

Ohio River Megapark Connector Study

McCracken County
KYTC Item No. 1-8702.00

Prepared for:



Kentucky Transportation Cabinet

Prepared by:



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Table of Contents

EXECUTIVE SUMMARY	iii
1.0 INTRODUCTION	1
1.1 BACKGROUND	2
1.1.1 Ohio River Megapark.....	2
1.1.2 Study Area	2
2.0 EXISTING CONDITIONS	4
2.1 ROADWAY CHARACTERISTICS.....	4
2.2 CRASH ANALYSIS.....	10
3.0 ENVIRONMENTAL OVERVIEW	11
3.1 NATURAL ENVIRONMENT.....	11
3.1.1 Surface Streams	11
3.1.2 Floodplains.....	12
3.1.3 Wetlands	13
3.1.4 Groundwater Resources.....	13
3.1.5 Public Water Supplies.....	13
3.1.6 Public Parks – Section 4(f) and Section 6(f) facilities	13
3.2 HUMAN ENVIRONMENT	13
3.2.1 Social and Economic Resources.....	14
3.2.2 Archaeological and Cultural Historic Resources	15
3.3 THREATENED AND ENDANGERED SPECIES.....	16
3.3.1 Federal-Listed Species	16
3.3.2 State-Listed Species	16
3.4 GEOTECHNICAL CONSIDERATIONS.....	17
3.5 ENVIRONMENTAL JUSTICE OVERVIEW	17
3.6 RESOURCE AGENCY COORDINATION	17
4.0 DEVELOPMENT OF ALTERNATIVES	19
4.1 CONCEPT DEVELOPMENT	19
4.1.1 Typical Sections.....	20
4.2 TRAFFIC FORECASTS.....	22
4.2.1 McCracken County Travel Demand Model.....	22
4.2.2 Travel Demand Model Updates and Assumptions	23
4.2.3 Future Year Updates	26
4.3 PUBLIC INVOLVEMENT	27
4.3.1 Advisory Committee	27
4.3.2 Public Meeting.....	28
4.4 EXPANDED STUDY AREA AND REVISED CONCEPTS	29
5.0 RECOMMENDATIONS	31
5.1 NEXT STEPS.....	32

OHIO RIVER MEGAPARK CONNECTOR STUDY

LIST OF TABLES

Table 1. Ohio River Megapark Connector Project Listing in the Kentucky 2012 Highway Plan.....	2
Table 2. Comparison of Original Conceptual Alternatives	22
Table 3. Percent Root Mean Square Error Statistics	24
Table 4. Screenline Volumes and Counts	25
Table 5. Socioeconomic Data Totals for McCracken County.....	26
Table 6. Advisory Committee Members.....	27
Table 7. Comparison of Revised Conceptual Alternatives	31
Table 8. Recommended Alternative	33

LIST OF FIGURES

Figure 1 – Project Area.....	1
Figure 2 – Ohio River Megapark Overview Map.....	3
Figure 3 – Initial Study Focus Area	4
Figure 4 – Functional Classification for Study Area Roadways	5
Figure 5 – Shoulder Widths.....	6
Figure 6 – Number of Lanes and Lane Widths.....	7
Figure 7 – Truck Weight Class.....	8
Figure 8 – Average Daily Traffic (ADT) Volumes and Level of Service (LOS).....	9
Figure 9 – Crash History (2010-2012) and Critical Rate Factors (CRF)	10
Figure 10 – Natural Environmental Resources.....	12
Figure 11 – Human Environment.....	14
Figure 12 – Original Roadway Concepts	20
Figure 13 – Two-Lane Typical Sections.....	21
Figure 14 – Four-Lane Typical Sections	21
Figure 15 – Screenline Locations for Travel Demand Modeling.....	25
Figure 16 – Wetland Reserve Program (WRP) Easements.....	29
Figure 17 – Revised Roadway Connector Concepts.....	30
Figure 18 – 2036 Traffic Forecasts.....	32
Figure 19 – Recommended Alternative 4 with Potential Western Extensions	33

APPENDICES

APPENDIX A – HISTORICAL CRASH DATA (2010 – 2012)

APPENDIX B – ENVIRONMENTAL OVERVIEW

APPENDIX C – GEOTECHNICAL OVERVIEW

APPENDIX D – ENVIRONMENTAL JUSTICE OVERVIEW

APPENDIX E – RESOURCE AGENCY COMMENTS

APPENDIX F – MEETING SUMMARIES

Executive Summary

The Kentucky Transportation Cabinet (KYTC) initiated the Ohio River Megapark Connector Study to evaluate options for a new connector route to serve the proposed Megapark site in McCracken County. The study area is located west of I-24 in Paducah. The Megapark, also referred to as the Triple Rail Megasite, is a proposed industrial site bounded by the Ohio River to the north, the Illinois Central rail line to the west, and the Paducah & Illinois rail line to the south. The site has ample rail access and future river access will be available through the development of a new dock / barge facility. However, the Megapark does not have efficient access to I-24. Paducah Economic Development has indicated the need to have such roadway access available within two years of signing a major tenant to develop at the site. Therefore, the purpose of the Ohio River Megapark Connector Project is to provide a safe and efficient connection between KY 305 (Old Cairo Road) near I-24 and the proposed Megapark site.

Through a comprehensive evaluation of the study area and discussions with project stakeholders and the general public, a number of new roadway alternatives were developed and evaluated. Part of this effort included updating the McCracken County Travel Demand Model (TDM) to estimate traffic volumes along not only the proposed roadway alternatives, but also the surrounding roadway network. The Megapark, when fully developed, is anticipated to attract over 2,000 new jobs to the region. The result is approximately 7,000 to 7,500 new trips entering and exiting the site by the horizon year of 2036.

The final study recommendation, referred to as Alternative 4 and shown on **Figure ES-1**, includes the construction of a new roadway from the KY 305 (Old Cairo Road) intersection with Commerce Drive, paralleling the Paducah & Illinois rail line to the south before crossing the rail line with a grade separation and tying into the existing Bobo Road corridor. This corridor was ultimately selected because it avoids impacts to Wetland Reserve Program (WRP) easements owned by the Natural Resource Conservation Service (NRCS) and results in fewer right-of-way impacts than other concepts that were considered, but still serves the future access needs of the Megapark.

Table ES-1 includes a summary of the costs and impacts associated with the recommended alternative. The construction cost estimates were developed based on 2012 average KYTC unit bid costs. A typical section for the proposed roadway has not been selected, but the intent for subsequent design phases is to design a two-lane initial, four-lane ultimate section. Initial construction of a two-lane roadway would include only the new connector road (west of Commerce Drive) and some improvement to KY 305 between the KY 998 (Olivet Church Road) intersection and I-24. The four-lane ultimate section is likely to include a five-lane widening along existing KY 305 (Old Cairo Road) between Commerce Drive and the I-24 interchange to minimize right-of-way and utility impacts. This cost does not include construction of a new connector road west of the Illinois Central rail line, but two concepts for such an extension will be explored further during the preliminary design phase.

OHIO RIVER MEGAPARK CONNECTOR STUDY

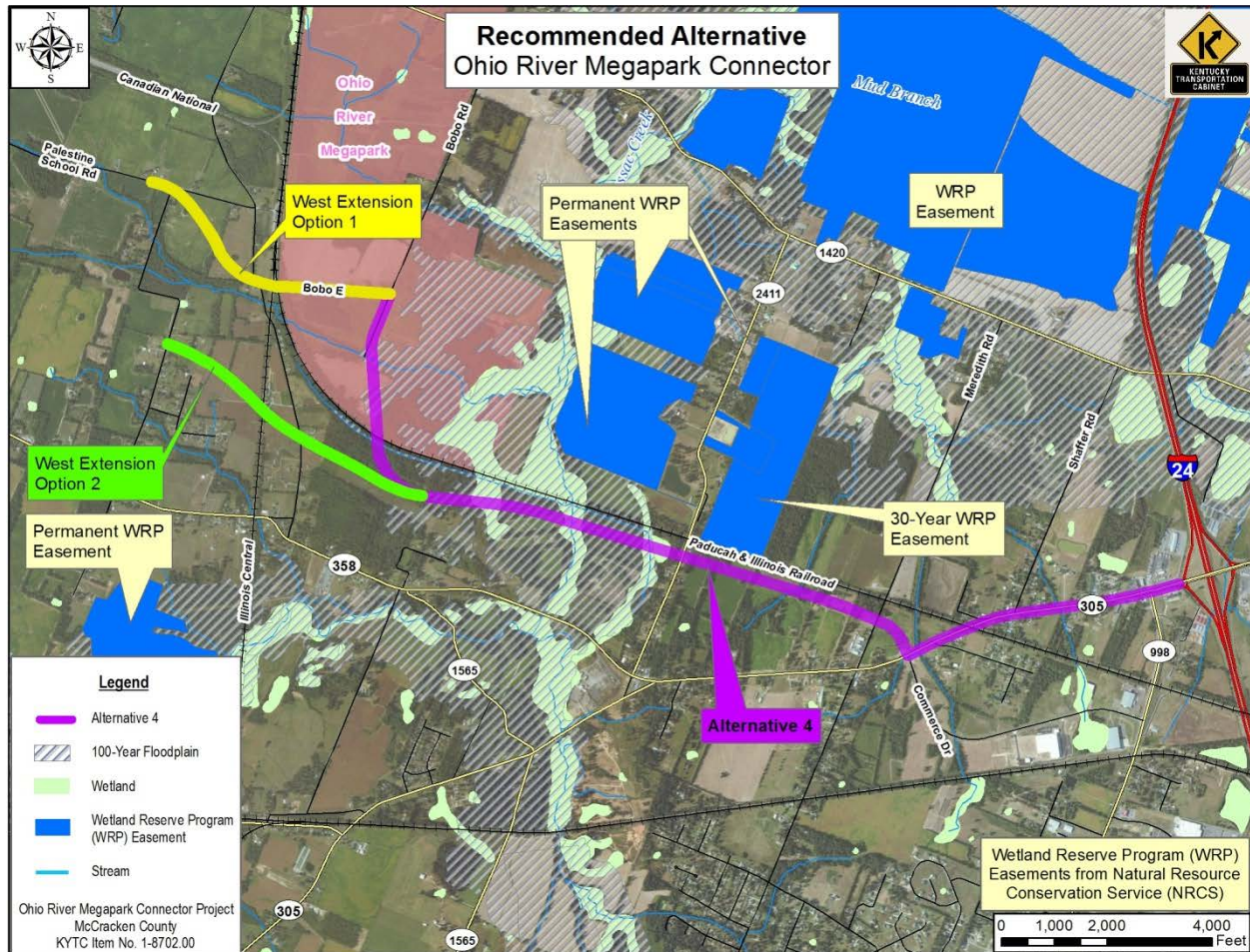


Figure ES-1 – Recommended Alternative with Potential Western Extensions

Alternative 4	Alternative 4 2-Lane	Alternative 4 4-Lane
Length (miles)	2.7	3.6
Wetland Reserve Program (WRP) Easement Disturbance (Acres)	0	0
Potential Relocations*	3	13
Probable Construction Cost (\$)	\$16 M	\$33 M

*Note: includes both businesses and residences.

Table ES-1. Recommended Alternative

1.0 Introduction

The Ohio River Megapark Connector Study was initiated by the Kentucky Transportation Cabinet (KYTC) to evaluate a new connector route to serve the proposed Megapark site in McCracken County. The Megapark, also known as the Ohio River Triple Rail Megasite, is located south of the Ohio River and approximately two miles west of I-24 in Paducah. The “Triple Rail” is a reference to the three rail lines that serve the industrial site– the Illinois Central (Canadian National) and the BNSF rail lines along the western boundary and the Paducah and Louisville line to the south. The only state-maintained roadway that currently serves the site is KY 1420 (Noble Road) just south of the Ohio River. There is currently no direct roadway access to I-24, and the nearest interchange with I-24 is on KY 305 (Old Cairo Road) at exit 3. The purpose of the Ohio River Megapark Connector Project is to provide a safe and efficient connection between KY 305 (Old Cairo Road) near I-24 and the proposed Megapark site. The general project area is shown in **Figure 1**.

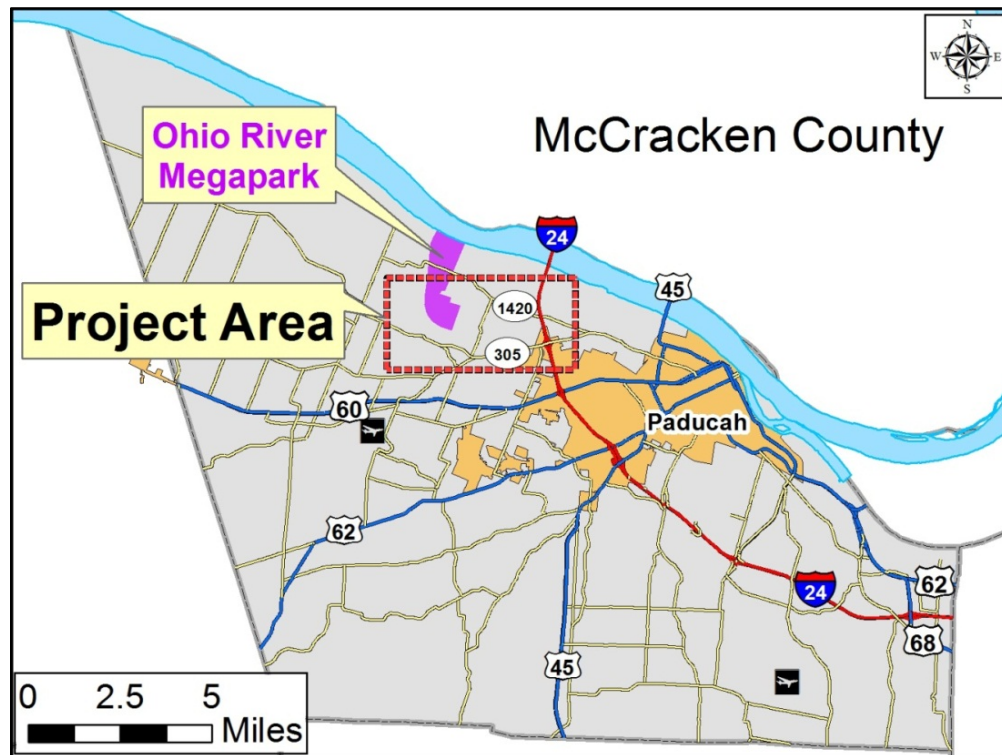


Figure 1 – Project Area

The Ohio River Megapark Connector Project is listed on the 2012 Kentucky Highway Plan, as summarized in **Table 1**. A portion of the design funds appropriated for the project were allocated to perform this study. The most appropriate corridor will be determined in which to construct a new roadway to provide access between the Megapark and I-24. Future design and right-of-way phases for this project are funded in the current biennium under the State Priority Program (SPP).

OHIO RIVER MEGAPARK CONNECTOR STUDY

Project Phase	Estimated Cost	Funding Code	Scheduled Fiscal Year
Design	\$3,000,000	State Priority Project (SPP)	2013
Right-of-Way	\$4,000,000	State Priority Project (SPP)	2014
Utility Relocation	\$3,000,000	State Priority Project (SPP)	2015
Construction	\$22,000,000	State Priority Project (SPP)	2016

Table 1. Ohio River Megapark Connector Project Listing in the Kentucky 2012 Highway Plan

1.1 BACKGROUND

1.1.1 Ohio River Megapark

The Ohio River Megapark site, shown in **Figure 2**, is currently being marketed by Paducah Economic Development with the intent of eventually attracting over 2,000 new jobs to the region. The primary focus of this study is to evaluate and recommend corridor options to provide new roadway access to 581 acres available for industrial development outlined in yellow in **Figure 2**. Within the same general area, Paducah Economic Development also has 392 acres of land available for development west of the BNSF rail line. Paducah Economic Development has a goal to construct a new roadway connection within two years from the point at which a tenant executes an agreement to develop within the Megapark.

1.1.2 Study Area

The original study area proposed by the KYTC included an area west of I-24, north of KY 305 (Old Cairo Road), south of KY 1420 (Noble Road, which is south of the Ohio River), and east of the Ohio River Megapark. During preliminary discussions with Paducah Economic Development, it was deemed important to maintain the integrity of certain portions of the overall site by providing an access road that does not bisect some areas. The most notable location of this type is between KY 1420 (Noble Road) and where the Canadian National railroad (the rail line that connects to the Tennessee Valley Authority's Shawnee power plant) intersects the north-south BNSF rail line. It was decided that no alternatives would be investigated north of the Canadian National line.

OHIO RIVER MEGAPARK CONNECTOR STUDY



Figure 2 – Ohio River Megapark Overview Map
(Source: www.epaducah.com)

Paducah Economic Development also indicated it is imperative that access be provided west of the Illinois Central rail line, which serves as the western boundary of the Megapark. This would provide improved access to an existing 335,000 square foot industrial building on KY 1420 (Noble Road) and would also facilitate future plans to provide a roadway connection to US 60 to the south. This could also connect to future roadway improvements associated with the redevelopment of the Gaseous Diffusion Plant to the west of the study area. The U.S. Department of Energy has indicated funding might be available for future infrastructure improvements related to the redevelopment.

After meeting with Paducah Economic Development and discussing development concepts, the study area was further refined to the blue shaded area shown in **Figure 3**. This revision would allow for a new roadway connection from KY 305 (Old Cairo Road) at KY 998 (Olivet Church Road) into the southern portion of the proposed development while allowing the site to maintain large, contiguous parcels immediately north and south of KY 1420 (Noble Road).

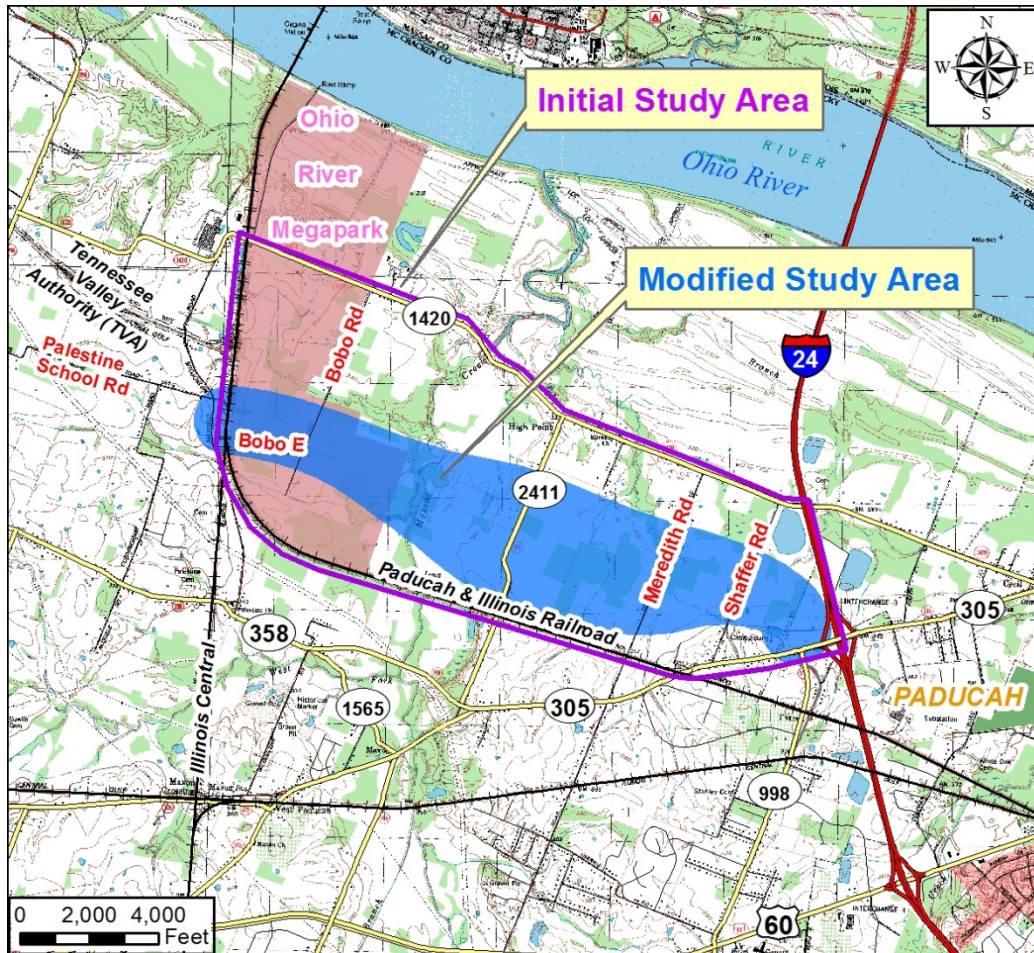


Figure 3 – Initial Study Focus Area

2.0 Existing Conditions

Conditions of the study area’s existing transportation network are examined in the following section. The information compiled includes roadway facilities and geometrics, crash history, and traffic volumes within the study area. Data for this section were collected from the KYTC’s Highway Information System (HIS) database, aerial photography, as-built plans, and field review.

2.1 ROADWAY CHARACTERISTICS

Figure 4 shows the functional classification of all state-maintained roadways within the study area. Functional classification is the grouping of roads, streets and highways into integrated systems ranked by the level of mobility for through movements and access to adjoining land. This grouping acknowledges that roads serve multiple functions and it provides a basis for comparing roads equitably.

OHIO RIVER MEGAPARK CONNECTOR STUDY

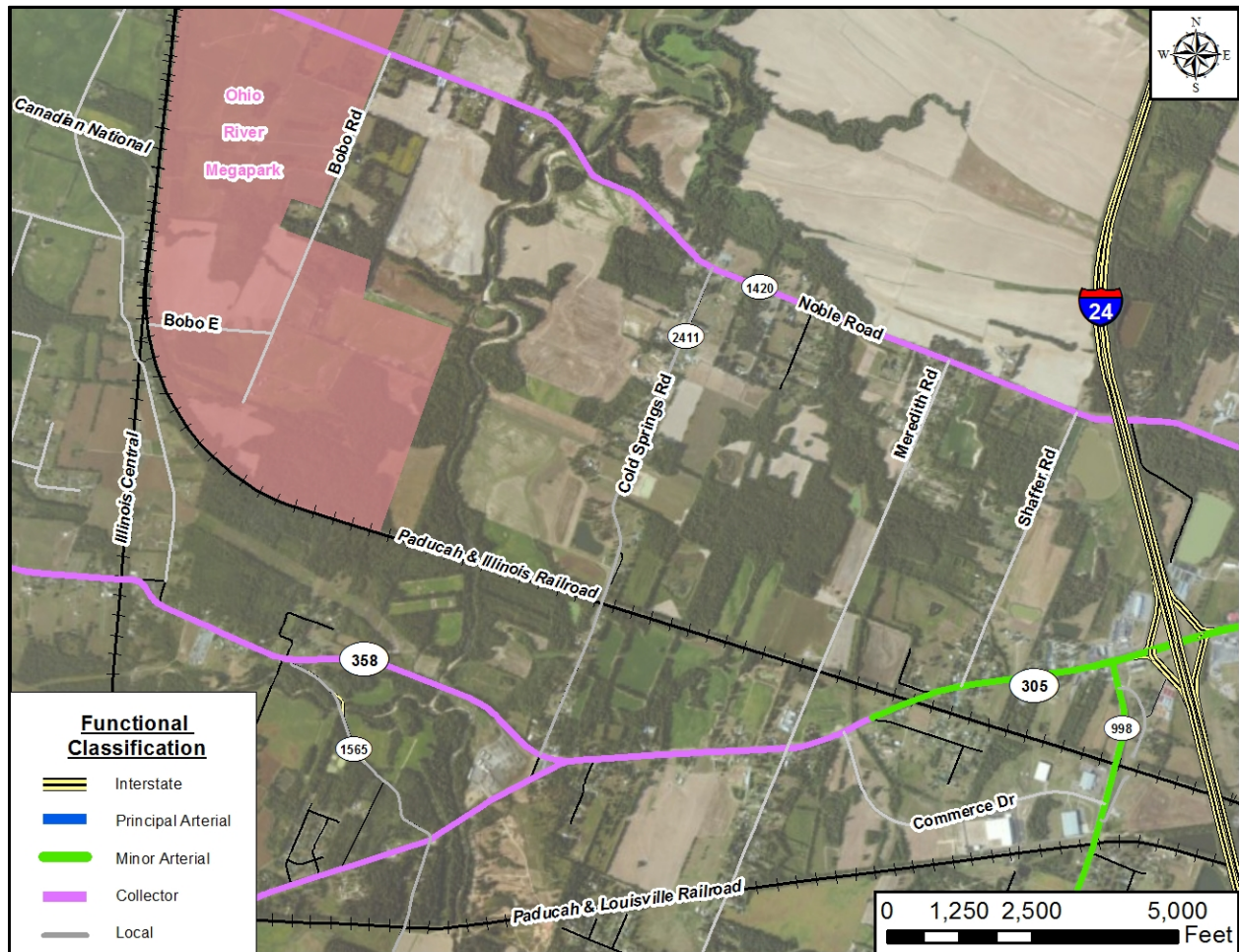


Figure 4 – Functional Classification for Study Area Roadways

Functional classification can be used for, but is not limited to, the following purposes:

- Provide a framework for highways serving mobility and connecting regions and cities.
- Provide a basis for assigning jurisdictional responsibility according to the roadway's importance.
- Provide a basis for development of minimum design standards according to function.
- Provide a basis for evaluating present and future needs.
- Provide a basis for allocation of limited financial resources.

KY 305 (Old Cairo Road) east of Commerce Drive and KY 998 (Olivet Church Road) are classified as minor arterial roadways. KY 2411 (Cold Springs Road) is classified as a local road. All the remaining state-maintained roadways within the study area are classified as collector roadways.

OHIO RIVER MEGAPARK CONNECTOR STUDY

Figure 5 shows existing shoulder widths in the study area, which typically range from one to four feet. KY 998 (Olivet Church Road) and KY 305 (Old Cairo Road) through the I-24 interchange both have 10-foot-wide shoulders.

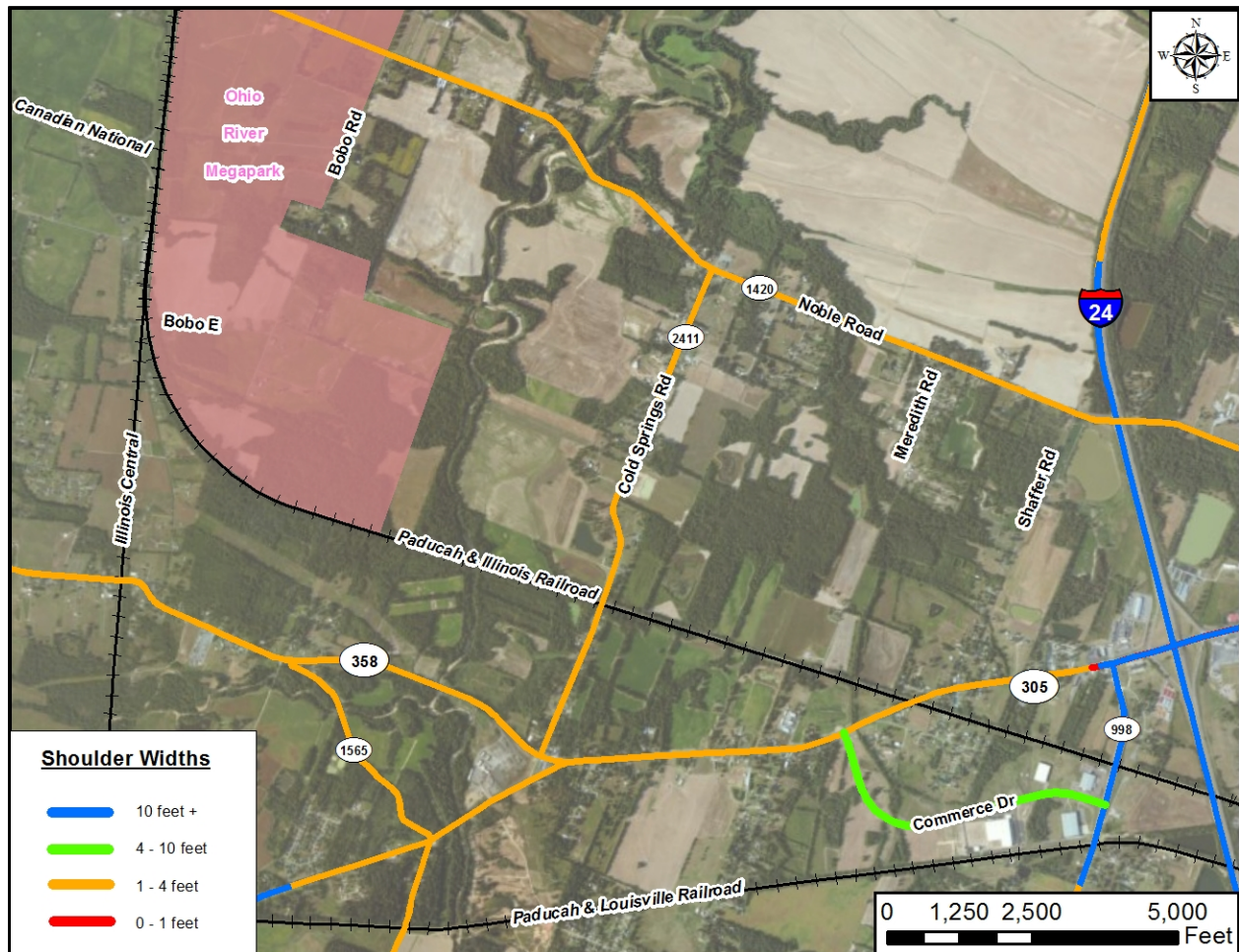


Figure 5 – Shoulder Widths

Figure 6 shows the existing lane widths for all roadways within the study area. Current KYTC design guidelines recommend a minimum of 11-foot-wide lanes on arterials and collector roadways. KY 998 (Olivet Church Road) is the only four-lane roadway within the study area, and it has 12-foot-wide lanes. East of its intersection with KY 358 (Ogden Landing Road), KY 305 (Old Cairo Road) consists of two 12-foot-wide lanes; to the west, lane widths are 10 feet on both KY 358 and KY 305. The central portion of KY 2411 (Cold Springs Road) has 11-foot-wide lanes, but the north and south ends both have 9-foot-wide lanes.

OHIO RIVER MEGAPARK CONNECTOR STUDY

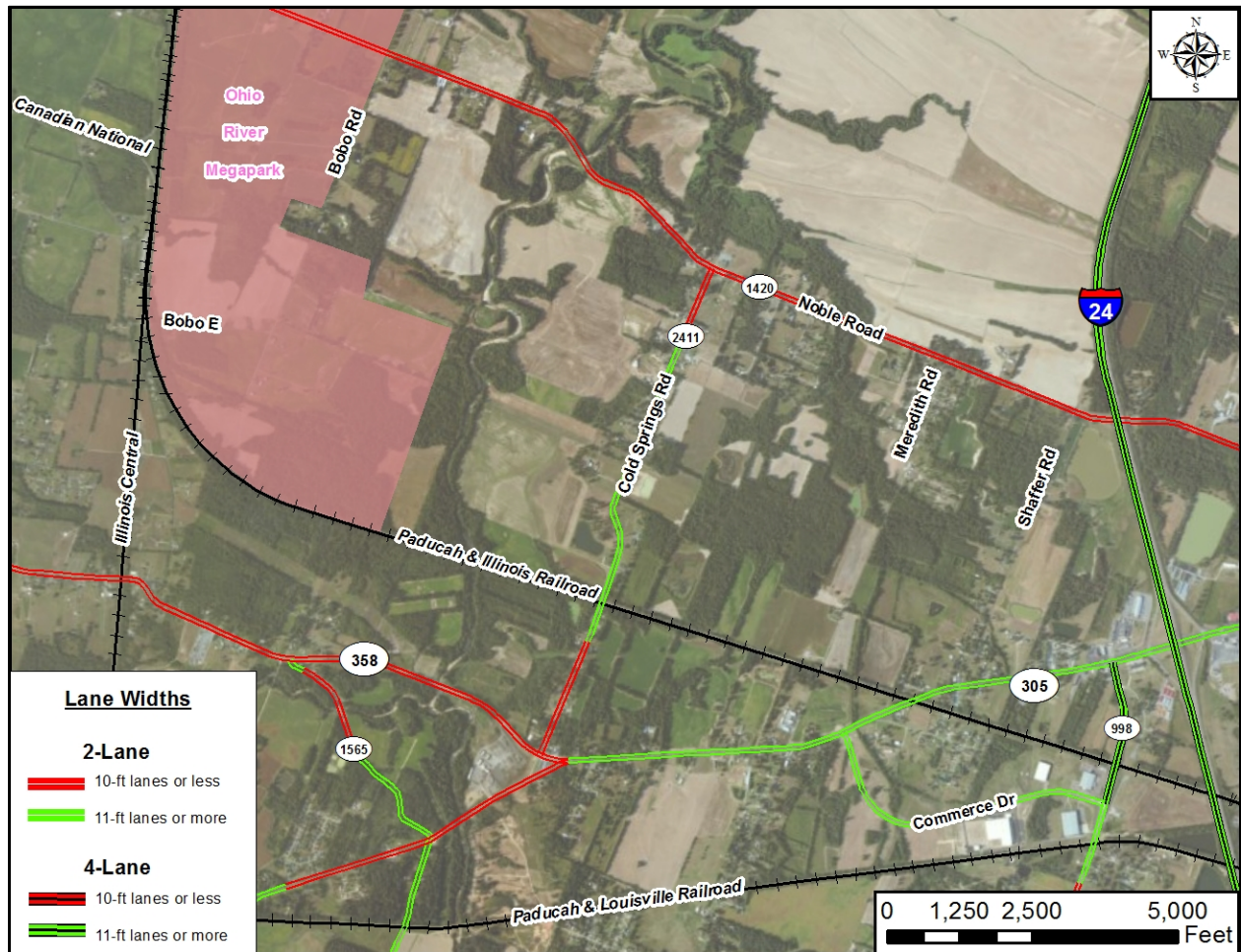


Figure 6 – Number of Lanes and Lane Widths

Figure 7 shows the truck weight class for the study area roadways. KY 305 (Old Cairo Road) and KY 358 (Ogden Landing Road) are both rated “AAA” for trucks up to 80,000 pounds. A portion of KY 1420 (Noble Road) through the Megapark is also rated “AAA.” The remaining routes are rated “A” for up to 44,000 pounds. I-24 is the only designated truck route within the study area.

OHIO RIVER MEGAPARK CONNECTOR STUDY

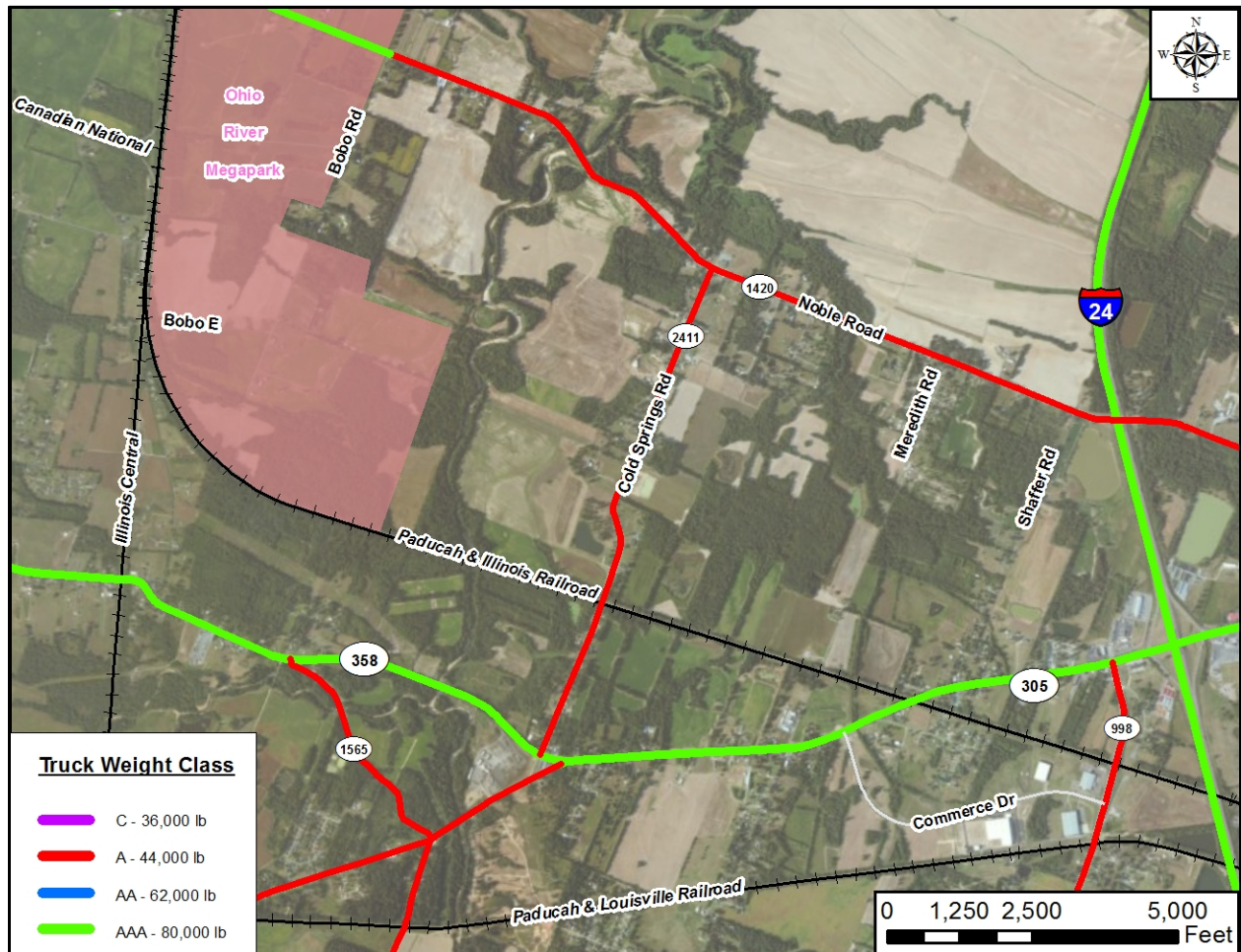


Figure 7 – Truck Weight Class

Figure 8 shows the existing average daily traffic (ADT) volumes throughout the study area. Traffic volumes on KY 305 range from 3,200 to 13,000 vehicles per day (VPD). Historically, traffic volumes along KY 305 west of I-24 have been consistently between 7,000 and 7,500 vehicles per day over the last 12 years.

Level of service (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, having letter grades 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 urban areas, LOS D or better is desirable. In rural areas, LOS C or better is desirable.

OHIO RIVER MEGAPARK CONNECTOR STUDY

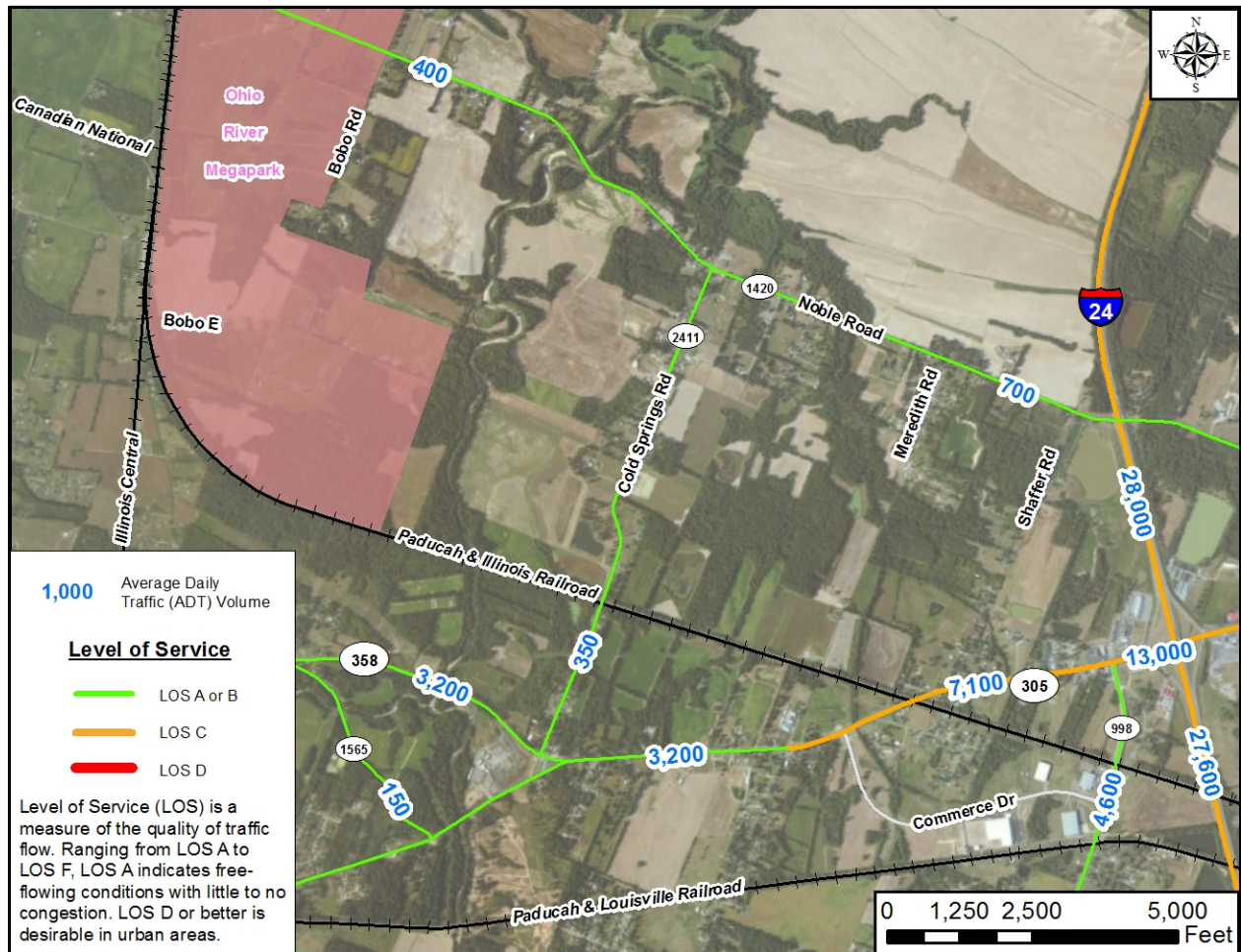


Figure 8 – Average Daily Traffic (ADT) Volumes and Level of Service (LOS)

Levels of service for different facility types are based on service measures deemed most appropriate for describing operations. For interstates, freeways and multilane highways, LOS is based on density (expressed in passenger car equivalents per mile). For arterial streets, LOS determinations are based on the percent of free-flow speed. This measure includes delay at signalized intersections. For two-lane highways, levels of service are determined based on two parameters – average travel speed and percent time following in a platoon or group of vehicles.

At the facility level, LOS can be computed using methods that involve detailed data and operational parameter input. After performing a LOS analysis using Highway Capacity Manual (HCM) procedures, all roadway segments within the study area were found to operate at LOS C or better. These results are depicted in **Figure 8**.

2.2 CRASH ANALYSIS

Historical crash data were collected for a three-year period from 2010 through 2012 along the routes in the study area. The crash records and locations are included in **Appendix A**. Critical Rate Factors (CRFs) were analyzed to determine how the roadway facilities in the study area compare to similar roads within Kentucky. The CRF value is calculated by dividing the actual crash rate along a particular roadway segment by the critical rate, which is the maximum accident rate for which it can be said that crashes are probably not occurring randomly based on roadway characteristics and traffic. A CRF greater than 1.0 suggests that conditions may exist that contribute to non-random occurrences. The results of the analysis are shown on **Figure 9**.

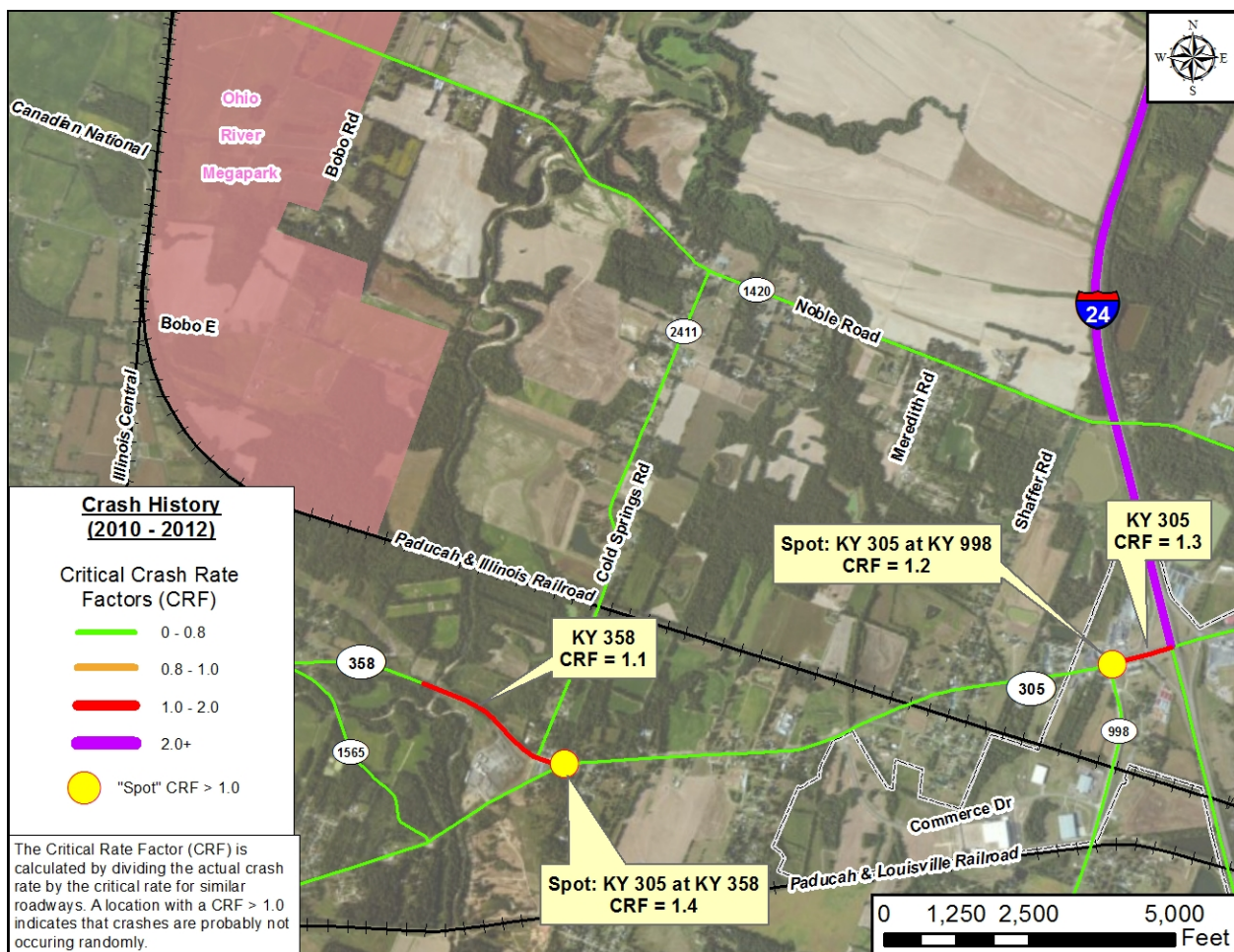


Figure 9 – Crash History (2010-2012) and Critical Rate Factors (CRF)

Two segments with CRF values greater than 1.0 were found. One is located on KY 358 (Ogden Landing Road) west of KY 305 (CRF = 1.1). The second location is on KY 305 (Old Cairo Road) between KY 998 (Olivet Church Road) and I-24 (CRF = 1.3). Additionally, two spots (a roadway length of less than 0.3 miles) exist within the study area with CRFs greater than 1.0. These spots are located at the intersection of KY 305 and KY 358 (CRF = 1.4) and the intersection of KY 305 and KY 998 (CRF=1.2).

3.0 Environmental Overview

An environmental overview was performed to determine potential impacts of the proposed project. The complete document is included in **Appendix B**. The following sections discuss both natural and human environment resources present within the study area.

3.1 NATURAL ENVIRONMENT

Natural environment resources located within the study area include: surface streams; floodplains; wetlands; ponds; groundwater; threatened, endangered and special concern species and habitat; and woodland and terrestrial areas. Information concerning each resource was obtained from publicly available secondary sources, such as maps and Geographic Information Systems (GIS) files, with limited on-site survey and verification. Natural resources present in the study area are shown on **Figure 10**.

3.1.1 Surface Streams

Eight (8) streams are mapped in the study area. The largest of these is Massac Creek, which traverses the western portion of the study area, flowing south to north towards the Ohio River. Unnamed tributaries of Massac Creek are located in the eastern portion of the study area, flowing in a north/northwesterly direction toward Massac Creek and the Ohio River.

Review of the 2010 Kentucky Division of Water (KDOW) 305(b) and 303(d) integrated water quality report indicates no streams within the study area are currently listed as impaired waters. Massac Creek in its entirety within McCracken County was delisted as a 303(d) impaired stream in 2003 and currently upstream from the Paducah & Louisville rail line is listed as Partially Supporting for Aquatic Life. The West Fork of Massac Creek west of its confluence with Massac Creek is also listed as Partially Supporting for Aquatic Life. Information from the Kentucky Division of Water indicates there are no Special Use Waters (cold water aquatic habitat, exceptional water, reference reach water, and outstanding state resource water) within the study area.

OHIO RIVER MEGAPARK CONNECTOR STUDY

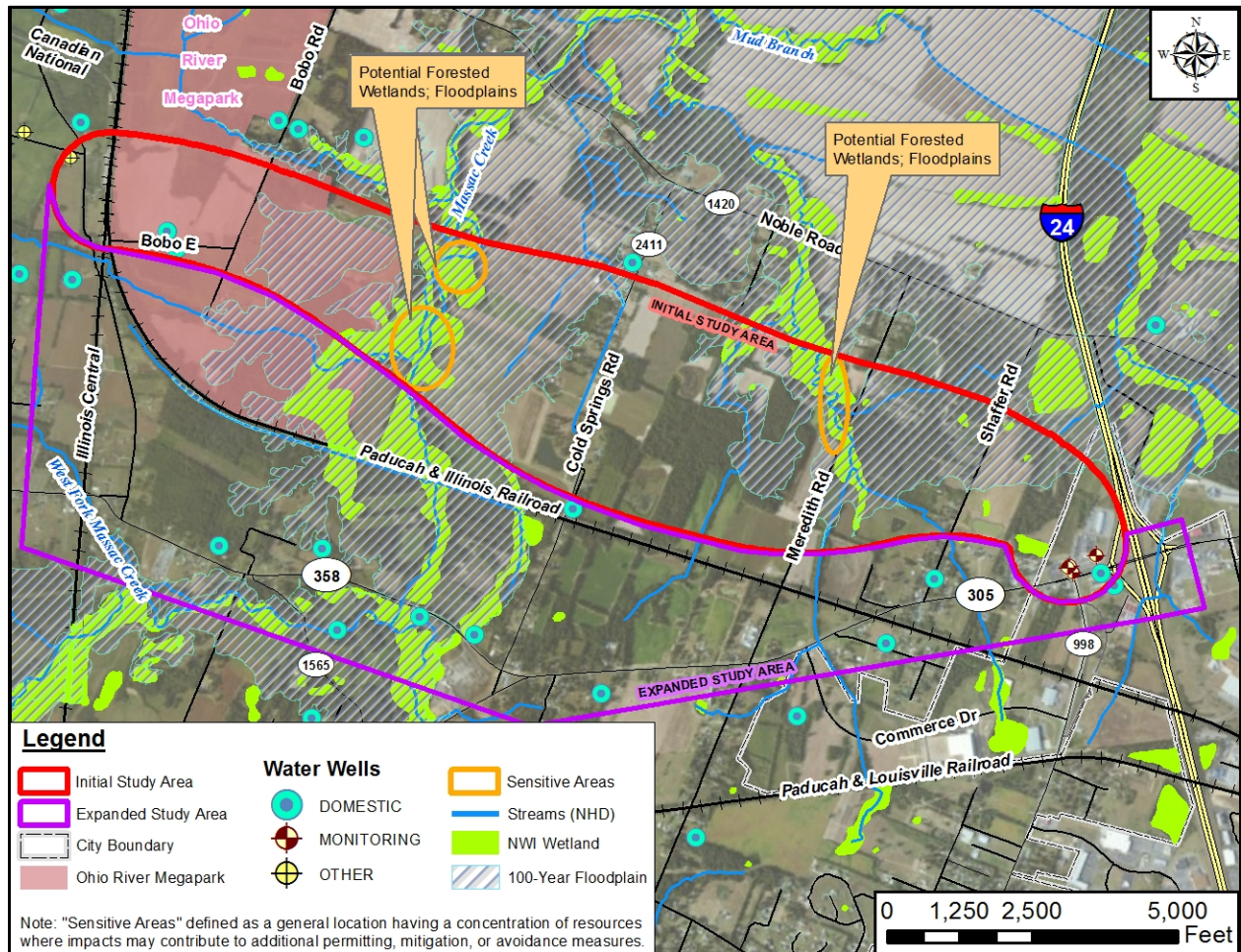


Figure 10 – Natural Environmental Resources
 (Source: Environmental Overview for the Ohio River Megapark Connector Project)

3.1.2 Floodplains

Based on review of Flood Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs), 100-year floodplains occur in most of the study area. Floodplains are associated with Massac Creek and its tributaries and represent influence from the Ohio River floodplain as well. No floodways are located within the study area. Coordination for transportation projects in mapped 100-year floodplain areas will be required with the McCracken County Floodplain Administrator and the KYDOW, Surface Water Permits Branch, Floodplain Management Section to determine limitations on construction activities in these areas, as well as local and state permit requirements.

OHIO RIVER MEGAPARK CONNECTOR STUDY

3.1.3 Wetlands

A review of National Wetlands Inventory (NWI) data indicates that twenty-one NWI-mapped wetlands are located throughout the study area. The majority of the NWI mapped features are identified as ponds, typically small farm ponds and storm water retention ponds readily observable in the landscape. Three larger features are mapped as forested wetlands along Massac Creek and unnamed tributaries to the east. The main channel of Massac Creek is mapped as a riverine wetland at the northern boundary of the study area. Several potential wetland locations were identified on aerial photography and were observed during field reconnaissance of the study area. These include potential emergent wetland features scattered throughout the study area and forested wetland features within the riparian corridor of Massac Creek. As a majority of the study area includes hydric soils, there is the high likelihood that additional unmapped wetlands are present. Comprehensive wetland surveys and impact assessments, including evaluation of avoidance and minimization measures, will need to be conducted during subsequent project phases.

3.1.4 Groundwater Resources

Groundwater, spring, and water well information from the Kentucky Geologic Survey (KGS) and KDOW was reviewed for McCracken County. Review of Kentucky Geologic Survey data indicate there are 32 water wells registered in the study area. Note the locations of these wells identified on **Figure 10** can represent clusters of wells. Of these, 15 (47 percent) are monitoring wells clustered around the commercial facilities at the southeast corner, 14 (44 percent) are domestic use wells, two (6 percent) are unused, and one is an agriculture well for livestock watering. No springs are mapped within the study area. Based on available groundwater and bedrock geology data, the presence of springs is not considered to be common or widespread throughout the study area.

3.1.5 Public Water Supplies

Water supply is provided to the western portion of the study area (Bobo Road and westward) by the West McCracken County Water District. From KY 2411 (Cold Springs Road) to the east, water is provided by the Paducah Water District. The study area is not within a Source Water Assessment and Protection (SWAP) area.

3.1.6 Public Parks – Section 4(f) and Section 6(f) facilities

Based on review of secondary source information and available aerial mapping, no parks (Section 4(f) resources) are located in the study area. In addition, no state or federal managed areas, parks, forests or preserves occur within the study area. No facilities in the study area were identified as having received Land and Water Conservation Fund (LWCF) grants (Section 6(f) resources). No public use parks, forests, preserves, or recreational use areas were observed during field reconnaissance of the study area.

3.2 HUMAN ENVIRONMENT

Through review of secondary source information and field reconnaissance, potentially sensitive resources were identified in the study area. These resources are shown on **Figure 11** and are discussed in the following sections.

OHIO RIVER MEGAPARK CONNECTOR STUDY

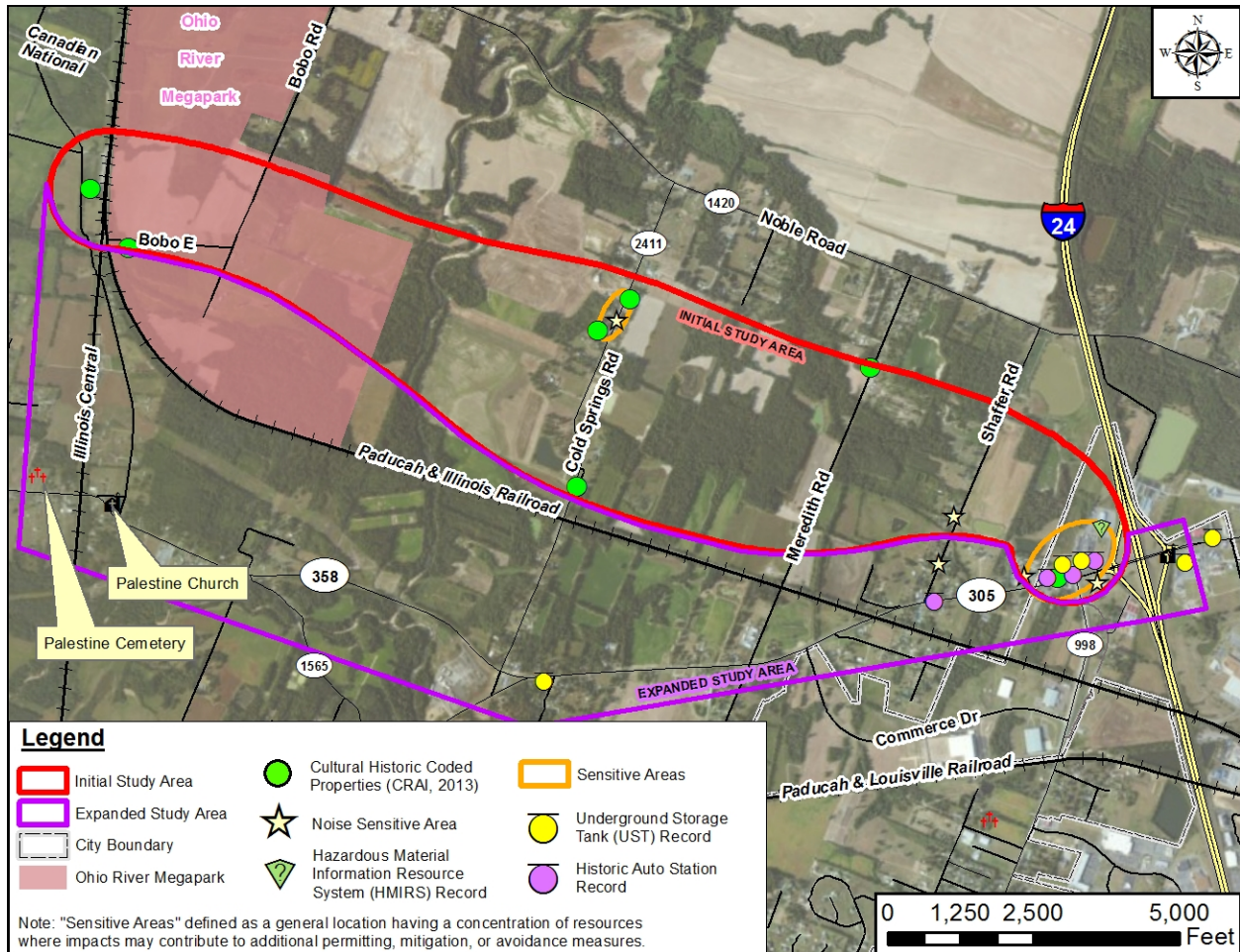


Figure 11 – Human Environment

(Source: Environmental Overview for the Ohio River Megapark Connector Project)

3.2.1 Social and Economic Resources

- **Cemeteries** – Based on a review of USGS topographic maps and field survey, the only cemetery located in the study area is the Palestine Cemetery located north of KY 358 (Ogden Landing Road) and west of the Illinois Central rail line.
- **Churches/Houses of Worship** – Based on a review of the USGS topographic map (Heath and Paducah West Quadrangles) and field reconnaissance, the only church located in the study area is the Palestine Church located north of KY 358 (Ogden Landing Road) and east of the Illinois Central rail line.
- **Schools, Institutions and Learning Centers** – No schools, institutions or learning centers are mapped within the study area or were observed during the field reconnaissance.
- **Federal Facilities** – No federal facilities or federal government owned lands are mapped in the study area or were observed during the field reconnaissance.

OHIO RIVER MEGAPARK CONNECTOR STUDY

- Fire Departments and Emergency Services – There are no fire departments or emergency operations centers located within the study area. The study area is within the Concord Fire District. Fire and emergency services are provided by both the West McCracken Volunteer Fire Department (VFD), located at KY 358 (Ogden Landing Road) and Metropolis Lake Road in proximity to the western portion of the study area, and Concord VFD, located at Meredith Road/Maxon Road and KY 305 (Old Cairo Road), in proximity to the eastern portion of the study area.
- Law Enforcement – No law enforcement facilities are mapped within the study area or were observed during the field reconnaissance.
- Industrial Parks – The proposed Ohio River Megapark, also known as the Ohio River Triple Rail Megasite, is located in the western portion of the study area. The site, which is owned by the Paducah Economic Development Agency, extends from the Ohio River on the north to the Paducah & Illinois Railway on the south and Massac Creek on the east. The park totals 1,319.3 acres, which includes approximately 392 acres outside the study area to the west of the Illinois Central rail line. The proposed new access road will connect this park with KY 305 (Old Cairo Road).
- Golf Courses – No golf courses are mapped in the study area or were observed during the field reconnaissance.
- Wetland Reserve Program (WRP) Easements – Numerous WRP easements were discovered at the June 2013 public meeting. More discussion of these locations and the impact to the project is found in Section 4.3.2 Public Meeting.

3.2.2 Archaeological and Cultural Historic Resources

Information concerning archaeological and cultural historic resources in the vicinity of the project study area was provided by Cultural Resource Analysts, Inc. through a records review of the study area in accordance with *Archeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines*. A records search of the National Register of Historic Places (NRHP) database, as well as records maintained by the Office of State Archaeology (OSA), and the Kentucky Heritage Council (KHC) was conducted to: 1) determine if the project area has been previously surveyed for archaeological or cultural historic resources; 2) identify any previously recorded archaeological or cultural historic sites that are situated within the study area; 3) provide information concerning archaeological and cultural historic resources that can be expected within the project area; and 4) provide a context for any archaeological or cultural historic resources recovered within the project area. The NRHP records indicate that no archaeological or cultural historic sites listed on the NRHP are situated within the study area.

The OSA geographic information system (GIS) database was searched for archaeological survey reports and records of archaeological sites for the proposed study area. The OSA records review indicates that no prehistoric archaeological sites are documented within the study area. However, these records also indicate that several sites with prehistoric components have been identified nearby. Furthermore, a few of these sites have been recommended for NRHP evaluations and others have been recommended for deep

OHIO RIVER MEGAPARK CONNECTOR STUDY

testing. Therefore, there appears to be a moderate potential for encountering prehistoric archaeological resources including deeply buried deposits within the study area.

The KHC records were searched and a review of professional survey reports and records of cultural historic sites located within and adjacent to the study area was conducted. The records review identified no previously recorded cultural historic sites and no previously completed cultural historic surveys within or adjacent to the study area. The records review indicated that there are seven “coded properties” within the study area; however, KHC does not maintain any records regarding these properties, so there is no additional information available regarding their potential significance.

Based on the findings from the archaeological and cultural resources screening, it is recommended that archaeological and cultural historic baseline surveys be conducted to identify any archaeological and cultural historic resources that may be affected by the proposed project. Due to the alluvial nature of the study area, the archaeological survey should include some form of deep testing, such as bucket augering or limited backhoe trenches.

3.3 THREATENED AND ENDANGERED SPECIES

Information concerning federal and state endangered, threatened and special concern species and unique habitats in the project vicinity was obtained from the United States Fish and Wildlife Service (USFWS), the USFWS Ecological Services Kentucky Field Office, the Kentucky Department of Fish and Wildlife Resources (KDFWR), and the Kentucky State Nature Preserves Commission (KSNPC).

3.3.1 Federal-Listed Species

Eleven (11) federal-listed species, including nine (9) mussel species, have the potential to occur within the study area based on review of database information, including ten (10) federal-endangered and one (1) federal candidate species. Of these, only the Indiana Bat has potential habitat within the study area that was observed during field reconnaissance. None of the mussel species are expected to be present in Massac Creek or any other stream within the study area due to habitat requirements.

3.3.2 State-Listed Species

State-listed species having the potential to occur in the study area were identified through KSNPC records and the KDFWR Quad List State Threatened, and Special Concern Species. Twenty-five species were identified that could potentially occur within the study area based on historic recorded occurrences, including seven (7) aquatic organisms, two (2) bats, one (1) amphibian, one (1) butterfly, two (2) vascular plants and 12 birds.

Based on habitats present within the study area as identified through aerial photography review and field reconnaissance, potential quality habitat may occur for 12 of the 25 state-listed species. These habitats include Massac Creek and its associated riparian corridor and bottomland woodlands (potential habitat for five (5) fish, one (1) amphibian, one (1) plant, two (2) birds and two (2) bat species) and the partly open agricultural areas around rural residential and farming sites (potential habitat for barn owl with several recorded occurrences in the area).

OHIO RIVER MEGAPARK CONNECTOR STUDY

3.4 GEOTECHNICAL CONSIDERATIONS

The KYTC Division of Structural Engineering, Geotechnical Branch provided a Geotechnical Overview for the study area, a copy of which is found in **Appendix C**. The review noted the study area is well known for its alluvial and Lacustrine deposits and there may be a fault running through the northwest portion of the study area. Available mapping indicates numerous ponded, wet, or swampy areas within the study area.

Foundations for bridges in the study area are generally founded on deep foundations such as steel or concrete friction piles. Smaller structures such as retaining walls and box culverts are commonly founded on shallow foundations. Native soils in the area are generally suitable for embankment construction, accommodating embankments to a height of 60 feet with 2:1 sideslopes if proper compaction methods are used. However, in no case should soil cuts be steeper than 2:1. California Bearing Ratio (CBR) values used in pavement design are generally low for subgrades in the area, ranging from two to five. Chemical modification of subgrade or the use of rock roadbed is sometimes recommended in the area.

3.5 ENVIRONMENTAL JUSTICE OVERVIEW

Issues pertaining to minority, elderly, disability and low income (persons living in poverty) populations in the project study area were evaluated and documented by the Purchase Area Development District in an October 2013 report entitled *Ohio River Megapark Connector Project - Environmental Justice Review*. A copy of the report is found in **Appendix D**. The report concluded that, based on evaluation of data obtained from the U.S. Census Bureau, Environmental Justice (EJ) populations above the state and county averages with respect to race, income, and disability are not present within the study area. One census tract (CT 314) was noted as having an elevated percentage of elderly population compared to McCracken County as a whole and should receive additional consideration during subsequent project phases. However, CT 314 was noted as comprising a large area and the majority of the population appears to live south of the study area.

3.6 RESOURCE AGENCY COORDINATION

The KYTC Division of Planning sent letters to several agencies asking for input and comments on the Connector Study to address any concerns early in the project development process. Responses were received from 16 agencies and their comments are included in **Appendix E**. A summary of the responses, in the order they were received, follows:

- Kentucky Department for Natural Resources - Wetland areas and endangered species may be an environmental concern. Water and gas wells exist within the study area.
- Kentucky State Nature Preserves Commission – No rare plants or animals or high quality natural communities are found within the study area, but several are near the site. A pre-construction survey is recommended.
- Kentucky Cabinet for Economic Development – Existing site lacks good access for large trucks and the project could have a positive impact by attracting new projects to the site.

OHIO RIVER MEGAPARK CONNECTOR STUDY

- Federal Aviation Administration – No impacts are anticipated.
- Kentucky Department of Fish and Wildlife Resources – The study area contains Indiana bat habitat areas as well as mussel, fish, lamprey, mammal, reptile, amphibian, and bird Conservation Areas. Impacts to these areas should be avoided to the extent practical. The proposed project has potential to impact wetland habitats. Impacts to streams should be minimized with certain design specifications.
- Kentucky Association for Economic Development – The existing site’s main weakness is access. The new roadway would potentially attract a large employer to benefit the local community.
- Department of Military Affairs – No significant impact to their properties or mission.
- Kentucky Division of Water – Water and sewer lines are present in the study area and should be considered during design and construction. Additionally, local utilities should be contacted. An Individual Water Quality Certification (WQC) may be necessary. The KYTC should strive to reduce stream and wetland impacts.
- Scenic Kentucky – Concerns regarding the possibility of new billboards and desired that the new corridor be designated billboard free.
- Education and Workforce Development Cabinet, Department of Education - No impacts are anticipated, but additional consultation with the McCracken County School District and Paducah Independent School District is recommended.
- United States Coast Guard – The proposed project may involve waterways over which the Coast Guard exercises jurisdiction for bridge administration purposes. Additional coordination may be required as the project moves forward.
- Kentucky Department for Environmental Protection:
 - Division of Waste Management – All solid waste generated by this project must be disposed at a permitted facility.
 - Division of Water - Assure that all appropriate floodplain, 401/404, and stormwater permits are obtained. There are no Outstanding State Resource Waters, Wild Rivers, or known Exceptional Waters within the project area. Best management practices shall be utilized to reduce runoff into surface waters. If the widening or rerouting crosses any water or monitoring wells, a Kentucky certified driller will need to properly abandon the wells before construction proceeds.
 - Division of Air Quality - The Division offered suggestions on how this project can help maintain compliance with the National Ambient Air Quality Standards, including the use of alternatively fueled equipment, emission controls, and reduced idling time.
- United States Fish and Wildlife Service – It is recommended that project plans be developed to avoid impacting wetland areas and/or streams. The United States Army Corps of Engineers

OHIO RIVER MEGAPARK CONNECTOR STUDY

(USACE) should be contacted to assist in determining if wetlands or other jurisdictional waters are present or if a permit is required. Federal-listed species may be present within the project area.

- Kentucky Commission on Human Rights – The Commission would like to be kept abreast of any contracts and subcontracts awarded to Disadvantaged Business Enterprises (DBE's) during planning and implementation phases of the project.
- Kentucky Transportation Cabinet, Office of Transportation Delivery – The Paducah Transit Authority noted there is a great need for an alternative route to connect neighborhoods and businesses to the Megapark.
- Natural Resources Conservation Service (NRCS) – The planning study should consider impacts of the proposed highway on prime and unique farmland and state and locally important farmland.

4.0 Development of Alternatives

4.1 CONCEPT DEVELOPMENT

Stantec initially developed three preliminary new connector road concepts, which included a northern corridor, a central corridor, and a southern corridor. **Figure 12** shows the proposed corridors for each original roadway alignment concept. Multiple constraints were revealed while defining the concepts shown in **Figure 12**, including the following:

- Paducah Economic Development indicated the proposed connector roadway should provide a connection west of the existing BNSF rail line at the west of the study area. This connection would better serve a currently vacant building they are currently marketing along KY 1420 and will also provide for a future connection to redevelopments proposed at the Paducah Gaseous Diffusion Plant and to US 60 to the south. Accommodating a grade-separated rail crossing for the BNSF line is desirable but the existing grades within the vicinity would require some reconfiguration of existing roadways to the west.
- The central portion of the study area is characterized by stream crossings, wetland areas, and significant floodplain encroachment. It is envisioned that any new route in this area will be built largely on fill with overflow structures within floodplain areas and structures (bridges and/or box culverts) at each blue-line stream crossing.
- At the east end of the study area, near the KY 305 (Old Cairo Road) intersection with KY 998 (Olivet Church Road), some access modifications would be required to accommodate the new connector road and access to the Pilot truck stop to the east and the gas station and Huddle House restaurant to the west.

OHIO RIVER MEGAPARK CONNECTOR STUDY

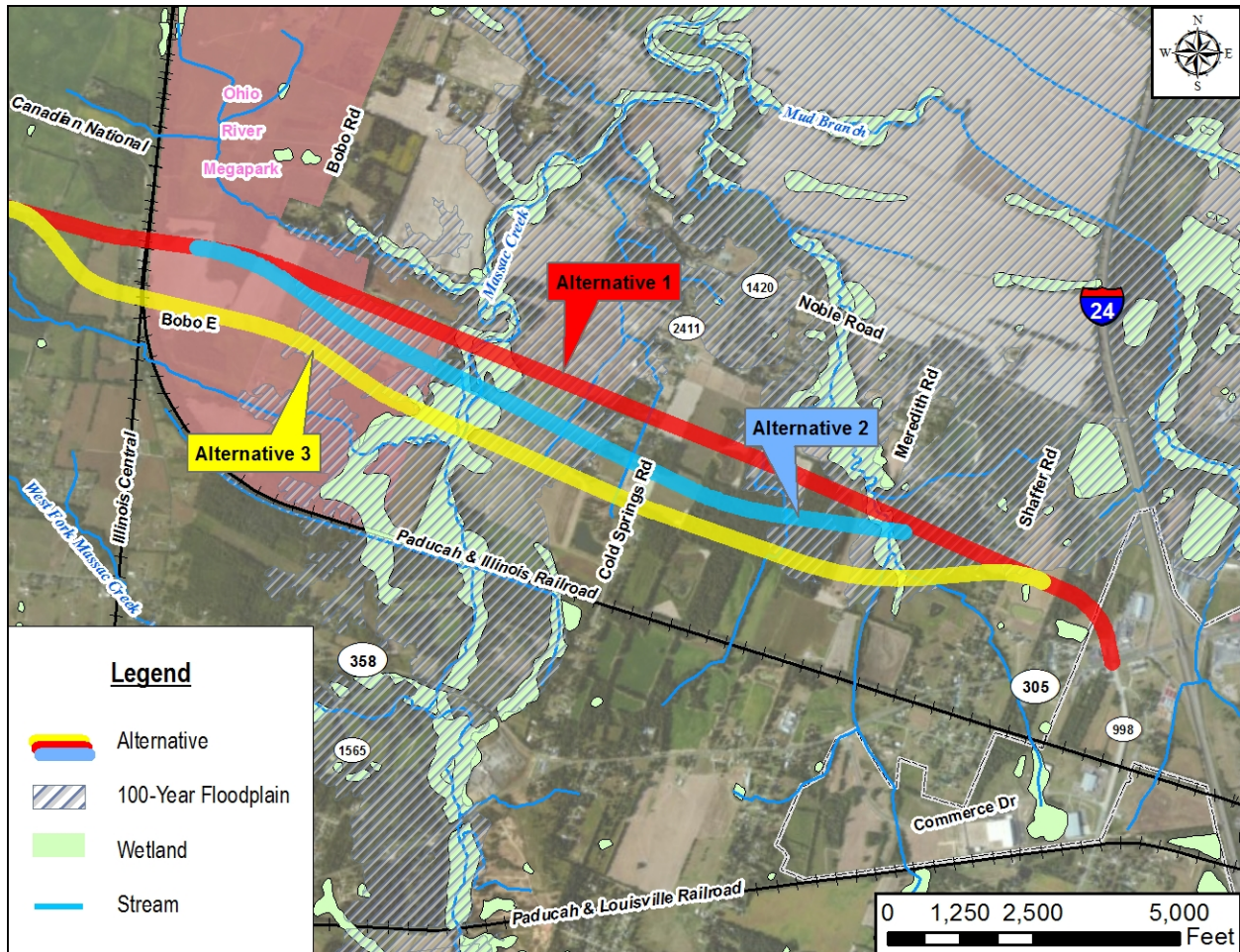


Figure 12 – Original Roadway Concepts

4.1.1 Typical Sections

The project team considered several possible typical sections, including a two-lane roadway and a four-lane roadway. Two options with fewer than four lanes were discussed, shown in **Figure 13**. The first option was a two-lane section (one lane per direction) with outside shoulders and the second includes three lanes, one lane per direction with a continuous center left-turn lane.

OHIO RIVER MEGAPARK CONNECTOR STUDY



Figure 13 – Two-Lane Typical Sections

Three different four-lane typical sections were discussed, as shown in **Figure 14**. These options include the following:

- Four lanes (two per direction) with a 40-foot depressed median (top left)
- Four lanes with 18-foot-wide raised median (top right)
- Five lanes (two per direction with a continuous center left-turn lane, bottom)

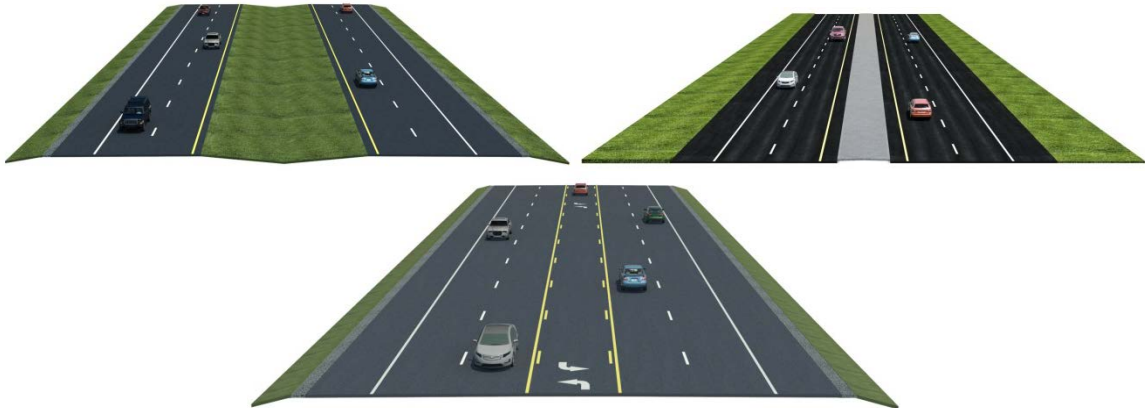


Figure 14 – Four-Lane Typical Sections

Both a two-lane and a four-lane option were evaluated to estimate costs and impacts associated with the original roadway concepts. A summary of the conceptual alternatives is shown in **Table 2**.

	Alternatives					
	Alt 1 - 2 Lane	Alt 2 - 2 Lane	Alt 3 - 2 Lane	Alt 1 - 4 Lane	Alt 2 - 4 Lane	Alt 3 - 4 Lane
Wetland Disturbance (acres)	4.2	0.59	2.07	5.88	0.95	3.26
Potential Relocations	4	1	1	7	4	1
Total Cost (\$Millions)	\$16	\$17	\$17	\$28	\$31	\$29

Table 2. Comparison of Original Conceptual Alternatives

Alternative 1, the northernmost concept, included the shortest bridge crossing over Massac Creek but had the greatest number of potential residential relocations (most occurring along KY 2411). Alternative 2 and 3 both had fewer potential relocations but required longer bridges that would increase construction cost.

4.2 TRAFFIC FORECASTS

The McCracken County Travel Demand Model was updated as part of this study. The tool was utilized to develop traffic forecasts for the proposed roadway based on likely development trends within the Megapark. As the type and intensity of development within the proposed Megapark is still unknown, the forecasting task examined a range of growth scenarios to estimate the future demand for travel.

4.2.1 McCracken County Travel Demand Model

KYTC's Travel Demand Model (TDM or "model") for McCracken County was used to help develop the forecasts for the project alternatives. The McCracken County model is a conventional four-step model (Trip Generation, Trip Distribution, Mode Choice/ Auto Occupancy, and Trip Assignment) developed in TransCAD according to KYTC's preferred model structure. The model, developed in 2010, was originally calibrated to the 2010 base year and provides forecasts for future years 2020, 2030, and 2040. The model provides auto and truck assignments and was validated to traffic counts provided by KYTC.

For this study, Stantec updated the model to reflect the new 2012 base year using newly available socioeconomic data from the 2010 Census and updated employment data provided by KYTC. A 2036 forecast year was developed based on this updated data to be used for the Ohio River Megapark Connector project. The model's road networks were also reviewed to reflect current configurations and new count data were incorporated to revalidate the model. Stantec then prepared specific employment scenarios to reflect the new Megapark development and geocoded the new roadway route for the development into the model network. The resulting traffic assignments for the 2036 forecast year were the basis for the preliminary traffic forecasts for the project alternatives.

4.2.2 Travel Demand Model Updates and Assumptions

While KYTC's TDM for McCracken County was developed within the past four years, the socioeconomic data used for the 2010 base year were built from the 2000 Census household and population data. Construction permit and certificate of occupancy data acquired from McCracken County Fiscal Court supplemented the 2000 Census data to create rough total households and population for the 2010 Traffic Analysis Zone (TAZ) database file. These data were then factored to match 2010 population forecasts taken from the Kentucky State Data Center (KSDC) and the City of Paducah Comprehensive Plan. With the 2010 Census data now available, household and population data were rebuilt at the block group level. Comparing the 2010 Census estimate from McCracken County (65,565) to the KSDC's 2012 estimate of McCracken County (65,549), and taking into account the economic recession, particularly present in the real estate sector, further adjustment to the 2010 Census data was deemed not necessary to effectively represent 2012 population and household data. Vehicles per TAZ estimates were adjusted to reflect the new 2012 households for each TAZ. Similar adjustments were made to K-12 school and post-secondary student enrollments.

KYTC planning staff provided updated employment data by TAZ for three employment categories. Measures were taken to distribute certain employee groups, such as school and municipal workers to the actual locations of their daily employment (as opposed to central headquarters). Once this re-distribution was complete, the total employment figures per TAZ were similar, but the subtotals for the old base model's Basic, Other, and Retail employment categories were significantly different from the 2012 data provided by KYTC for the Retail, Nonretail, and Service sectors. Rather than request a reclassification of employment or alter the employment classes for which the model had been initially calibrated, it was decided to use the new employment totals for each TAZ as control totals and redistribute the employment classes according to their previous proportions.

The 2010 base network was reviewed to check necessary adjustments. Given that a thorough review had recently been done as part of the US-60 Scoping Study in 2012, the network was found to accurately represent the current network configurations. New counts from the most recent KYTC count cycle were input into the network file for use in model validation.

Given the model's recent development, most calibration parameters were carried over from the original model. However, two adjustments were made. First, as had been an issue with the model when originally developed, the model under-assigned trips to the Central Business District (CBD) and surrounding urban fringe of Paducah. To address this, the factors for calculating trip attractions were increased within this area, such as business employment and school enrollment. Further, speeds for one-way arterials were adjusted upward by 30 percent to improve Volume-to-Count ratios on US 60 and US 62 near downtown Paducah. While the model still under-assigns, these adjustments resulted in a marked increase in traffic in and through downtown. Second, the overall model was under-assigning volumes compared to counts. With the household trip production rate already at the high end of the conventional range (11.1 trips per household per day), the gamma equation parameters in the gravity model were adjusted to slightly increase the overall distance of trips distributed between TAZ's. The assigned Volume-to-Count ratio is now 0.99.

Table 3 presents the primary validation statistics for the McCracken County model. The desired threshold for Percent Root Mean Square Error (%RMSE), which represents how well the model predicts observed counts, is 30 percent for all counts, with 35 percent being acceptable. The updated model results in a 28.7 percent RMSE for all vehicles, better than the desirable threshold. The Volume-to-Count ratios for all vehicles and for trucks only are 0.99 and 1.01, respectively.

ROOT MEAN SQUARE ERROR REPORT			
COUNT RANGE	Number of Links	%RMSE	Desirable/Acceptable
(< 1,000)	26	69.9	< 55% / < 95%
(1,000 to 5,000)	102	48.3	< 45% / < 55%
(5,000 to 10,000)	59	30.4	< 35% / < 45%
(10,000 to 20,000)	26	12.7	< 27% / < 35%
(20,000 to 30,000)	12	14.9	< 24% / <27%
(30,000 to 40,000)	0	0	< 22% / < 24%
Trucks	103	32.3	< 35% / < 45%
All Vehicles	225	28.7	< 30% / < 35%

Table 3. Percent Root Mean Square Error Statistics

The model evaluation also includes a screenline analysis. Screenlines illustrate whether larger zone-to-zone traffic assignments are matching observed counts. Screenlines are placed across multiple network links to measure broad traffic flows within the region, and the assigned traffic flows across these lines can then be compared to actual counts. **Figure 15** presents the location of nine screenlines analyzed in this model. Screenlines 1 and 2 cordon either side of I-24, while the other screenlines bisect the model area, on either north-to-south or east-to-west axes. **Table 4** presents the statistics from the screenline analysis. Of the nine screenlines, only one, Screenline 7, falls outside the desirable target range. This screenline bisects western McCracken County and represents the lowest observed traffic volumes spread over a large area. Regardless, this screenline suggests the model is assigning too much traffic in the western rural area of the county.

OHIO RIVER MEGAPARK CONNECTOR STUDY

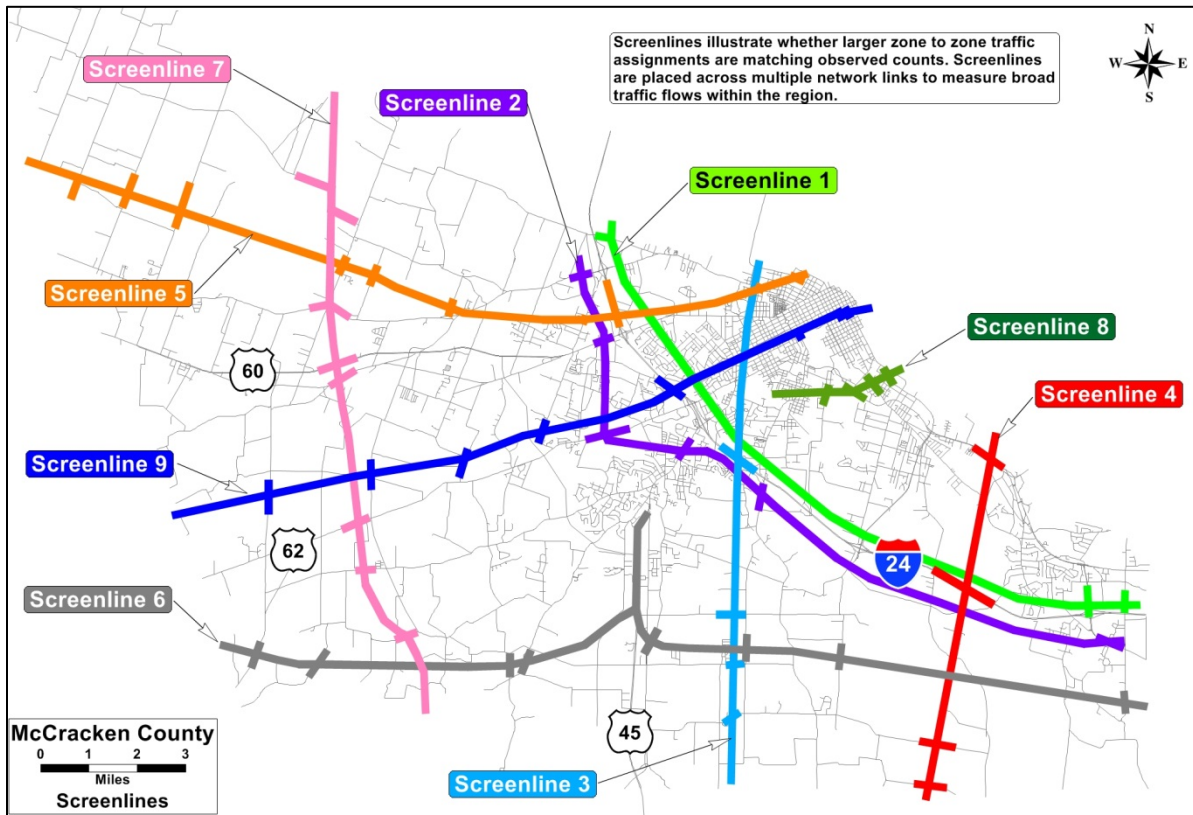


Figure 15 – Screenline Locations for Travel Demand Modeling

Screenline	Links	Volume	Count	Ratio	Desirable Range
1	11	94,655	91,696	1.03	0.92 - 1.08
2	8	90,721	85,717	1.06	0.92 - 1.08
3	8	83,770	84,300	0.99	0.92 - 1.08
4	10	62,049	58,031	1.07	0.91 - 1.09
5	4	48,935	43,877	1.11	0.88 - 1.12
6	9	22,166	21,149	1.05	0.81 - 1.19
7	19	26,907	20,881	1.29	0.81 - 1.19
8	11	45,758	46,665	0.98	0.90 - 1.10
9	13	83,753	81,958	1.02	0.92 - 1.08

Table 4. Screenline Volumes and Counts

4.2.3 Future Year Updates

The forecast year for the model for this is 2036. Future socioeconomic forecasts were based on population projections for the year 2025 made in the City of Paducah’s Comprehensive Plan. These projections included KSDC’s historic estimates, but produced additional estimates based on linear, geometric, and exponential growth trends. Unlike KSDC’s projection of population decline, the City of Paducah’s Comprehensive Plan projects an increase in population from 65,514 in the 2000 Census estimate, to between 71,304 and 72,223 in 2025. Given that the 2010 Census estimate for McCracken is 65,565, it was decided to apply the general growth rate from Comprehensive Plan to the 2010 Census estimate and extrapolate it to 2036. While this approach is clearly optimistic compared to recent historical trends and the KSDC’s flat projection, it represents only a 0.037 percent annual growth rate, which is significantly less than the KSDC’s annual growth rate for the state as a whole (0.062). All other socioeconomic variables for 2036 are indexed to the population estimate. **Table 5** presents the 2012 and 2036 socioeconomic data.

Socioeconomic Data	2012	2036
Population	65,600	72,500
Households	27,600	31,100
Total Employment	37,700	42,300
K12 Enrollment	10,000	11,700
College Enrollment	7,500	7,700

Table 5. Socioeconomic Data Totals for McCracken County

In addition to this base future economic scenario, two additional scenarios were evaluated. The first scenario adds 2,000 jobs to the Megapark site, and the second scenario adds 2,000 jobs to the Megapark site, but reduces the number of jobs at the Paducah Gaseous Diffusion Plant from 1,425 to 325, in anticipation of its closing and limited reuse of the site.

The 2036 network reflects the current Existing and Committed (E+C) road projects that provide new or additional roadway capacity. These projects include:

- Olivet Church Road (KY 998) reconstruction and realignment, from Enterprise Drive to US 60 at new Holt Road;
- Fisher Road extension from US 62 to KY 1438;
- The Paducah Outer Loop from US 60 to US 45; and,
- The Paducah Outer Loop from US 45 to I-24.

OHIO RIVER MEGAPARK CONNECTOR STUDY

4.3 PUBLIC INVOLVEMENT

Public outreach helped guide the Ohio River Megapark Connector Study, particularly in identifying potential issues and developing alternatives. Public involvement was undertaken through a two-step process that involved meetings with project stakeholders and local officials, and the general public. Summaries for all project meetings, including project team meetings, are found in **Appendix F**.

4.3.1 Advisory Committee

An Advisory Committee, consisting of project stakeholders and local officials, was established to solicit feedback at critical stages of the study. **Table 6** includes a list of the stakeholders and local officials invited to participate in the study.

Committee Member	Title / Representing
Alex Metzger	Vice President of Paducah Economic Development
Bill Paxton	Mayor of Paducah
Chad Chancellor	Greater Paducah Economic Development Council
Dan Key	Regional Transportation Committee Member
Don Hodgson	Local Law Enforcement Representative
Fran Johnson	Paducah Chamber of Commerce
John Dinning	Manager Public Works
Jon Hayden	McCracken County Sheriff
Ken Carter	Regional Transportation Committee Member
Paul Carter	Emergency Responders Representative
Richard Roof	Regional Transportation Committee Member
Rick Murphy	Paducah City Engineer
Stacey Courtney	Purchase Area Development District
Steve Ervin	Regional Transportation Committee Member
Van Newberry	McCracken County Judge Executive

Table 6. Advisory Committee Members

OHIO RIVER MEGAPARK CONNECTOR STUDY

The first meeting was held in May 2013, just after the original new roadway concepts had been developed. The purpose of this meeting was to introduce the study and the proposed project and to solicit input on the alternatives under consideration at that time. The second meeting was held in early November to discuss the revised alternatives that were developed over the summer (after the public meeting) and to listen to opinions on the preliminary project recommendations.

4.3.2 Public Meeting

On June 27, 2013, the Project Team held a public meeting at the Concord Elementary School in Paducah. The purpose of the meeting was to provide information about the study, discuss the conceptual alternatives and to solicit input from the public. The meeting was held in an open house format, with a formal presentation at 5:15 pm to explain the project. Attendees were asked to sign in and were provided a project handout and questionnaire. The project team was available to answer questions and discuss issues. Forty-four members of the public attended and 16 comment sheets were submitted.

Several meeting attendees suggested improving KY 1420 (Noble Road) or KY 305 (Old Cairo Road) and providing a connection from one of these existing routes to the Megapark as an alternative to new construction through the study area. Property owners along KY 2411 (Cold Springs Road) also indicated there were Natural Resource Conservation Service (NRCS) easements on their properties that would be affected by one or more of the alternatives under consideration.

The project team investigated these easements further and found several Wetland Reserve Program (WRP) easements currently exist within the study area, as shown in **Figure 16**. Under these easements, the landowner retains ownership of the property but receives funding to enhance wetlands and habitat. The NRCS advised that any project should be re-routed to avoid these easements. If the easement is WRP and avoidance is not possible, a complete National Environmental Policy Act (NEPA) analysis (including an extensive investigation of alternatives considered and justification documenting why the alternative routes are not feasible) will be required.

After the public meeting, Paducah Economic Development requested that Stantec investigate additional options that would change the location where the connector road would enter the Megapark site. At that time, prospective tenants expressed interest in the areas adjacent to Bobo E Road, an area affected by two of the three alternatives shown at the public meeting.

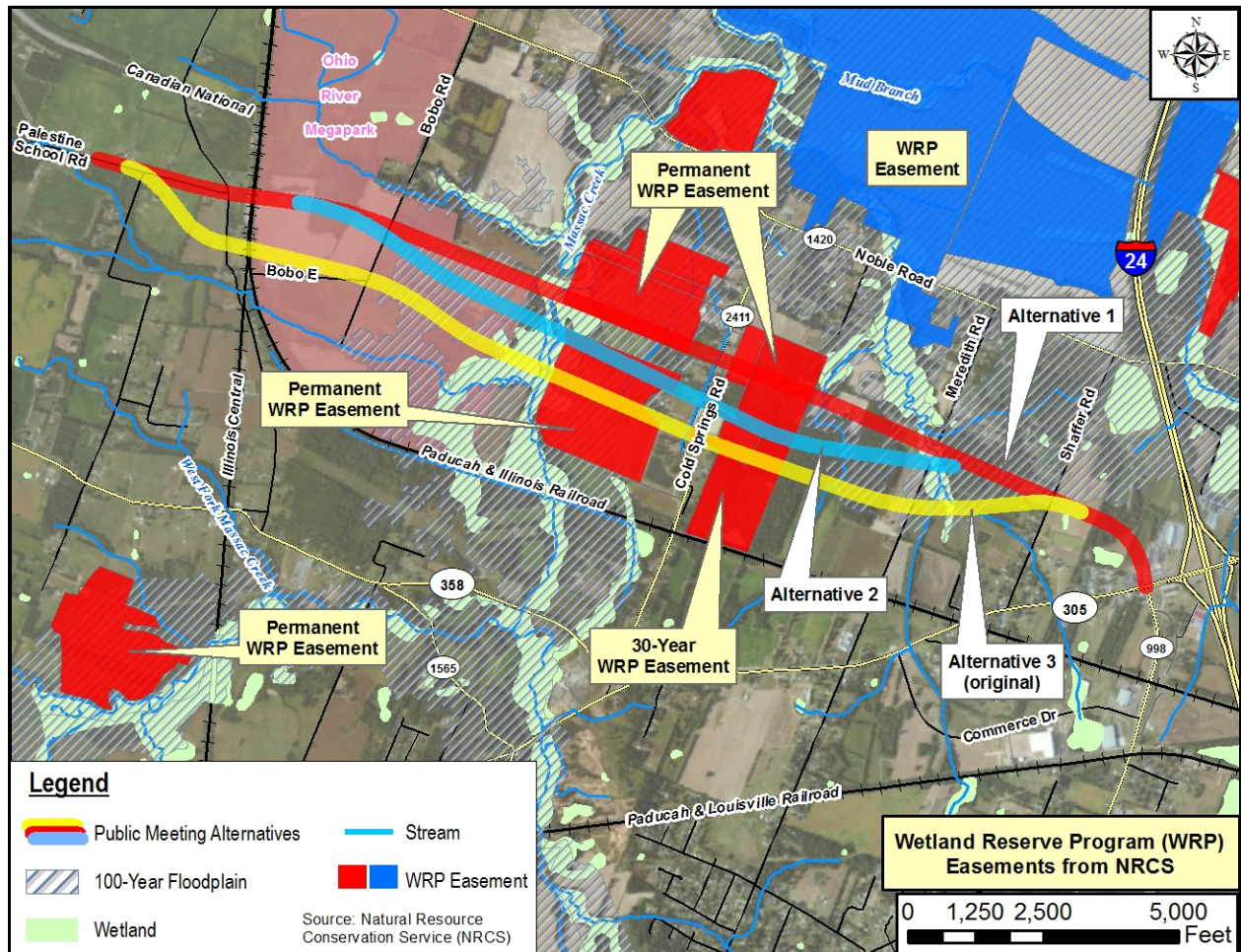


Figure 16 – Wetland Reserve Program (WRP) Easements
(Source: Natural Resource Conservation Service, NRCS)

4.4 EXPANDED STUDY AREA AND REVISED CONCEPTS

Given the concerns related to the WRP easements and the potential for development within southern portions of the Megapark, it was decided to expand the study area south of the Paducah & Illinois Railroad and to investigate additional alternatives. These revised alternatives are shown on **Figure 17**.

OHIO RIVER MEGAPARK CONNECTOR STUDY

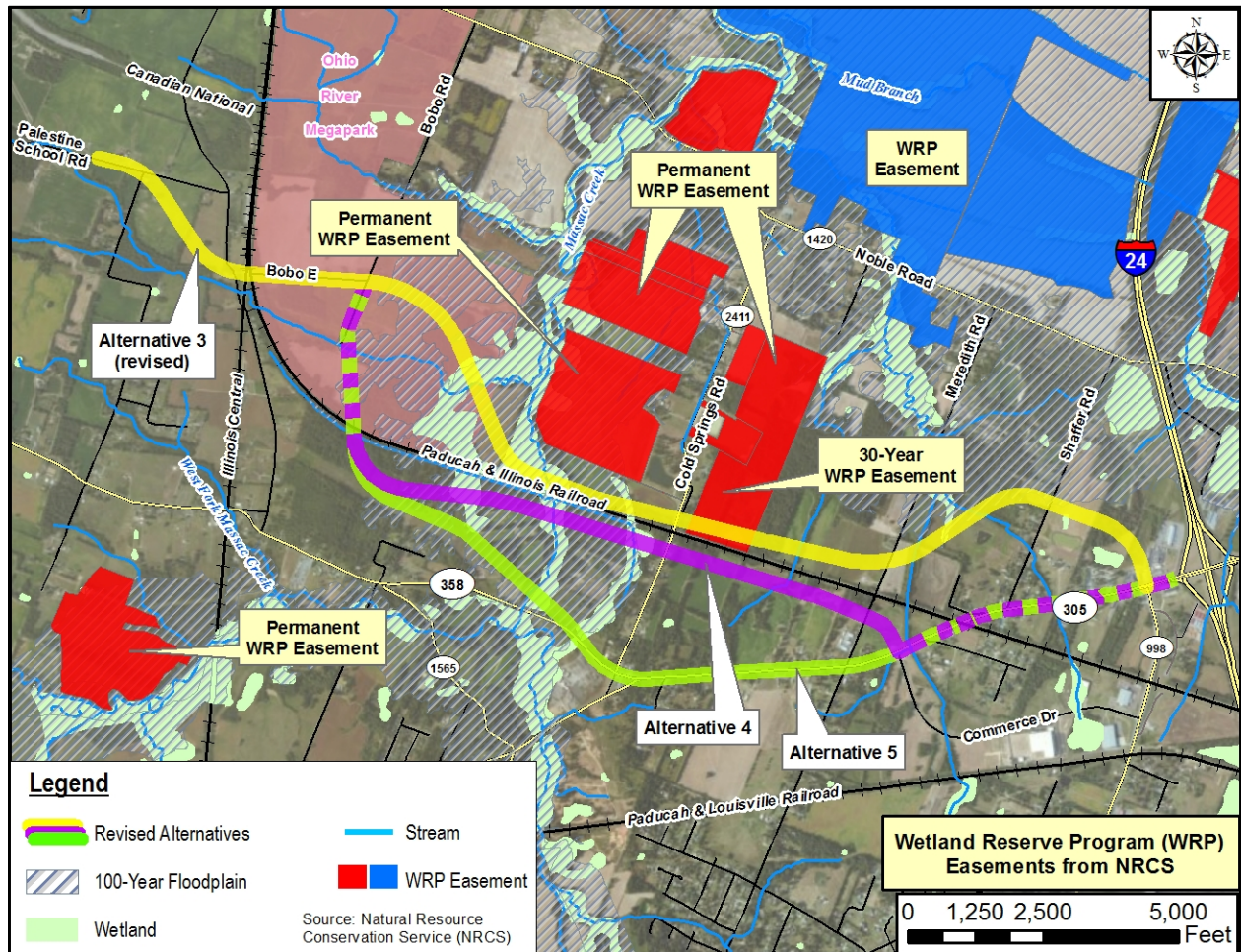


Figure 17 – Revised Roadway Connector Concepts

One alternative that was shown at the June public meeting was revised in an effort to minimize disturbance to known WRP easement areas. Alternative 3 was the southernmost option originally presented to the public. Revised Alternative 3 represents a southern shift in the previous corridor for Alternative 3 such that it more closely paralleled the Paducah & Illinois rail line and affected only a limited portion of one WRP easement and connected directly into the existing Bobo E corridor.

Two additional concepts were developed that would utilize portions of KY 305 (Old Cairo Road) west of KY 998 (Olivet Church Road). Alternative 4 begins at the Commerce Drive intersection and parallels the Paducah & Illinois rail line on new alignment. Alternative 5 follows KY 305 to the KY 358 (Ogden Landing Road) intersection, and then uses a short segment of KY 358 before beginning on new alignment. Both Alternative 4 and Alternative 5 follow the same alignment as they cross the rail line and tie into the existing Bobo Road corridor. A summary of the revised alternatives is included in **Table 7**.

2 Lane Alternatives	Alternative 3 (Revised)	Alternative 4	Alternative 5
Length (miles)	4.5	2.7	1.7
Wetland Reserve Program (WRP) Easement Disturbance (Acres)	7.73	0	0
Potential Relocations*	3	3	2
Probable Construction Cost (\$)	\$17 M	\$16 M	\$13 M
4 Lane Alternatives	Alternative 3 (Revised)	Alternative 4	Alternative 5
Length (miles)	4.5	3.6	3.7
Wetland Reserve Program (WRP) Easement Disturbance (Acres)	9.38	0	0
Potential Relocations*	4	13	24
Probable Construction Cost (\$)	\$31 M	\$33 M	\$32 M

*Note: includes both businesses and residences.

Table 7. Comparison of Revised Conceptual Alternatives

5.0 Recommendations

At the August project team meeting, the project team decided to pursue revised Alternative 3 and Alternative 4. Alternative 5 was eliminated from consideration because it would require significantly more relocations to construct a four-lane section should that be necessary in the future as it affects more existing development along both KY 305 and KY 358.

The two remaining alternative corridors, Revised Alternative 3 and Alternative 4, were evaluated using the McCracken County TDM. **Figure 18** shows the forecasted 2036 traffic volumes for the roadways in the study area. Both options result in increased traffic volumes along portions of KY 305.

OHIO RIVER MEGAPARK CONNECTOR STUDY

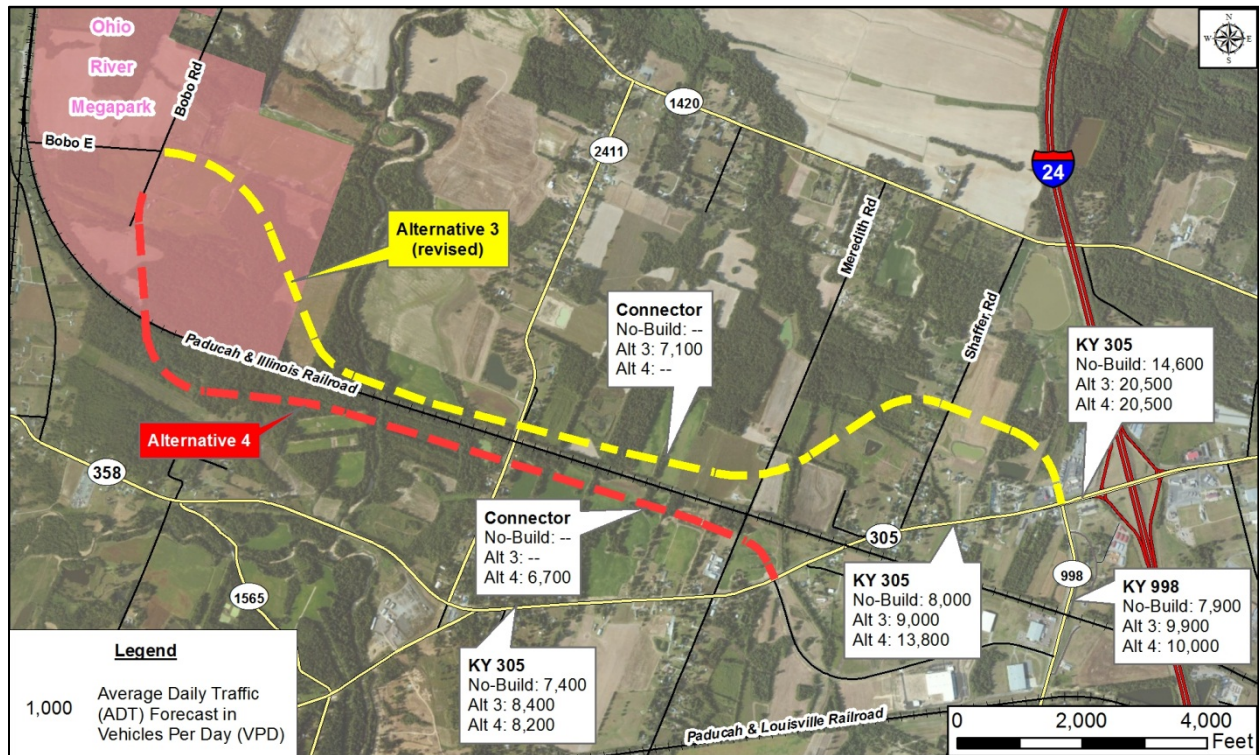


Figure 18 – 2036 Traffic Forecasts

Revised Alternative 3 and Alternative 4 were presented to NRCS to solicit input. Even though the revised Alternative 3 would affect only a limited portion of one easement area, NRCS indicated this would still be treated as an encroachment and would require a full environmental evaluation. Based on this and Paducah Economic Development’s need to have a roadway connection available within two years, Alternative 4 appears to be the best solution to move forward. A summary of the likely costs and impacts associated with Alternative 4 is shown in **Table 8**.

At the final Advisory Committee meeting, Paducah Economic Development reiterated the need for the Ohio River Megapark Connector to extend west of the Illinois Central rail line. **Figure 19** presents two options for such a connection. Option 1 would follow the existing Bobo E corridor and provide a grade-separated crossing over the Illinois Central line, ultimately connecting to Palestine School Road. Option 2 would extend west from Alternative 4, remaining south of the Paducah & Illinois rail line and providing a grade separation over the Illinois Central line. Note costs are not included for either of these concepts in **Table 8** and would require further investigation during subsequent design phases.

5.1 NEXT STEPS

The KYTC intends to quickly advance the recommended alternative into the preliminary design phase. During this effort, the western extensions will be evaluated and additional coordination with Paducah Economic Development and other stakeholders will be undertaken to determine the optimal concept to be advanced to final design.

OHIO RIVER MEGAPARK CONNECTOR STUDY

Alternative 4	Alternative 4 2-Lane	Alternative 4 4-Lane
Length (miles)	2.7	3.6
Wetland Reserve Program (WRP) Easement Disturbance (Acres)	0	0
Potential Relocations*	3	13
Probable Construction Cost (\$)	\$16 M	\$33 M

*Note: includes both businesses and residences.

Table 8. Recommended Alternative

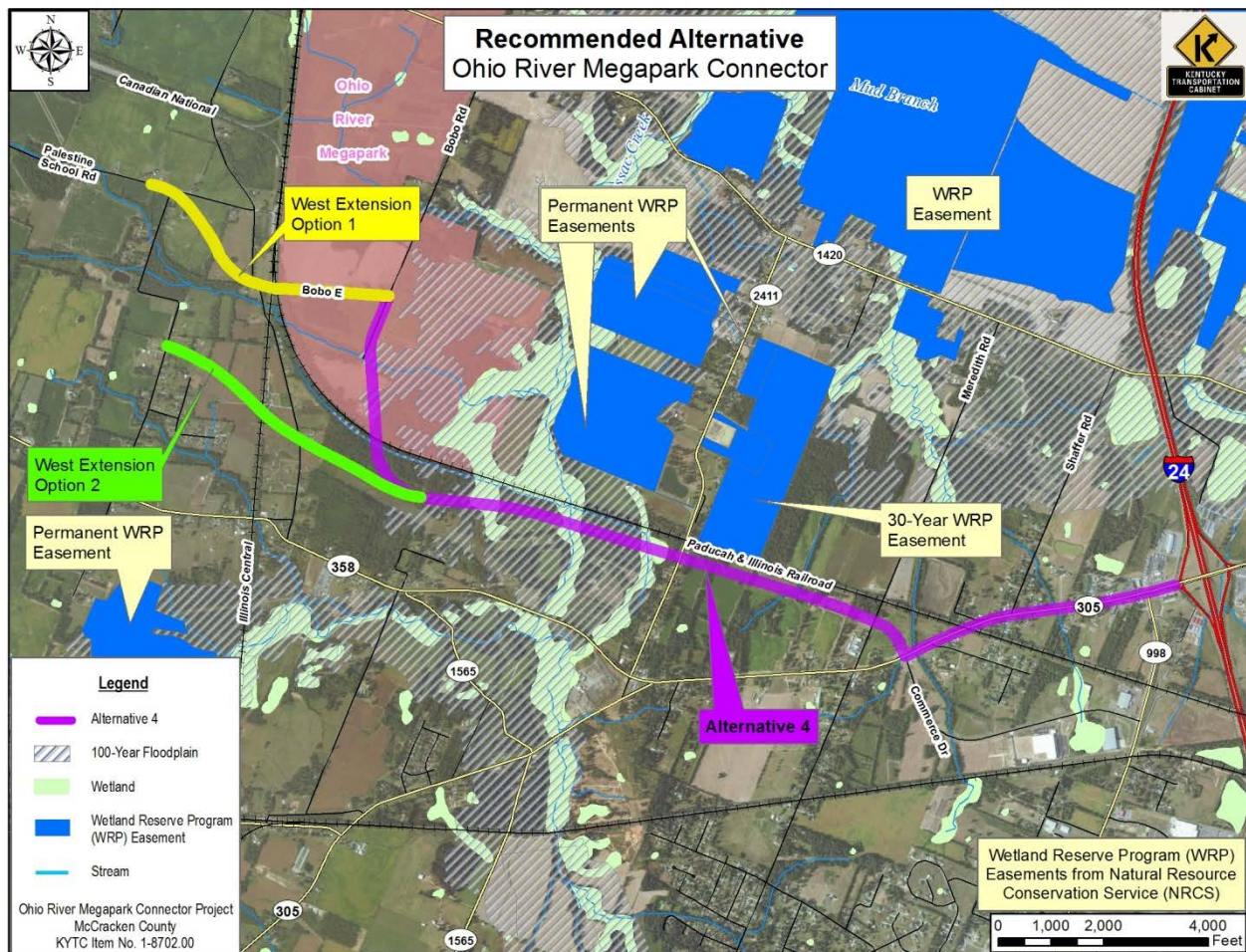


Figure 19 – Recommended Alternative 4 with Potential Western Extensions