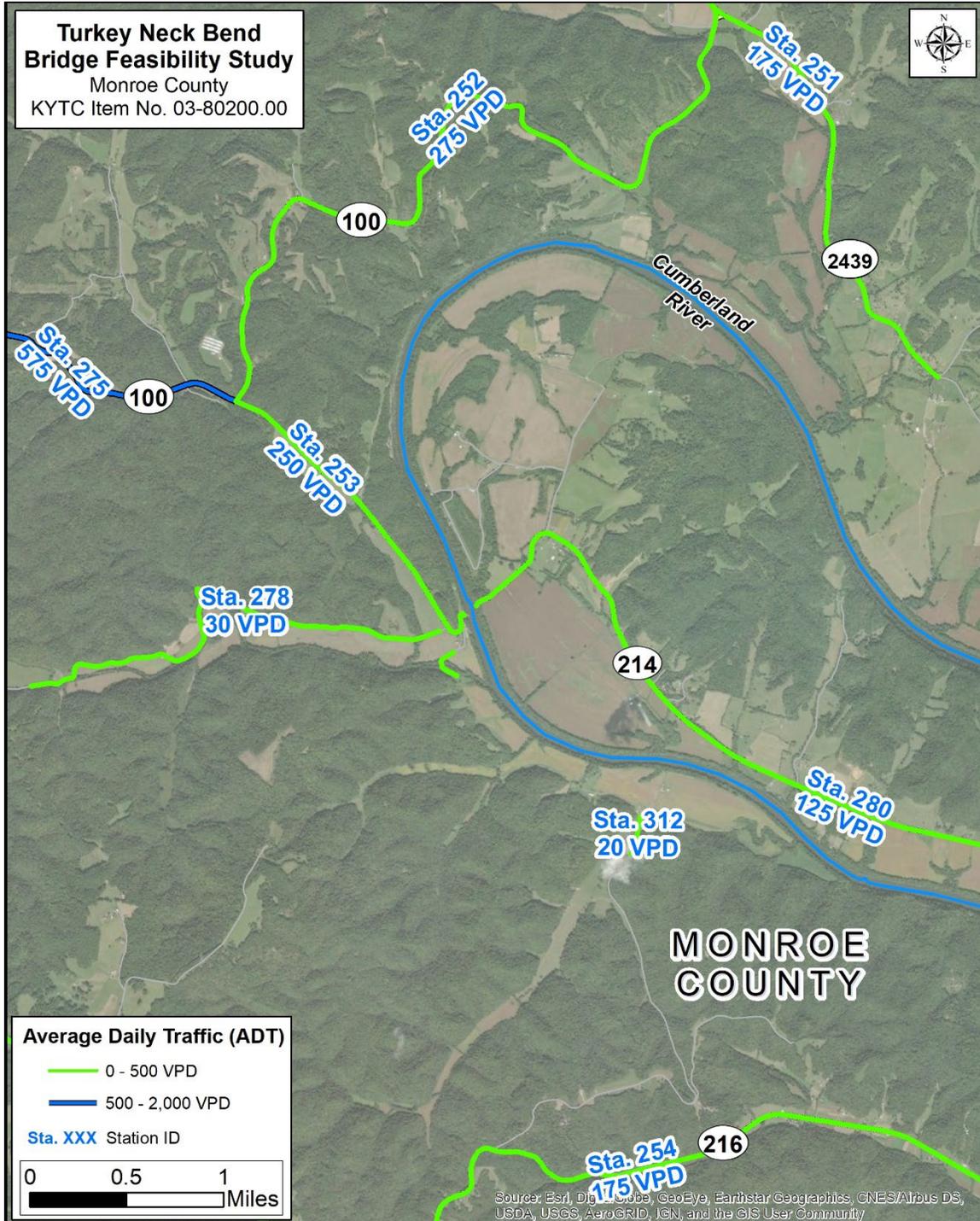


Figure 2: Turkey Neck Bend Average Daily Traffic (VPD = Vehicles per Day)

Reference: Turkey Neck Bend Traffic Forecasting Technical Memorandum

Table 1: Turkey Neck Bend Historical KYTC Traffic Counts

Year	KY 214 W	KY 214 E	KY 100	KY 100	KY 2439	KY 216
Station ID	253	280	252	275	251	254
2000				723		
2001						
2002	279		434			119
2003		110		1,090	186	
2004					161	
2005	298		344			214
2006		97				
2007					175	
2008	242		368			228
2009		87		749		
2010					186	
2011	245		285			197
2012		95				
2013					166	
2014	195		288			186
2015		89				
2016					166	
2017	241		280			183
2018		89		786		
2019					174	
2020	196		246			153
2021		128		569		
Annual Growth Rate	-0.97%	0.85%	-2.88%	-1.13%	-0.42%	2.91%

Source: Kentucky Transportation Cabinet (KYTC)

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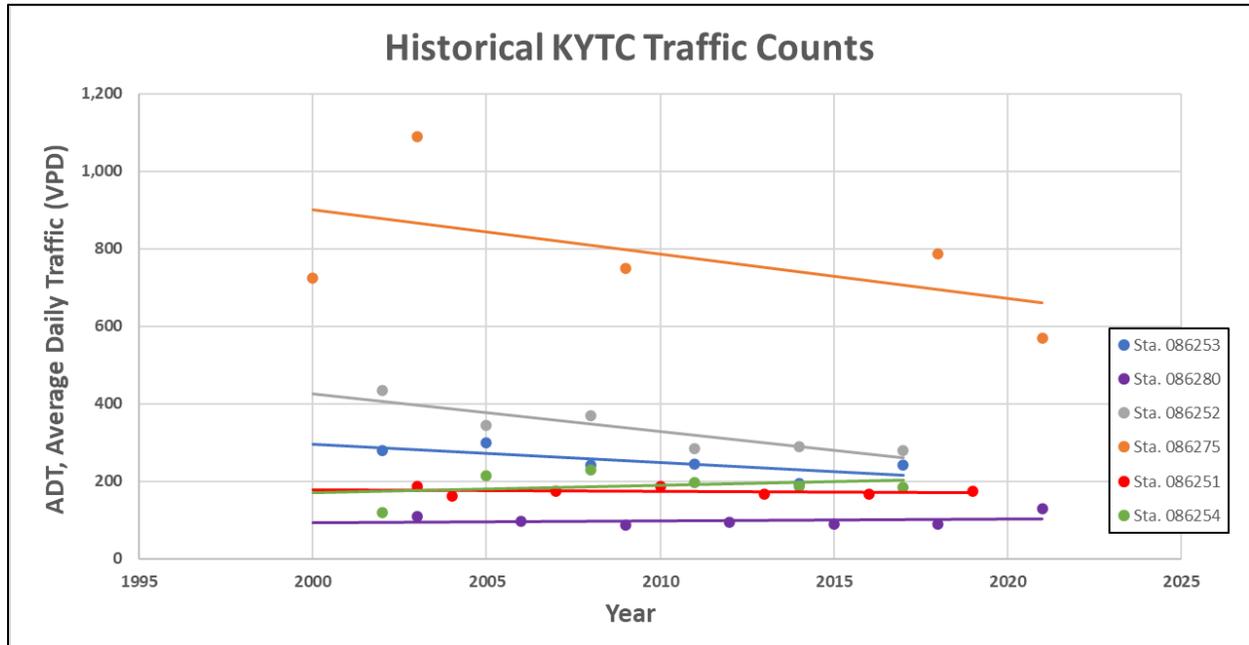


Figure 3: Turkey Neck Bend Historical KYTC Traffic Counts

showing an increase in daily traffic between 2003 and 2021, increasing at a rate of 0.85 percent per year from 110 VPD to 128 VPD. The red text in Table 1 represents the traffic counts from 2020 which may not be an accurate representation of recent traffic patterns due to COVID-19 shutdowns and were not used to calculate growth rates. The bolded values were used as the most up-to-date traffic count.

POPULATION

Population data, including data from the 2020 Census, were obtained from the Kentucky State Data Center (KSDC) at the University of Louisville, Kentucky's official clearinghouse for census data. Population projections for the state of Kentucky and Monroe County are summarized in **Table 2**. Between 2000 and 2020, Monroe County decreased in population at a rate of 0.18 percent per year while the state of Kentucky increased in population at a rate of 0.54 percent per year. Between 2020 and 2050, Monroe County is anticipated to grow at a rate of 0.04 percent per year while the state of Kentucky is expected to grow at a rate of 0.30 percent per year, as shown in **Figure 4**.

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Table 2: Population Estimates and Projections

Area	2000	2020	Annual Growth (2000 - 2020)	2050 Projection	Annual Growth (2020 - 2050)
Kentucky	4,041,769	4,505,836	0.54%	4,785,233	0.30%
Monroe County	11,756	11,338	-0.18%	11,428	0.04%

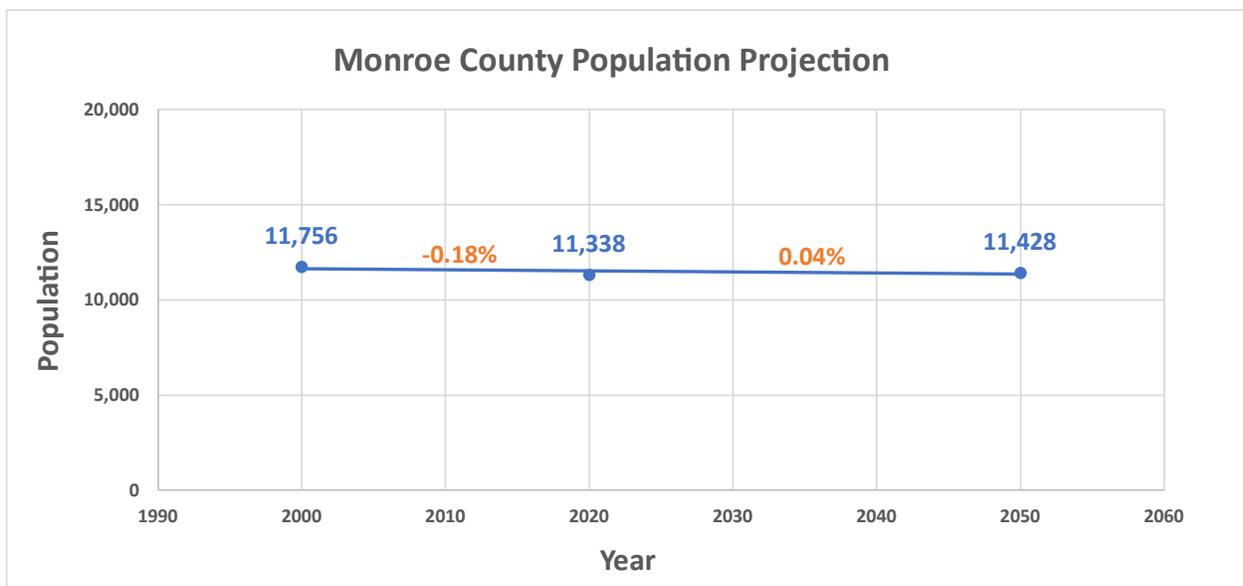


Figure 4: Monroe County Population Projection

KENTUCKY STATEWIDE TRAVEL DEMAND MODEL (KYSTM)

As an additional data source, the Kentucky Statewide Travel Demand Model version 19 (KYSTMv19), was provided by the KYTC Division of Planning in November 2022. As there is no roadway connection across the Cumberland River, the KYSTM did not have connecting links on KY 214 and therefore shows traffic assignments of 0 VPD. To replicate the ferry crossing, the KY 214 links were connected across the river, resulting in a daily assignment of 101 VPD. The model's TL_Class values on KY 214 range between 3 and 6, which lower model estimated free flow speeds on the corridor between 0 and 15 MPH. These values were not altered for the first model run. To better match the current river crossing count of 220 VPD, the speeds on several KY 214 links between KY 101 and KY 61 were increased by changing the TL_Class from 6 to 5. This reduced the speed penalty from 15 MPH to 10 MPH for those links. The resulting model run resulted in 226 VPD crossing the Cumberland River. These same changes were then made to the 2045 network, resulting in an annual growth rate of 0.5 percent per year, as shown in **Figure 5**. The updates to the network were meant to better reflect existing traffic and do not indicate improvements to the KY 214 corridor. Improvements to KY 214 would likely increase traffic at the river crossing but are not being considered as part of this study.

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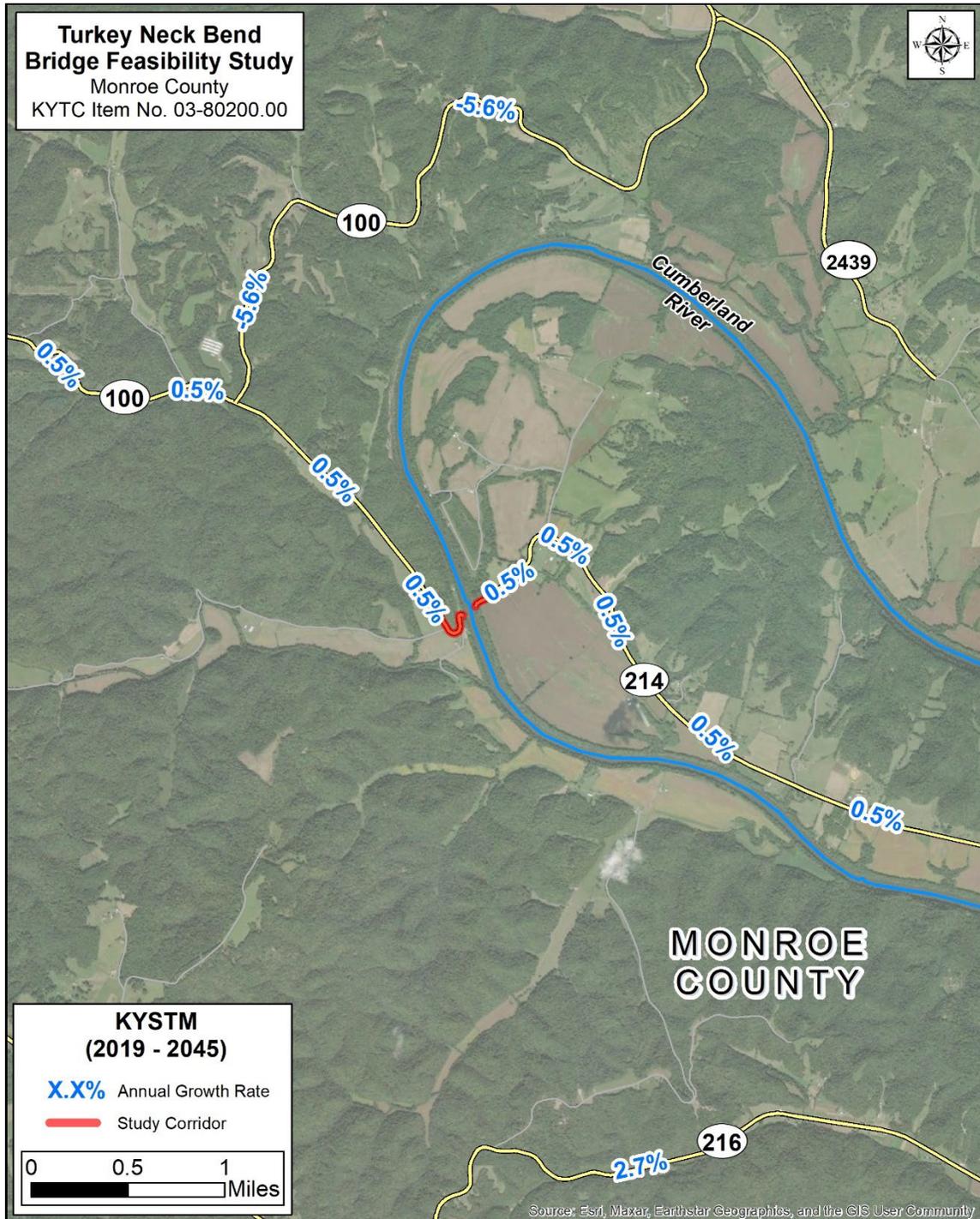


Figure 5: KYSTM Annual Growth Rates (2019 - 2045)

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GROWTH RATE CONCLUSIONS

Based on the historical count data, Monroe County population projections, and growth rates from the most updated version of the KYSTM, an annual growth rate of 0.5 percent was selected to reflect moderate growth for the Turkey Neck Bend study corridor through the year 2045.

EXISTING TRAFFIC

The annual growth rate was applied to the latest KYTC daily traffic counts (excluding 2020) to develop 2022 daily traffic estimates, as shown in **Figure 6**.

2045 TRAFFIC FORECASTS

The annual growth rate was then used to develop 2045 daily traffic forecasts, shown in **Figure 7**.

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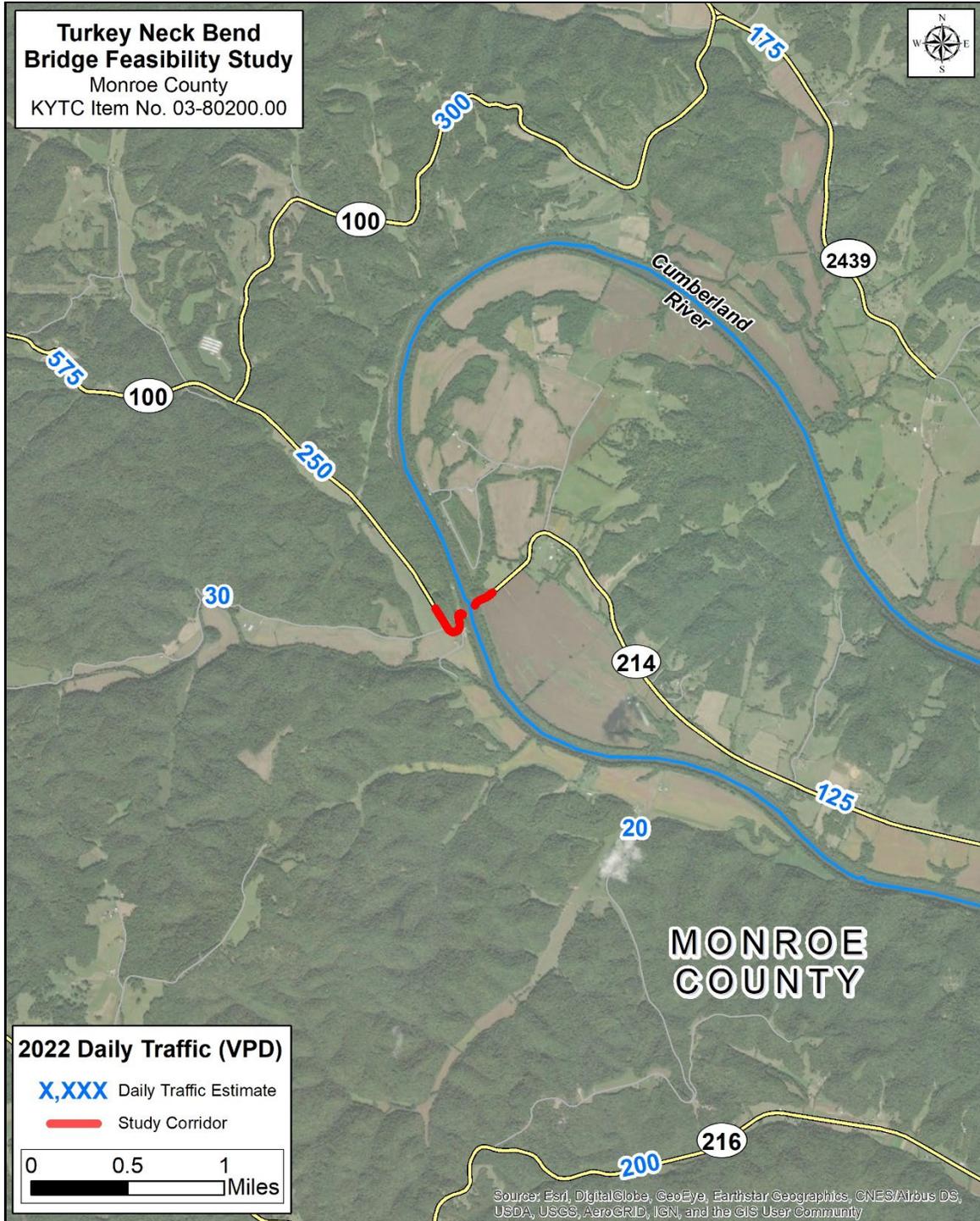


Figure 6: 2022 Daily Traffic Estimates
(Source: KYSTMv19 and Stantec)

Reference: Turkey Neck Bend Traffic Forecasting Technical Memorandum

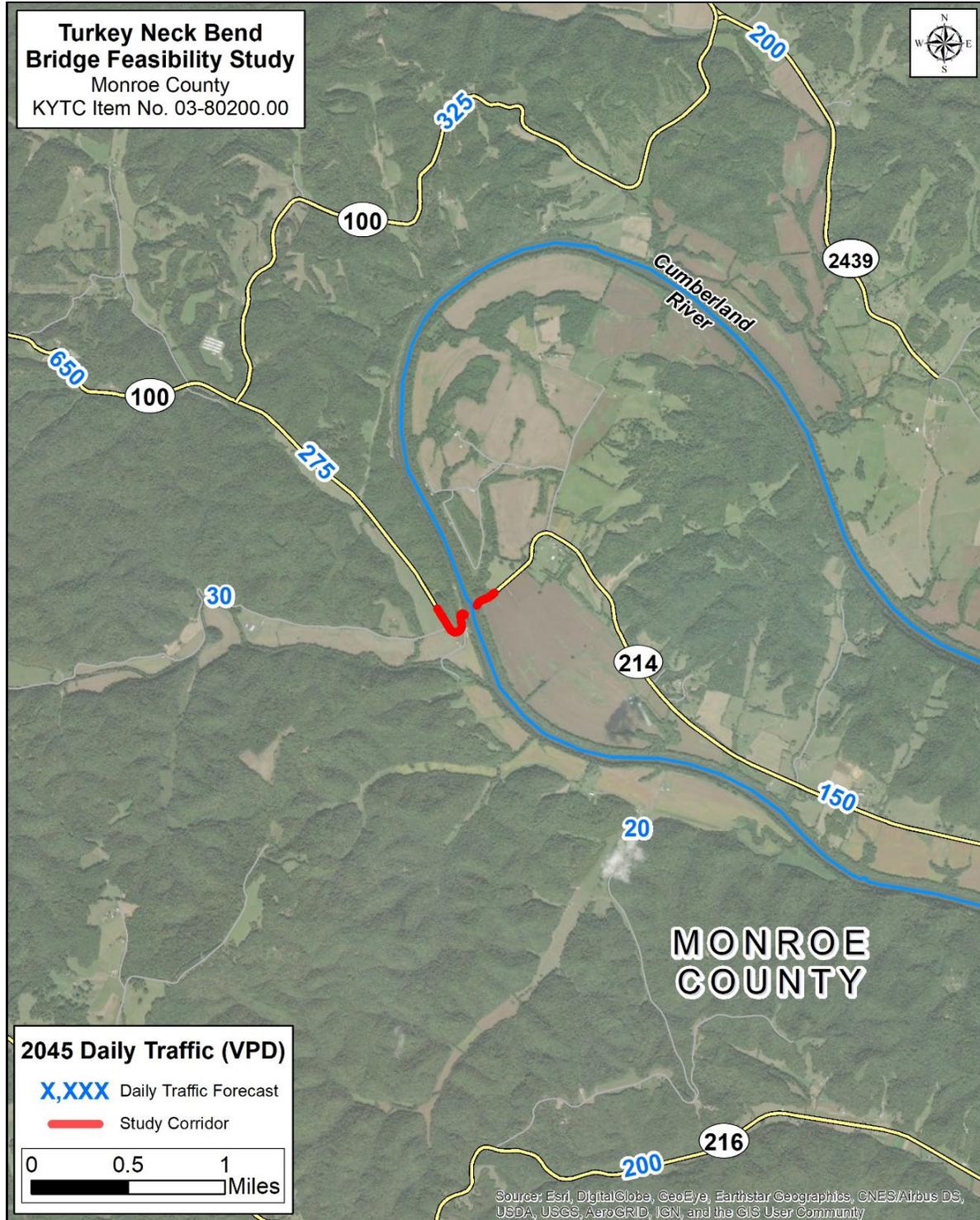


Figure 7: 2045 Daily Traffic Forecasts

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Reference: Turkey Neck Bend Traffic Forecasting Technical Memorandum

NEXT STEPS

The next steps are to develop and analyze alternatives to connect KY 214 across the Cumberland River.

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A handwritten signature in black ink, appearing to read "Graham Winchester".

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