



April 6, 2017

Secretary Gary Thomas
Commonwealth of Kentucky
Transportation Cabinet
Frankfort, Kentucky 40622

Dear Secretary Thomas:

Thank you for the opportunity to provide input and comments regarding the Pembroke Planning Study, Christian County, Item No. 2-381.00.

Safe and reliable access to the expanded Commerce Park is a critical asset to job creation and job retention in our region. Approximately 2,000 people work at Commerce Park each day, employed with manufacturers such as T.RAD, Riken Elastomers, Amfine, Continental Mills, TGASK, and Martinrea. In addition, agri-business is a significant employer in Christian County and the Pembroke area.

Safe and reliable access to the rail-accessible, expanded Commerce Park will only enhance economic development efforts in this region. Rail-accessible industrial sites are critical to economic growth and business recruitment efforts. Enhanced roadways and thoroughfares will continue to be a critical tool in the efforts of the South Western Kentucky Economic Development Council (SWK EDC).

Again, thank you for the opportunity to provide input and comments. The SWK EDC applauds all efforts to seek public input and address conservation and environmental impacts with the Pembroke Planning Study. Safety for citizens and industrial park tenants is and will continue to be our number one concern.

Sincerely,

Liana Mitchell Wallace
Executive Director

2800 Fort Campbell Boulevard
Hopkinsville, Kentucky 42240
www.southwesternky.com

U.S. Department of
Homeland Security

United States
Coast Guard



Commander
Eighth Coast Guard District

1222 Spruce Street
St. Louis, MO 63103-2832
Staff Symbol: dwb
Phone: (314)269-2381
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www.uscg.mil/d8/westernriversbridges

16591
March 28, 2016

John Moore, P.E.
Director, Div of Planning
Kentucky Transportation Cabinet
Frankfort, Kentucky 40622

Subj: PEMBROKE PLANNING STUDY, CHRISTIAN COUNTY, ITEM NO.2-381.00

Dear Mr. Moore:

In reference to your letter dated March 14, 2017. Pursuant to the Coast Guard Authorization Act of 1982, it has been determined that this is not a waterway over which the Coast Guard exercises jurisdiction for bridge administration purposes. Therefore, a Coast Guard bridge permit is not required for this project.

We appreciate the opportunity to comment on the project.

Sincerely,

A handwritten signature in blue ink, appearing to read "Eric A. Washburn", written over a large blue "X" mark.

ERIC A. WASHBURN
Bridge Administrator, Western Rivers
By direction of the District Commander

RECEIVED

APR 03 2017

Div. of Planning



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

APR 06 2017

Mr. John Moore, P.E.
Director
Division of Planning
Commonwealth of Kentucky
Transportation Cabinet
Frankfort, Kentucky 40622

Re: EPA Comments on the Pembroke Planning Study, Christian County, Item No. 2-381

Dear Mr. Moore:

The U.S. Environmental Protection Agency is responding to a March 14, 2017, request for input and comments on a planning study to determine the need and potential impacts for a proposed highway project to provide access, primarily for freight, from the newly expanded Commerce Park to I-24. The purpose of this request is to solicit early coordination pursuant to National Environmental Policy Act. Consistent with this request, enclosed are the EPA's comments regarding the proposed action's purpose and need, alternatives analysis, significant issues to facilitate appropriate project scoping, the locations of any known issues to be considered when developing alternatives, and any mitigation strategies to be considered.

Thank you for the opportunity to comment on the proposed project. This letter provides recommendations to strengthen the Pembroke Planning Study. If your staff wishes to discuss this matter further, please contact Ms. Beth Walls, of my staff, at (404) 562-8309 or walls.beth@epa.gov.

Sincerely,

A handwritten signature in black ink that reads "Alan Farmer".

G. Alan Farmer
Director
Resource Conservation and Restoration Division

Enclosure

cc: Thomas L. Nelson, Jr., Division Administrator, Kentucky Division, Federal Highway Administration

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ENCLOSURE

Scoping Comments for the Pembroke Planning Study

Project Description

The proposed action's purpose is to improve the safe and efficient movement of traffic, especially freight traffic, to and from I-24 and the Commerce Industrial Park. The need is to address issues associated with KY 115. KY 115 currently is a narrow roadway on the Kentucky Highway Freight Network that connects US 41 to I-24, part of the National Highway Freight Network System. KY 115 improvement needs include addressing the US 41/KY115 intersection's substandard large-vehicle turning radii. KY 115's at-grade railroad crossing poses geometric challenges and travel time delays and the KY 115 bridge over Montgomery Branch is functionally obsolete.

The proposed action involves three concepts: A, B, & C.

Concept A proposes to widen 1.21 miles of US 41 between its intersection with KY 115, within the City of Pembroke, and the already widened section of US 41 northwest of the City leading to Commerce Industrial Park and Hopkinsville. Concept A also proposes three intersection-widening alternatives for the US 41 intersection with KY 115.

Concept B, the proposed Pembroke Connector, includes three alternative design lengths (1.0, 1.25, and 1.8 miles) each with a different connection point to US 41. One alternative connects into the existing 3-lane portion of US 41 while the other two alternatives connect to the existing 2-lane portion of US 41, which suggests US-41 may require widening. Additionally, one alternative also gives the option of another entrance to the Commerce Industrial Park, one that keeps heavy freight traffic off US-41. All three alternatives include a 3-span bridge crossing of CSX's railroad and two stream-crossing culverts. They also bypass the City of Pembroke, the downtown railroad crossing, avoid the need to widen the US 41/KY 115 intersection, and the 1.2-mile section of US 41. Moreover, this proposed alternative diverts heavy freight bearing trucks away from the City and its residents.

Concept C proposes to widen KY 115 from outside the City of Pembroke to I-24 and to upgrade the KY 115 bridge crossing Montgomery Branch. This concept considers four alignment/widening alternatives. This proposed alternative has the greatest impact to the City, its character, and the numerous residential properties bordering KY 115 and US 41 within the city limits.

Purpose and Need

1. The EPA recommends the alternatives be more precisely defined. The planning study should clarify whether all three of the proposed concepts are components of the proposed action or are components of two proposed alternatives. Based on our review, the EPA assumes two alternatives are being proposed: "Concept A & C" and "Concept B & C." Additionally, the planning study should clarify whether the proposed improvements will widen KY 115 from its current 2-lane status to a 3-lane road similar to the proposed US 41 widening in Concept A.

2. The EPA recommends that the need for the project be consistent with the stated purpose. It should also be appropriately broad to ensure consideration of other available and reasonable alternatives that can achieve the stated project purpose. The proposed project's purpose is to improve the safety and efficient movement of freight traffic to and from I-24 and US 41 where the Commerce Industrial Park is located, northwest of the City of Pembroke. However, the stated need is to upgrade KY 115's heavy-

load/freight carrying capacity from its current 44,000-lb maximum-load to 88,000-lb, which includes improving an at-grade railroad crossing and the KY 115 intersection with US 41 within the City's "downtown" area and upgrading the KY 115 bridge crossing Montgomery Branch, also within the vicinity of the City.

The "Concept A & C" alternative appears to be the alternative that best addresses the identified need. However, it does not appear to address the railroad improvement need. Additionally, Concept A proposes to widen US 41 to its intersection with KY 115, which means Class AAA heavy-freight carrying trucks (88,000-lb maximum total weight) will still be driving on a Class A highway (rated for 44,000-lb maximum) and through the City of Pembroke's "downtown" area as Concept C widens KY-115 from a point outside the downtown area to I-24.

The "Concept B & C" alternative appears to be the alternative that best addresses the identified purpose but does not address the stated need: KY-115/US 41 intersection's large-vehicle substandard turning radii or the geometric challenges and travel time delays associated with the existing railroad crossing of KY 115. Concept B does include railroad crossing improvements associated with the proposed Pembroke Connector's railroad crossings but these are not on KY 115.

Additionally, because the stated need is specific to KY 115, it appears to preclude the consideration of the "Concept B&C" alternative and other available and reasonable alternatives that can also achieve the stated purpose of improving the safety and efficient movement of 88,000-lb maximum-load, freight traffic to and from I-24 and the Commerce Industrial Park. Moreover, the expressed need ("Concept A & C" alternative) appears to have the greatest impact to the City of Pembroke and its residences when compared to other reasonable and available alternatives, such as the "Concept B&C" alternative, which bypasses the City without detrimentally impacting the City of Pembroke. This appears to contradict the stated purpose of safe and efficient transport of freight.

EPA recommends expanding the number of reasonable alternatives considered. For example, KY 109 appears to provide a direct link from KY 115 to the Commerce Industrial Park and divert long-haul, heavy freight trucks from most of KY 115's length, the City of Pembroke, and US 41, which is a direct link between the City of Pembroke and Hopkinsville. Advantages include reducing heavy freight trucks from a congested area, the residential properties bordering both US 41 and KY115 near the City of Pembroke, and associated passenger traffic. Additionally, this alternative likely avoids impacts to surface water bodies, such as Long Pond and Morgan Branch and their associated wetlands.

Other Recommendations

In order to adequately scope the proposed action, the EPA recommends the following:

- EPA recommends additional alternatives be considered to ensure that "Concept B&C" do not appear to be predetermined. Concept B, the Pembroke Connector, is mentioned numerous times in the Hopkinsville-Christian County Comprehensive Plan. For example, a KY 115 reconstruction project is proposed between the *proposed Pembroke Bypass* to US 68. Another example, a KY 115 major widening project between Anderson Road and the *proposed Pembroke Bypass*.
- Discuss the proposed action in context of the other projects proposed in the Hopkinsville-Christian County Comprehensive Plan, the City of Pembroke's Comprehensive Plan, and the City of Oak

Grove's Comprehensive Plan. This discussion should include cumulative impacts and address any potential segmentation issues.

- For example, Concept A appears to be inconsistent with the Hopkinsville-Christian County Comprehensive Plan Transportation Goal 18: Avoid development of street access through areas of significantly lower intensity or density development, if such access would create significant nuisances. Concept A also appears to require, consistent with Transportation Goal 19, cautious review since it proposes to expand and alter transportation arteries (KY 115 & US 41) through residential neighborhoods with the primary concern focused on the impact to residential stability. It also appears inconsistent with the Access Management, Principle #6 – to limit the number of conflict points between vehicles, vehicles and pedestrians.
- The proposed Pembroke Connector is in the Hopkinsville-Christian County Comprehensive Plan but it is unclear whether their plan is consistent with either the City of Pembroke's and/or the City of Oak Grove's Comprehensive Plans.
- The Hopkinsville-Christian County plan includes:
 - A 5-lane widening project that appears to overlap with Concept A's proposed 3-lane widening component for US 41 between the KY 115 intersection and John Rivers Road.
 - A KY 115 reconstruction project from the proposed Pembroke Bypass to US 68.
 - A KY 115 major widening project between Anderson Road and the proposed Pembroke Bypass.
- *Cumulative Impacts:* Identify and discuss cumulative effects associated with existing and proposed transportation projects in the area, including Hopkinsville and any designated truck routes
- *Alternatives:* The alternatives need supporting information to demonstrate achievement of the purpose.
 - *Level of Service:* From the information provided, it appears that efficient movement of freight in context of level of service (LOS) may remain unchanged. Additionally, the existing LOS of "C" in the provided information appears inconsistent with the defined LOS of "A or B" in the Hopkinsville-Christian County Comprehensive Plan.
 - *Safety:* The Planning Study should indicate which of the proposed concepts improve safety. The safety data given, which includes the number of crashes along area roadways, should support a determination that a safety issue exists and if so the cause. The data indicates the project study area experienced an average annual number of 12.4 crashes, which appears to be relatively low when compared to the Christian County annual average of 1,843 crashes. No crashes appear to be attributed to the railroad's operation. Most of the crashes appear to be concentrated in two areas of high passenger vehicle use.
- *Business and Community:* Identify and discuss potential impacts to the affected communities, including the number of relocations: residential and business and the amount of residential or commercial properties that will be condemned for the proposed action and the associated impacts, including: economic; increased thru traffic impacts to residential neighborhoods; abutting land uses; the type of freight to be transported through the City; etc. The Study should also identify and discuss potential impacts associated with the Executive Order (EO) 12988 - Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, and EO 13045 - Protection of Children from Environmental Health Risks and Safety Risks. This includes air, noise, water quality, aesthetics, and health impacts. The study should identify impacts to schools, parks, playgrounds, health-care facilities, etc., and appropriate mitigation. In addition, potential impacts to Rosedale Cemetery should also be discussed. Concept B, the Pembroke Connector, proposes to connect to KY 115 across from the Rosedale Cemetery. This connection point may result in potential

- noise and traffic impacts, and conflict with the use of a cemetery that appears to be used as a park and museum.
- *Air Quality*: Identify and discuss any potential construction and operation impacts to all criteria pollutants under the National Ambient Air Quality Standards (NAAQS), and any significant concentration of hazardous air pollutants. Based on a review of the project area, the KYTC, Division of Planning's Air Quality Modal Program, lists Christian County as an Air Quality Maintenance Area of 8-hour Ozone as of July 2012. Efforts to identify, minimize and mitigate potential impacts to sensitive receptors, including children should be evaluated. In addition, the EPA encourages opportunities for the use of clean diesel equipment, vehicles, and fuels during construction of the proposed action to reduce emissions from diesel engines.
- *Hazardous Waste*: Identify and discuss potential direct, indirect, and cumulative impacts of hazardous waste from construction and operation of the proposed action, including potential spill types associated with reasonably expected freight transport.
- *Aquatic Resources*: Identify and discuss current groundwater conditions, including karst topography, and assess potential impacts to groundwater quality associated with the proposed action's construction and operation. This includes identifying whether any potentially impacted groundwater sources may have an interface with surface waterbodies, leading to potential indirect impacts to these waters. We recommend identifying and discussing mitigation measures to prevent or reduce adverse impacts to groundwater quality and discuss their likely effectiveness. EPA also recommends identifying and discussing any potential impacts to source waters, including wellhead protection areas, designated sole source aquifers, municipal and private wells, upstream of drinking-water supply intakes, springs regions – including any fault zones and karst areas, and karst terrain. This includes addressing the potential for contaminants to be introduced into existing or future sources of public water supplies, including aquifers, downgradient springs, wells, and surface waterbodies. Additionally, impacts and mitigation measures should be identified. In addition, waterbodies the proposed action is likely to impact and proposed mitigation should be discussed. This should include a discussion of wetlands and stream impacts. Identify any waters, including aquatic ecosystem, of special significance such as designated special use waters, impaired streams, floodplains, etc.
- *Farmland*: Identify and discuss the proposed action in context of the Farmland Protection Policy Act regulations (7 CFR Parts 658 and 675). These regulations require all federal agencies to evaluate federally-funded project impacts to farmlands.
- *Mitigation*: Identify and discuss the proposed action's range of impacts and associated mitigation measures, including any design alternatives that would decrease pollution emissions, construction impacts, and esthetic intrusion. Also discuss potential mitigation measures such as relocation assistance, possible land use controls that could be enacted, and other possible efforts. According to the CEQ, mitigation measures must be considered even for impacts that by themselves would not be considered significant. Mitigation includes: avoiding the impact, minimizing impacts, rectifying the impacts, reducing or eliminating the impact, and compensating for the impact. EPA recommends addressing how any proposed mitigating measures will be consistent with CEQ's Mitigation guidance.

Gilley, Andy

From: McKenzie, Shane (KYTC) <Shane.McKenzie@ky.gov>
Sent: Wednesday, April 12, 2017 4:25 PM
To: Gilley, Andy; Coffey, Annette
Subject: FW: Pembroke Planning Study, Christian Co (Item No. 2-381.00)

This one is from NRCS. This one might have been on your list already.

From: McIntosh, Jerry - NRCS, Mayfield, KY [<mailto:jerry.mcintosh@ky.usda.gov>]
Sent: Monday, March 27, 2017 12:15 PM
To: McKenzie, Shane (KYTC) <Shane.McKenzie@ky.gov>
Cc: Yancey, Frank - NRCS, Hopkinsville, KY <Frank.Yancey@ky.usda.gov>; Blanford, Steve - NRCS, Lexington, KY <Steve.Blanford@ky.usda.gov>
Subject: Pembroke Planning Study, Christian Co (Item No. 2-381.00)

Mr. McKenzie,

I recently received the cover letter and several attachments requesting any comment from our agency, USDA-NRCS, regarding the scoping of environmental issues/impact associated with proposed improvements to KY Highway 115 (Pembroke-Oak Grove Rd) southward to I-24 in Christian Co. NRCS does not officially conduct environmental assessments for this type of project. However, since the project area as outlined below encompasses a significant acreage of Prime Farmland, if it is anticipated to receive federal dollars (*usually via the **Federal Highway Administration***) then an AD-1006 (Farmland Conversion Impact Rating) should be initiated and forwarded on to NRCS for completion in accordance with the Farmland Policy Protection Act (*Agriculture and Food Act of 1981 (Public Law 97-98): Farmland Protection Policy Act (FPPA) subtitle I of Title XV, Section 1539-1549*).

Farmland Conversion Impact Rating Form

If you represent a Federal agency in a project that has the potential to convert important farmland to non-farm use, please contact your local office of the Natural Resources Conservation Service (NRCS) or USDA Service Center. NRCS uses a land evaluation and site assessment (LESA) system to establish a farmland conversion impact rating score on proposed sites of Federally funded and assisted projects. This score is used as an indicator for the project sponsor to consider alternative sites if the potential adverse impacts on the farmland exceed the recommended allowable level.

The assessment is completed on form [AD-1006, Farmland Conversion Impact Rating](#). The sponsoring agency completes the site assessment portion of the AD-1006, which assesses non-soil related criteria such as the potential for impact on the local agricultural economy if the land is converted to non-farm use and compatibility with existing agricultural use.

Since the project is in the scoping phase, it doesn't appear it is far enough along for this to be needed just yet. Generally, once a project having potential to convert farmland to non-ag usage is narrowed to a single or 2nd alternative, then an AD-1006 is initiated for us (NRCS) to complete. However, if you are confident the area as outlined below is a primary consideration/alternative and know federal monies will be used to carry out this project, then initiate the AD-1006 and forward me a shapefile of the anticipated area of disturbance/conversion and I'll be glad to do the analysis necessary for the AD-1006.

Do not hesitate to contact me if you have questions or additional follow-up.

Sincerely,

JERRY MCINTOSH

Area 1 Soil Scientist/P.G.

USDA-NRCS

Mayfield, KY

270.356.8123

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From: [Hall, Nick S \(KYTC-D02\)](#)
To: [Gilley, Andy](#)
Subject: FW: Pembroke Bypass
Date: Friday, February 17, 2017 10:50:44 AM

Here you are..

From: Rudd, John W (KYTC-D02)
Sent: Monday, February 13, 2017 9:43 AM
To: Hall, Nick S (KYTC-D02) <Nick.Hall@ky.gov>
Cc: Clements, Wade B (KYTC-D02) <Wade.Clements@ky.gov>; McKenzie, Shane (KYTC) <Shane.McKenzie@ky.gov>
Subject: FW: Pembroke Bypass
Nick,

I will not be available at today's meeting so I am forwarding this email so that it can be considered at the meeting.

Thanks,

John Rudd, P.E.
TEBM Project Development
District Two
Madisonville, KY 42431
270-824-7080
John.Rudd@ky.gov

From: Judy Peterson [<mailto:mayorjudyp@gmail.com>]
Sent: Friday, February 10, 2017 12:37 PM
To: Clements, Wade B (KYTC-D02) <Wade.Clements@ky.gov>
Cc: Rudd, John W (KYTC-D02) <John.Rudd@ky.gov>; Dossett, Myron (State Rep.) (LRC) <myron.dossett@LRC.KY.GOV>; judge@christiancountky.gov
Subject: Pembroke Bypass

I understand there is a meeting next week concerning the Pembroke Bypass/connector route.. As future plans are made for the construction of this Bypass we request that there should be a bike and pedestrian trail designed and constructed as part of the new route. I believe a separate Bike/Ped route that is in the new right of way but separate from the traffic lanes would be a great asset to the City. The engineers would need to co-route the Bike/Ped path into the shoulder on the bridge that goes over the railroad tracks, but the other sections could be separate from the traffic lanes. My second choice would be to have the Bike/Ped facilities as part of the shoulder of the road, but the more the separate distance is from the traffic lanes, the safer is for kids and it is just a better experience if you are not 6 feet away from a truck going 45 MPH.

The City of Pembroke could make a long term goal of trying to connect sidewalks to the Bypass' trail by extending new sidewalks in the US 41A and KY 115 ROWs from the downtown to where they will intersect with the new Bypass, which would create a loop round

the southwest side of the City and residents can walk or bike on. I understand that this would be a future plan but one which would benefit our community and our future!

Thank you for your consideration in this project.

Sincerely,

Judy R. Peterson

Mayor

City of Pembroke



April 4, 2017

Shane McKenzie, P.E.
Kentucky Transportation Cabinet
Division of Planning
200 Mero Street
5th Floor West
Frankfort, Kentucky 40622

Dear Ms. McKenzie and Mr. Moore:

I am writing in regard to the planning study that is being conducted to analyze improvements to and from I-24 to the Commerce Industrial Park on Hwy 115.

I lived off of Hwy 115 in Pembroke for eight years and can say with certainty that improvements are needed for the safety of drivers. It is a very narrow road with many twists and turns, some of which make visibility difficult while driving. Bad weather conditions and darkness make visibility even worse. Because of the narrowness of the road, there is little room for error or room to move over.

This road is traveled heavily by tractor trailers and Amish buggies which creates additional hazards. The bridge just before Mason Lane is so narrow that one vehicle has to almost stop if a tractor trailer is coming from a different direction at the same time.

The intersection of 115 and Pembroke Road also has problems as you have shown in the crash site data provided. It is uneven causing cars to back up when a tractor trailer needs to turn and has visibility issues.

I am very supporting of any efforts made to improve this area of roadway. If you need additional information from me, please don't hesitate to contact me.

Respectfully,

Kelli Pendleton
President/CEO
Christian County Chamber of Commerce

Gilley, Andy

From: McKenzie, Shane (KYTC) <Shane.McKenzie@ky.gov>
Sent: Wednesday, April 12, 2017 4:22 PM
To: Gilley, Andy; Coffey, Annette
Subject: FW: Pembroke Planning Study Christian County Item No. 2-381.00

This is the Airport Zoning Commission Response.

From: Houlihan, John F (KYTC)
Sent: Thursday, March 23, 2017 3:20 PM
To: McKenzie, Shane (KYTC) <Shane.McKenzie@ky.gov>
Subject: Pembroke Planning Study Christian County Item No. 2-381.00

Shane,

I have reviewed the above subject and the following would apply to this project:

Any construction equipment or permanent structure greater than 200 feet above ground level would require a permit from the KAZC.

If you have any questions, please let me know.

Thank you

Kentucky Airport Zoning Commission (KAZC)
John Houlihan, Administrator
200 Mero Street, 4th Floor Office of Audits
Frankfort, KY 40622
Office 502-782-4044, Cell 502-330-3955

KAZC webpage: <http://transportation.ky.gov/Aviation/Pages/Zoning-Commission.aspx>

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**COMMONWEALTH OF KENTUCKY
CABINET FOR HEALTH AND FAMILY SERVICES**

Matt G. Bevin
Governor

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Greg Thomas
Secretary

April 3, 2017

Kentucky Transportation Cabinet
Dept. of Highways
Mr. John Moore, P.E., Director Division of Planning
200 Mero Street 5th Floor
Frankfort, Ky. 40622

Subject: Pembroke Planning Study
Christian Co., Item No. 2-381.00

Mr. Moore,

Thank you for the opportunity to provide input for the Pembroke Planning Study for the Kentucky Transportation Cabinet. We reviewed the study to identify specific issues or concerns which may affect the development of the road improvement project in Christian County. We have reviewed the project location map that you provided as well as the location of the three CHFS facilities in the area.

The Cabinet for Health and Family Services does not lease or own property located within the area of this proposal; therefore, we do not anticipate or have any specific issues or concerns with regards to the proposed project.

Thank you for giving consideration to our facilities, staff, and clients.

Sincerely,

A handwritten signature in blue ink that reads "Vickie Yates Brown Glisson".

Vickie Yates Brown Glisson
Secretary
Cabinet for Health and Family Services

Cc: file



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MATTHEW G. BEVIN
GOVERNOR

CHARLES G. SNAVELY
SECRETARY

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION

AARON B. KEATLEY
COMMISSIONER

300 SOWER BOULEVARD
FRANKFORT, KENTUCKY 40601
April 7, 2017

Shane McKenzie, P.E.
Kentucky Transportation Cabinet
Division of Planning
200 Mero Street
5th Floor West
Frankfort, KY 40622

Re: SERO 2017-4
Pembroke Planning Study
Christian County, Kentucky
Item No. 2-381.00

Mr. McKenzie,

The Energy and Environment Cabinet serves as the state clearinghouse for review of environmental documents generated pursuant to the National Environmental Policy Act (NEPA). Within the Cabinet, the Commissioner's Office in the Department for Environmental Protection coordinates the review for Kentucky state agencies.

We received your correspondence dated March 14, 2017. Your letter requested a review of the "Pembroke Planning Study in Christian County, Kentucky."

Comments from the Division of Water:

This project will have potential impacts to an unnamed tributary (UT) to Montgomery Creek, which are expected to be minor and temporary. This UT is unassessed for warm water aquatic habitat. Best management practices shall be utilized to reduce runoff from the project into adjacent surface waters. Questions should be directed to Andrea Fredenburg, Water Quality Branch, (502) 782-6950, Andrea.Fredenburg@ky.gov.

Kentucky Revised Statute KRS 151.250 provides for exemption for the Department of Highways; therefore, a "Stream Construction Permit for Construction In or Along a Stream" will not be required. No formal approval is required for Water Withdrawal Permitting or Water Management Planning. Questions should be

directed to Julia Harrod, Watershed Management Branch, (502) 782-6967, Julia.Harrod@ky.gov.

The Groundwater Section of the Watershed Management Branch endorses the proposed work. However, there are several domestic groundwater water well users near the proposed work. The vicinity of the proposed work is also located in an area with a high potential for karst development where groundwater is susceptible to direct contamination from surface activities. It is our recommendation that site be made aware of the requirements of 401 KAR 5:037 and the need to develop a Groundwater Protection Plan (GPP) for the protection of groundwater resources within that area. Questions should be directed to Sean Vanderhoff, Watershed Management Branch, (502) 782-7119, Sean.Vanderhoff@ky.gov.

Comments from the Division of Waste Management:

All solid waste generated by this project must be disposed at a permitted facility. If underground storage tanks are encountered, they must be properly addressed. If asbestos, lead paint, and/or other contaminants are encountered during this project, they must be properly addressed.

Comments from the Division of Air Quality:

Kentucky Division for Air Quality Regulation **401 KAR 63:010** Fugitive Emissions states that no person shall cause, suffer, or allow any material to be handled, processed, transported, or stored without taking reasonable precaution to prevent particulate matter from becoming airborne. Additional requirements include the covering of open bodied trucks, operating outside the work area transporting materials likely to become airborne, and that no one shall allow earth or other material being transported by truck or earth moving equipment to be deposited onto a paved street or roadway. Please note the [Fugitive Emissions Fact Sheet](#).

Kentucky Division for Air Quality Regulation **401 KAR 63:005** states that open burning is prohibited. Open Burning is defined as the burning of any matter in such a manner that the products of combustion resulting from the burning are emitted directly into the outdoor atmosphere without passing through a stack or chimney. However, open burning may be utilized for the expressed purposes listed on the [Open Burning Brochure](#).

The Division would like to offer the following suggestions on how this project can help us stay in compliance with the NAAQS. More importantly, these strategies are beneficial to the health of citizens of Kentucky.

§ Utilize alternatively fueled equipment.

§ Utilize other emission controls that are applicable to your equipment.

§ Reduce idling time on equipment.

Comments from the Kentucky Department of Fish and Wildlife Resources:

The Kentucky Fish and Wildlife Information System indicate the Piping Plover (*Charadrius melodus*), Grey bat (*Myotis grisescens*) and Northern Long-eared bat (*Myotis septentrionalis*) are known to occur within 10 miles of the project area. No additional state-listed species, caves, mine portals or special natural areas are known to occur within one mile of the project area. Known locations of listed species do not occur within the outlined project area. Please be aware that our database system is a dynamic one that only represents our current knowledge of various species distributions.

To minimize impacts to the aquatic environment, the KDFWR recommends erosion control measures be developed and implemented prior to construction to reduce siltation into waterways and/or karst features located within the project area. Such erosion control measures may include, but are not limited to silt fences, staked straw bales, brush barriers, sediment basins and diversion ditches. Erosion control measures will need to be installed prior to construction and should be inspected and repaired regularly as needed.

This review is based upon the information that was provided by the applicant. An endorsement of this project does not satisfy, or imply, the acceptance or issuance of any permits, certifications, or approvals that may be required from this agency under Kentucky Revised Statutes or Kentucky Administrative Regulations. Such endorsement means this agency has found no major concerns from the review of the proposed project as presented other than those stated as conditions or comments.

If you should have any questions, please contact me at (502) 782-6739.

Sincerely,



Ronald T. Price
State Environmental Review Officer
Kentucky Department for Environmental Protection

Ryan F. Quarles
Commissioner



Corporate Drive
Complex
Frankfort, KY 40601
(502) 573-0282

Kentucky Department of Agriculture

April 7, 2017

Shane McKenzie, P.E.
Division of Planning
Transportation Cabinet
200 Mero Street
5th Floor West
Frankfort, Kentucky 40601

Dear Ms. McKenzie:

Subject: Pembroke Planning Study
Christian County
Item No. 2-381.00

Thank you for allowing the Kentucky Department of Agriculture the opportunity to view the planning study. After confirming with the PACE partners at Fort Campbell Army Base the above proposed transportation project corridor in Christian County, Kentucky will not affect any properties currently in the PACE program.

Please let me know if you need any other assistance from our office regarding this project.

Sincerely,

A handwritten signature in blue ink, appearing to read "Elizabeth Gordon".

Elizabeth Gordon
Director
Ag Education and Outreach



Gilley, Andy

From: Forgacs, Joe (EEC) <Joe.Forgacs@ky.gov>
Sent: Monday, March 27, 2017 8:20 AM
To: McKenzie, Shane (KYTC)
Subject: Pembroke Planning Study - Christian County

Good morning Shane,

The Division has reviewed the subject planning study, Item # 2-381.00, dated March 14, 2017. Based on our review, the Division offers the following comments.

401 KAR 63:010, Fugitive Emissions, states that no person shall cause, suffer, or allow any material to be handled, processed, transported, or stored without taking reasonable precaution to prevent particulate matter from becoming airborne. Additional requirements include the covering of open bodied trucks, operating outside the work area transporting materials likely to become airborne, and that no one shall allow earth or other material being transported by truck or earth-moving equipment to be deposited onto a paved street or roadway. Please note the Fugitive Emissions Fact Sheet located at <http://air.ky.gov/SiteCollectionDocuments/Fugitive%20Dust%20Sheet.pdf>

401 KAR 63:005 states that open burning shall be prohibited except as specifically provided. Open Burning is defined as the burning of any matter in such a manner that the products of combustion resulting from the burning are emitted directly into the outdoor atmosphere without passing through a stack or chimney. However, open burning may be utilized for the expressed purposes listed on the Open Burning Brochure located at <http://air.ky.gov/Pages/OpenBurning.aspx>

The Division would like to offer the following suggestions on how this project can help us stay in compliance with the NAAQS. These air quality control strategies are beneficial to the health of citizens of Kentucky.

- Utilize alternatively fueled equipment.
- Utilize other emission controls that are applicable to your equipment.
- Reduce idling time on equipment.

The Division also suggests an investigation into compliance with applicable local government regulations.

Thank you.

Have a good week!

Joe Forgacs, Environmental Scientist III

Kentucky Division for Air Quality

Program Planning and Administration Branch

Evaluation Section

(502) 782-6610

joe.forgacs@ky.gov

Mailing Address:

Kentucky Division for Air Quality

300 Sower Boulevard, 2nd Floor

Frankfort, Kentucky 40601-6571

Gilley, Andy

From: Kull, Steve J <Steve.Kull@ky.gov>
Sent: Monday, March 27, 2017 8:17 AM
To: McKenzie, Shane (KYTC)
Subject: Pembroke Planning Study 2-381.00

The Division of Forestry does not have any comments regarding the planning study. We do agree with using an urban template where appropriate to minimize impacts.

Steve

Steven J. Kull, Assistant Director

Kentucky Division of Forestry
4th Floor SE Room 436
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MATTHEW G. BEVIN
GOVERNOR

CHARLES G. SNAVELY
SECRETARY

**ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR NATURAL RESOURCES**

ALLEN LUTTRELL
COMMISSIONER

300 SOWER BOULEVARD
FRANKFORT, KENTUCKY 40601
TELEPHONE: 502-564-6940
TELEFAX: 502-564-4245

Mr. Shane McKenzie, PE
Kentucky Transportation Cabinet
Division of Planning
200 Mero Street
Frankfort, KY 40622

Dear Mr. McKenzie,

Thank you for your correspondence regarding the Pembroke Planning Study in Christian County, Item Number 2-381.00.

The Division of Mine Reclamation and Enforcement notes no impacts to mining operations in the area of this project, as there currently are no mining operations in Christian County. Therefore, we have no concerns regarding this project.

Please feel free to contact me at 502-782-6770 should you have any questions or concerns.

Thank you,

A handwritten signature in cursive script that reads "Courtney G. Skaggs".

Courtney G. Skaggs, Acting Director
Division of Natural Resources
Department of Mine Reclamation and Enforcement



UNIVERSITY OF KENTUCKY

Mr. John Moore, P.E.
Director Division of Planning
Transportation Cabinet
Frankfort, Kentucky, 40622

Kentucky Geological Survey
Research
504 Rose Street
228 Mining & Mineral Resources Bldg.
Lexington, KY 40506-0107
Phone: (859) 257-5500
Fax: (859) 257-1147
www.uky.edu/kgs

Dr. Mr. Moore,

In response to your request for comments on the Pembroke Planning study (Item No. 381.00), the Kentucky Geological Survey has the following observations of the project area.

- 1) The entire length of the highway widening project is underlain by karstic limestone. All of the build routes and intersection placements will be vulnerable to cover-collapse and possibly bedrock collapse. Only a no build option avoids the problem.
- 2) The route as planned will cross three large spring sheds (see the enclosed map). The spring's draining these areas may be water supplies. In so far as the cargo being transported across these spring sheds is unknown, but is certain to include hazardous liquids, the protection of the ground water along this route is critical for the continued use of this important resource.
- 3) Flooding of sinkholes is also a possible risk. Because most of the land surface drains into the subsurface, except in the areas where there has been groundwater dye tracing the direction of flow and any reduction in velocity or discharge is unknown. If the surface runoff rate exceeds the hydraulic capacity of the conduits, temporary storage of the excess water in the sinkhole depressions will occur.
- 4) According to the files of the Kentucky Speleological Survey, there are no known caves inside the buffer as represented on the over view map provided by the Division of Planning. That does mean caves are not there, however. I think there is nearly a 100-percent chance there are caves along the project route large enough to cause a major subsidence risk. There are over seven large caves east of Barkers Mill Road and Dickerson Road, including Glovers Cave, about two miles east of the project buffer.

Also enclosed is a paper by James Currens on the rate of cover-collapse in Kentucky. The study area for this research was southeastern Christian County, very near and including a small part of the Pembroke Connector project. The rate of cover collapse determined by the research was 0.58 collapse events/mile²/year. Extraordinary measures will have to be taken to prevent damage to water supplies and the highway pavement and sub grade by collapse.

Sincerely,



James C. Currens
Karst Hydrogeologist
Kentucky Geological Survey
Cc: Jerry Weisenfluh, Charles Taylor

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Div. of Planning



An Equal Opportunity University

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A METHOD TO DETERMINE COVER-COLLAPSE FREQUENCY IN THE WESTERN PENNYROYAL KARST OF KENTUCKY

JAMES C. CURRENS*, RANDALL L. PAYLOR, E. GLYNN BECK, AND BART DAVIDSON
Kentucky Geological Survey, University of Kentucky, 228 Mining and Mineral Resources Building, Lexington, KY 40506-0107

Abstract: To determine the rate of cover-collapse sinkhole formation in Christian County, Kentucky, we used large scale aerial photographs taken nearly twenty years apart. The negatives were enlarged and printed to 1:3,000 scale and examined for collapses. The photographs constrained the time period within which the collapse could have occurred, and the large scale of the prints provided a means to identify, locate, and field-verify the cover collapses. All features noted on the photographs were checked in the field. Sinkholes seen on the later photographs, but not the earlier ones, were recorded. The rate of formation calculated was 0.2 cover-collapse $\text{km}^{-2} \text{yr}^{-1}$.

INTRODUCTION

Cover collapse is the phenomena of apparently sudden collapse of soil or other unconsolidated cover over karstic bedrock. In Kentucky, cover collapse frequently damages buildings, roads, utility lines, and farm equipment. It has killed livestock, including some thoroughbred horses, and has injured people. The Kentucky Geological Survey estimates a total economic cost of \$20 million annually in Kentucky from karst-generated geologic hazards (Dinger et al., 2007). The survey records an average of two dozen cover collapses per year and has developed a case history file spanning some thirty years. In this paper, we report a site-specific study of collapse frequency in a small area of the Western Pennyroyal sinkhole plain east of Hopkinsville in Christian County, Kentucky (Fig. 1).

COVER-COLLAPSE PROCESS

The development of voids in unconsolidated cover overlying karstic bedrock has been studied for decades (Beck, 1991; White and White, 1992). Small voids in soil at depths of a few meters are comparatively stable because of the lateral distribution of the overburden-induced stress by the arched roof of the void. The voids are enlarged by a loss of cohesion and loading of the arch-forming material caused by either a wetting front of soil water from infiltrating precipitation or by rapid draining of an inundated void. The saturated pores in the unconsolidated cover cannot drain as quickly as the conduit-connected void. The wetting and increased pore pressure result in an incremental loss of strength of the regolith arch (Tharp, 1999) and the underside of the arch sloughing into the soil void. Ultimately, the repeated sloughing from wetting and drying of the unconsolidated cover propagates the arched-over void to near the land surface (Hyatt and Jacobs, 1996; Waltham et al., 2005). The sudden appearance of a cover-collapse sinkhole is initiated when the arch becomes too

thin to support its own weight and shears the remaining soil in a nearly circular pattern (Fig. 2). If sufficient volume is not available in the underlying bedrock cavity to store the collapsed soil, the loose material is transported away by groundwater flow through the bedrock conduit. Although the genesis of cover collapse is well understood, precisely predicting the time and place at which a collapse will occur is not yet possible (Hyatt et al., 2001).

STUDY AREA

The study area is 4.04 km^2 in east-central Christian County, Kentucky (Fig. 3). The topography within the study area is karst plain and a single low hill, giving 23.5 m of local relief, formed by resistance to dissolution of the basal part of the Bethel Sandstone. Land use at the time of the study (2004) was largely pasture and row-cropped fields with scattered farmsteads, a retail agriculture supply store, a cement plant, and a restaurant. The boundaries were defined by the overlapping area of stereo aerial photograph pairs. The study area was selected without any prior knowledge of existing cover collapses in the area.

The exposed Mississippian section, in ascending order, is Ste. Genevieve Limestone, Renault Limestone, and Bethel Sandstone (Klemic, 1967). The bedrock at the base of the stratigraphic column is predominantly oolitic and micritic limestones, medium- to thick-bedded, and is greater than 95 percent calcium carbonate. Interbedded thin shale and argillaceous carbonates are a minor interruption to the otherwise very pure carbonate section. The residual 10 m of Bethel is a calcite-cemented, argillaceous quartzarenite that weathers into a friable, porous, sandy residuum that readily slumps into underlying sinkholes (Klemic, 1967). The Lost River Chert is exposed near the base of the Ste. Genevieve in local quarries, but is below the depth of karst development in the study area. The exposed Ste. Genevieve Limestone is

* Corresponding Author: currens@uky.edu

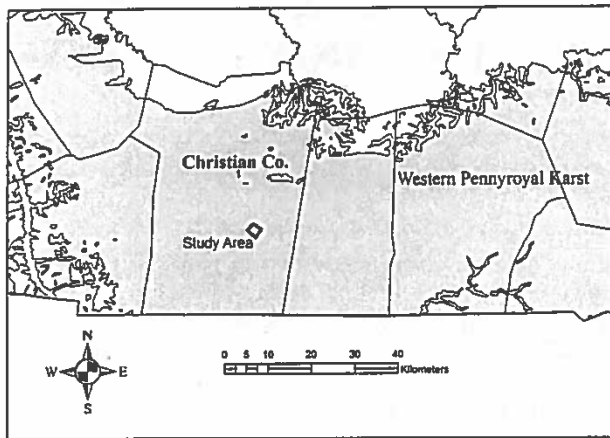


Figure 1. The black polygon is the study area in Christian County, east of Hopkinsville, Western Pennyroyal region in Kentucky. The gray shaded area is underlain by karstic carbonates.

over 52 m thick, while the Renault Limestone is some 15 to 29 m thick. The regional gentle dip of 3 m km^{-1} to the north is the only structure in the otherwise flat-lying bedrock at the study site.

The cover collapses inventoried were mostly in the outcrop area of the Renault. Because of the purity and thickness of the carbonates, the presence of topographically mapped dolines, and the moderate total relief of 60 m within the study area, we expected the rate of occurrence of cover collapse to be comparatively high. The conditions in the study area are nearly ideal for cover-collapse development.

METHODS

We used a simple and inexpensive method to locate sinkholes and constrain the time of cover collapse. Because we did not have access to a magnifying stereoscope, the Kentucky Geological Survey purchased prints of black-and-white, low-altitude, large-scale, visible-light, aerial photography at an imaged scale of 1:12,000 (1 cm = 120 m; 1 in. = 1,000 ft) from the Tennessee Valley Authority. The photographs were taken March 9, 1971, and January 31, 1991. Although we also obtained stereo sets of contact prints, the most useful images were enlargements of the central image from the sets. The enlargements were printed at a scale of 1:3,000 (1 cm = 30 m; 1 in. = 250 ft), four times the scale of the negative. Using 2-power magnifying glasses, we visually scanned the enlargements systematically for features appearing to be sinkholes. The emulsion grains on the print were sufficiently small in comparison with the typical cover-collapse that shadows cast on the interior of a collapse less than a meter in diameter could be discerned from those cast by small cedar trees, for example. Further, labeling devices



Figure 2. A classic example of a cover collapse in the study area.

could be attached to the enlargement print to preserve the interpretive data.

We also searched for cover-collapse features on the stereo-pair contact prints and the digital images made at the KGS from scans of the enlargements. Most of the features identified on the 1:3,000-scale enlargements could not be relocated with confidence on the 1:12,000-scale contact prints. Scanned enlargements were saved as 16-bit gray-scale TIFF files at 1,200 dpi, giving a pixel size of roughly 0.5 m at ground level. The file size was large (428,853 kb) and prevented viewing the scan with image viewers on most of the available computers. We did view the images with GIS software, but could not relocate any cover-collapse locations on the digital images due to pixilation.

Fifty potential cover-collapse sites were selected for field inspection from the enlarged prints (Table 1). KGS staff field-checked all of the sites and determined if they were, in fact, cover collapses. Those sites that had developed within

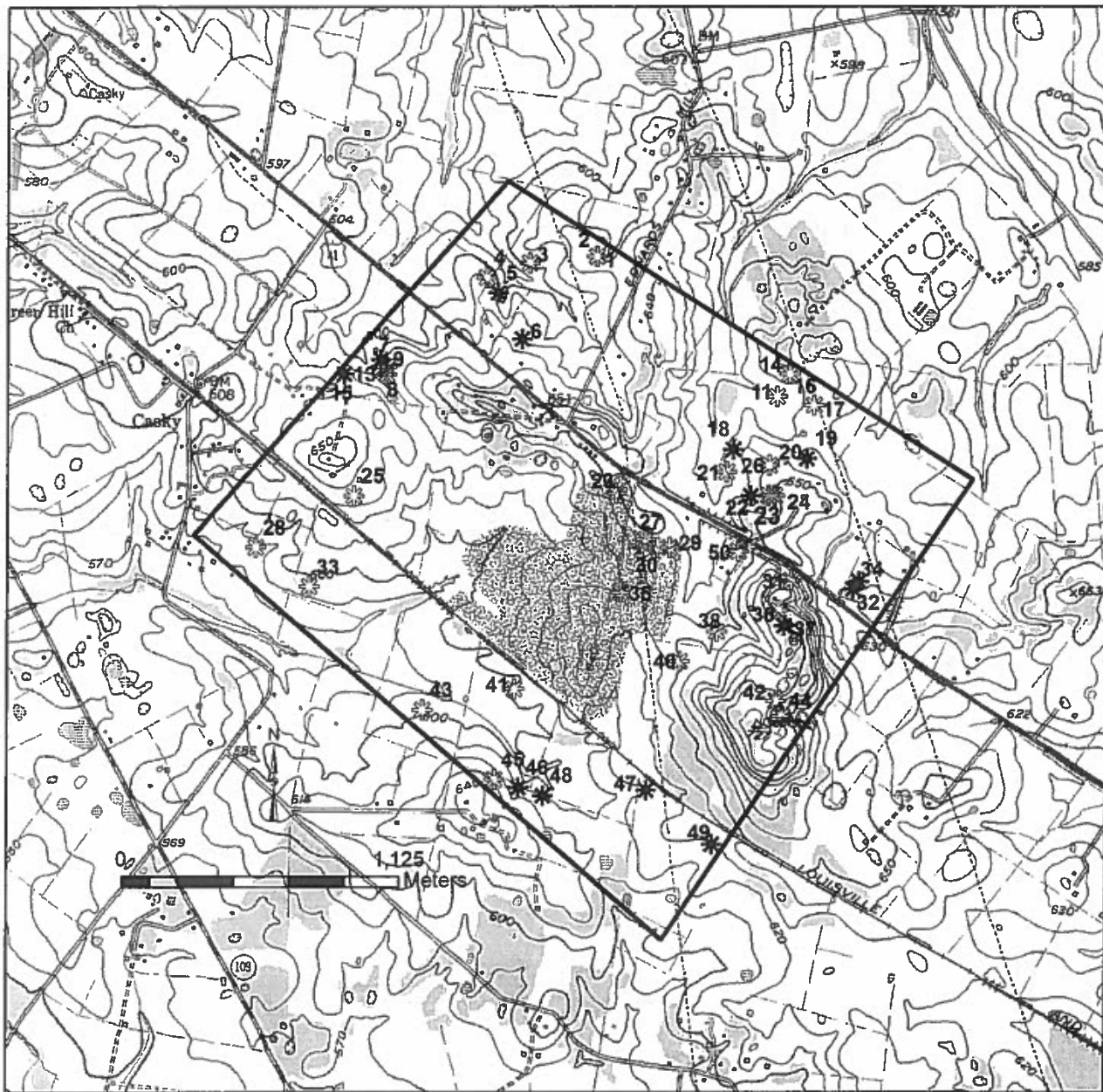


Figure 3. The cover-collapse inventory area in the Hopkinsville 7.5-minute quadrangle is inside the black line. The disrupted textured area enclosed by a gray line is the property of a limestone quarry, which was excluded from the inventory. Solid asterisks are cover-collapse sinkholes identified on the 1991 aerial photograph and verified in the field. Hollow asterisks are other features from the same images determined not to be cover-collapse.

the twenty-year period bracketed by the photographs were identified. We also found a small number of cover collapses that did not appear until after the 1991 photography. These were too recent to include in the calculation of the rate, but were documented for future reference. Some features that were visible on the earlier photographs, but not on the later ones, were also noted. We also received a limited number of

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reports that a collapse had occurred and had been filled and graded during the period between the aerial photography. Such cover collapses were included in the rate calculation only if we found field evidence that the report was correct. Field evidence for a filled sinkhole included a circular variation in texture and color of vegetation, buried trash exposed at the surface, subsidence due to soil compaction, or

Table 1. Features identified on aerial photographs and field verified as possible cover collapses since 1971.

Field and Map ID	Location		Present on 1971 Aerial Photograph	Present on 1991 Aerial Photograph	Correctly Identified on Photo as Cover Collapse?	Stratigraphic Unit	Comments and Notes
	Long., °W	Lat., °N					
5 ^c	-87.4189	36.82111	N	Y	Y	Renault	PA ^a
6 ^c	-87.4178	36.81944	N	Y	Y	Renault	SH ^b - Suspect
7 ^c	-87.4242	36.81861	N	Y	Y	Renault	SH/PA Group
11	-87.4056	36.81833	N	Y	N	Renault	PA
14	-87.4056	36.81833	Y	Y	N	Renault	PA/SH - Omitted from rate computation. On both photographs.
15 ^c	-87.4258	36.81806	N	Y	Y	Renault	SH - Obvious
19 ^c	-87.4047	36.81528	Possibly	Y	Y	Renault	SH
22 ^c	-87.4072	36.81389	N	Y	Y	Renault	SH - Suspect; photographed
32 ^c	-87.4022	36.81083	N	Y	Y	Renault	SH - Near existing sink on US71
34 ^c	-87.4025	36.81056	N	Y	Y	Renault	SH - Near existing sink on US71
37	-87.4056	36.80917	N	Y	Y	Bethel Sandstone	SH - May be others here.
41	-87.4178	36.80667	N	Y	N	Ste. Genevieve	PA
46 ^c	-87.4175	36.80306	N	Y	Y	Ste. Genevieve	SH - photograph
47 ^c	-87.4117	36.80306	A hint?	Y	Y	Ste. Genevieve	PA - another PA to the SE
48 ^c	-87.4164	36.80278	Y	Y	Y	Ste. Genevieve	SH - Seems to have moved
49 ^c	-87.4086	36.80111	A hint?	Y	Y	Renault	PA - has been filled in
50 ^c	-87.4079	36.81183	N	N	N	Renault	Owner says formed between 1975 and 1980
1	-87.4144	36.8225	N	Y	N	Renault	PA
2	-87.4144	36.8225	N	Y	N	Renault	PA
3	-87.4175	36.82222	N	Y	N	Renault	SH/PA
4	-87.4194	36.82167	A hint?	Y	N	Renault	PA
8	-87.4242	36.81833	N	Y	N	Renault	SH/PA - Group
9	-87.4239	36.81833	N	Y	N	Renault	SH/PA - Group
10	-87.4239	36.81806	N	Y	N	Renault	SH/PA - Group
12	-87.4239	36.81806	N	Y	N	Renault	SH/PA - Group
13	-87.4239	36.81806	N	Y	N	Renault	SH/PA - Group
16	-87.4061	36.8175	N	Y	N	Renault	PA
17	-87.4044	36.81722	N	Y	N	Renault	PA - Suspect
18 ^c	-87.4081	36.81556	N	Y	Y	Renault	SH
20	-87.4064	36.815	N	Y	N	Renault	PA?
21	-87.4083	36.81472	N	Y	N	Renault	SH - Suspect
24 ^c	-87.4061	36.81389	N	Y	N	Renault	SH
25	-87.4253	36.81361	N	Y	N	Renault	PA
26 ^c	-87.4064	36.81389	N	Y	N	Renault	SH - Has been filled.
27	-87.4119	36.81222	N	Y	N	Renault	SH - Suspect

Table 1. Continued.

Field and Map ID	Location		Present on 1971 Aerial Photograph	Present on 1991 Aerial Photograph	Correctly Identified on Photo as Cover Collapse?	Stratigraphic Unit	Comments and Notes
	Long., °W	Lat., °N					
28	-87.4297	36.81167	N	Y	N	Ste. Genevieve	SH - Suspect - possibly another to southwest
29 ^c	-87.4108	36.81194	N	Y	N	Renault	SH
30	-87.4114	36.81194	N	Y	N	Renault	SH - Suspect
33	-87.4272	36.81028	N	Y	N	Ste. Genevieve	SH/PA - Possible berm?
36	-87.4058	36.80972	N	Y	N	Bethel Sandstone	SH
38	-87.4086	36.80889	N	Y	N	Renault	PA- In area now occupied by quarry
39	-87.4056	36.80889	N		N	Bethel Sandstone	Old pond site. In area now occupied by quarry.
40	-87.4103	36.80778	N	Y	N	Renault	SH - Suspect feature in area now occupied by quarry
42	-87.4058	36.80639	N	Y	N	Bethel Sandstone	SH
43	-87.4219	36.80583	N	Y	N	Ste. Genevieve	PA
44	-87.4056	36.80583	N	Y	N	Bethel Sandstone	SH
45 ^c	-87.4186	36.80333	N	Y	N	Ste. Genevieve	SH - Two others possible a few feet to southwest
23	-87.4133	36.81389	N	Y	?	Renault	SH - Near existing US 71 sink destroyed by road infilling.
31	-87.4053	36.81083	N	Y	?	Renault	SH?
35	-87.4131	36.81028	N	Y	?	Renault	SH (quarried away)

^a PA- An obstacle in a crop field that was driven around during tillage of the ground.
^b SH- A field verified sinkhole.
^c Used to calculate rate of occurrence.

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Figure 4. The 1991 aerial photograph of the study area in the Hopkinsville East 7.5-minute quadrangle, Christian County, Ky. The dark area in the center is the now-flooded limestone quarry that was excluded from the analysis. North is at the top the photograph. The scale of the negative is 1:12,000.

a local change in soil color if the soil was bare. After comparing recent sinkholes to sinkholes that are clearly old, we think that insufficient time has passed in the 35 years between the earlier photography and our study for any recent cover collapses to have been naturally obscured by slumping and erosion. Finally, our method does not work in wooded areas, although woodlands can still be field-checked, which

we did. No cover collapse was found in the small wooded area.

LIMITATIONS ON DATA ANALYSIS

The primary goal of this study was the demonstration of the technique, and we anticipated several limitations on

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accuracy of the cover-collapse rate. The aerial coverage obtained from TVA has one of the largest scales available, and it is only available in Kentucky for the Tennessee River valley. The limited area of photography restricted the location of study areas. Although the area was well suited for cover collapse, we had some concern that none would be identifiable on the images or that no collapses had actually occurred in the study area. This proved unfounded. Third, the size of the study area was limited by the budget, which resulted in it being too small for a statistically significant sampling (Beck, 1991) that would be representative of the larger region. Ideally, an area of 10 more square miles should be used, or several smaller sampling sites scattered over the region.

Large-scale photographic prints are not commonly used because of the increased cost of processing the prints necessary to cover the same area on the ground when compared to contact prints. It may become increasingly difficult to obtain contact prints and enlargements of additional analog photography because of the closure of processing facilities. As of February 2010, the Tennessee Valley Authority still offered the enlargement service that GIS utilized (https://maps.tva.com/Scripts/MetaWeb/map_rial.asp).

More problematic was a misunderstanding between the Kentucky Geological Survey and the Tennessee Valley Authority about the area to be covered. The KGS intended the quarry (the large dark area in the center of Fig. 4) to be reference landmark outside of the photograph frame, not the object of the exercise. We did not realize the photographs encompassed the stone quarry until we received them. It was not possible to replace the prints. The staff of the stone quarry was contacted, and they stated that the quarry opened shortly after 1971 and operated less than ten years. They were not aware of any history of cover-collapse sinkholes induced by dewatering the quarry. The quarry occupies 0.88 km² or 18 percent of the study area. Only one probable cover collapse was found within the quarry area on the 1971 image, and it could not be verified in the field because its location had been mined in 1991. We could not find any obvious pattern that suggested induced sinkhole clustering near the quarry, either in the field or on the photographs. We think the effect of the quarry and the study was negligible beyond the previous loss of study area.

Two of the features of the area, quarry dewatering and highly favorable geology, potentially inflate the population

of cover-collapse features and one of the others, uncounted sinkholes that occurred and then were filled between photographs, possibly deflates the count. Further, if cover collapses occurred during the period between the two photos that we did not find, these would lead us to underestimate the rate of formation. Because of the pure, thick limestone and 60 m of relief within the study area, we think our rate of sinkhole formation should be considered a maximum for application to other areas.

RESULTS

We identified fifty cover-collapse like features that occurred between 1971 and 1991 from the aerial photograph and reports from local residents. The photographic enlargements made possible the identification of the features and their location in the field. The detail of the photographic enlargement was an important factor in the success of the technique.

Also, we physically examined an estimated 90 percent of the study area. Of the fifty possible sites identified on the photographs, thirteen could not be found in the field and there was no evidence of collapse in the vicinity of the feature seen on the photograph. Of the remaining thirty-seven sites, sixteen (43 percent) were correctly identified on the photographs as to origin (whether cover-collapse or not) when located in the field. Fifteen of the cover-collapse sinkholes were accurately identified on the photographs and verified in the field, the remaining collapses were thought some other feature until field checked (Table 1). One cover collapse identified on the 1991 enlargement was also on the 1971 image and was not counted (Table 1). Ultimately, a total of eighteen sites were determined to be cover collapses that occurred within the time frame of the two images.

The primary benefit of the photographic enlargements was they directed us where to focus our field work. The total cover collapses correctly identified from the photographs (36 percent of the total features and 43 percent of the features that could be found in the field) is a useful success rate, but could be expected to improve with experience.

Calculation of the rate of formation of the cover-collapse is subject to the limitations cited above. We excluded the area of the quarry as defined by the property line (Fig. 3) from the rate calculation. The rate of cover-collapse events for the study area is 0.2 km⁻² yr⁻¹

Table 2. Results of inventory and field-verified cover-collapse events between aerial photographs by TVA in 1971 and 1991 (19.9 years).

Area if Quarry Included/Excluded	Count, Cover-Collapse Sites	Inventory Area, km ²	Cover Collapse per Unit Area, km ²	Cover Collapse/Unit Area/Year, km ⁻² yr ⁻¹
Included	18	4.92	3.7	0.18
Excluded	18	4.04	4.5	0.22

(0.6 mi⁻² yr⁻¹; Table 2), which is consistent with some previous studies. Hyatt et al. (1996) reported more than 312 cover collapses in the vicinity of Albany, Georgia, that developed within a 25 km² study area within a week following a tropical storm in July 1994. The density of the features ranged from 0.09 km⁻² to 5.3 km⁻² (0.21 mi⁻² to 13.7 mi⁻²). A follow-up study by Hyatt et al. (1999) is perhaps the most complete descriptive study of cover-collapse sinkholes in the United States to date. We used their data to calculate the occurrence of cover-collapse at 12.5 events per square kilometer over the one week observation period. The minimum annual rate based on the 1994 data would be 0.2 km⁻² yr⁻¹. Beck (1991) reported 0.11 km⁻² yr⁻¹ (0.29 mi⁻² yr⁻¹) in Florida, and Ketelle et al. (1988) reported a range of 0.04 to 0.64 km⁻² yr⁻¹ (0.1 to 1.69 mi⁻² yr⁻¹) in eastern Tennessee. Wilson et al. (1987) reported 0.01 km⁻² yr⁻¹ (0.04 mi⁻² yr⁻¹), also in Florida.

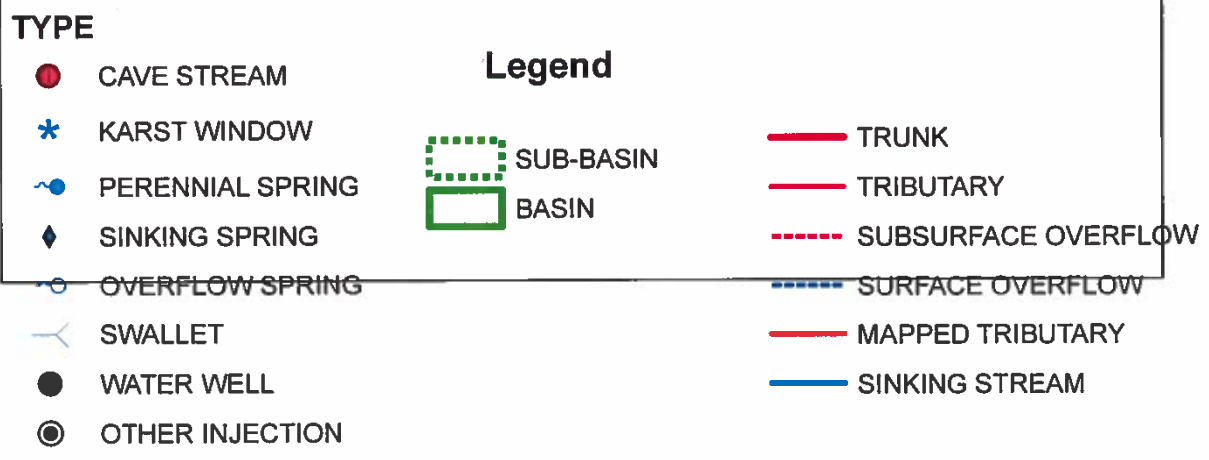
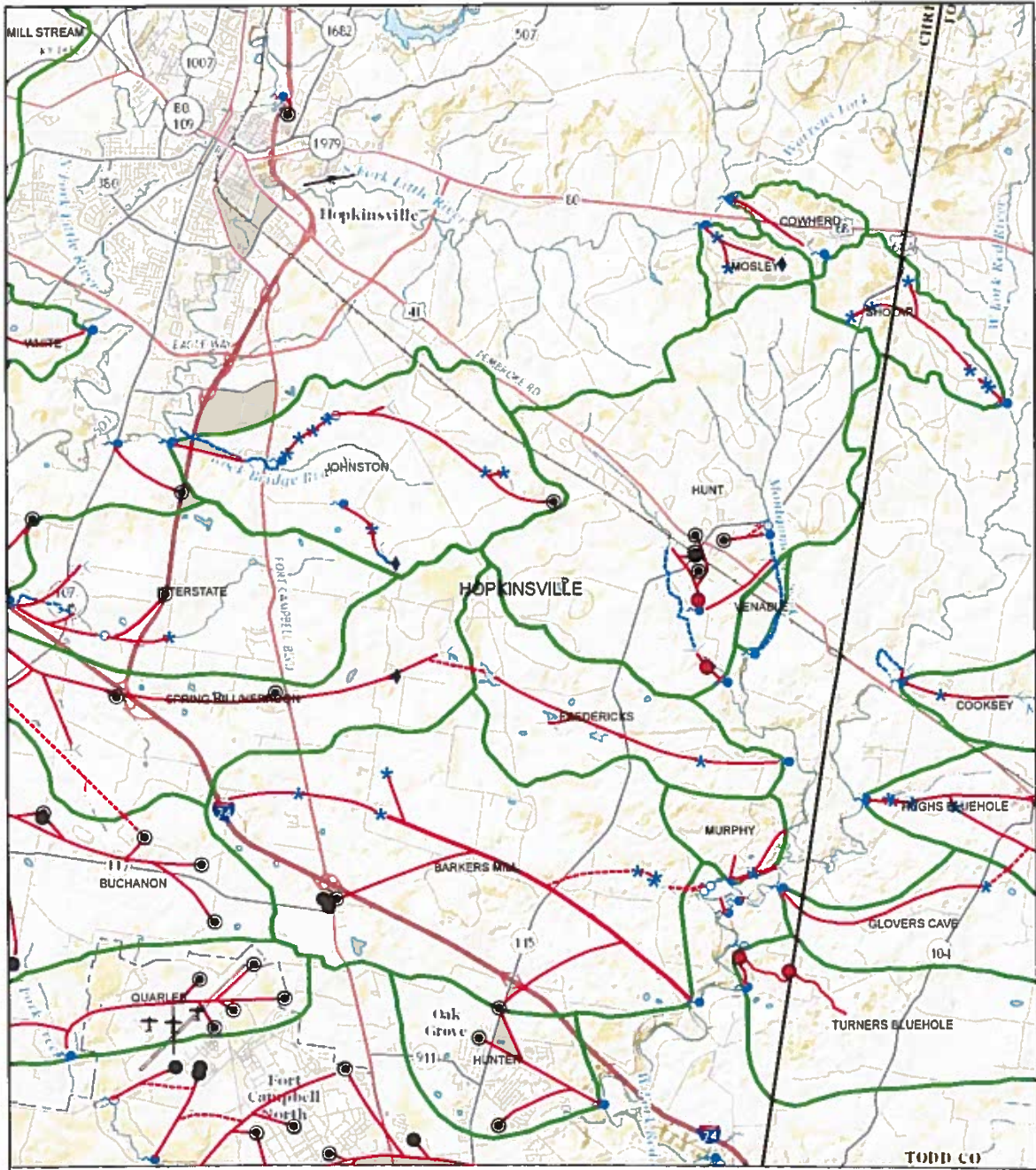
CONCLUSIONS

The use of enlargements of conventional aerial photography to both locate and constrain the date of formation of cover-collapse sinkholes proved practical, inexpensive, and reasonably robust for the sinkhole plain of the Western Kentucky Pennyroyal. Although ground inspection is still needed, field work, regardless of how thorough, can only grossly estimate when an unobserved collapse occurred. The photography-based field inventory was possible because the land use of the study area was dominated by pasture and crop fields. Except for any undiscovered cover-collapse sinkholes that occurred and were filled in the interim between photographs, the method can be categorized as exhaustive.

In the study area, cover collapse occurs at 0.2 km⁻² yr⁻¹ (0.58 mi⁻² yr⁻¹), consistent with most previous studies. Because of the favorable geology of thick, pure carbonates, the rate calculated here should be considered a maximum if applied to other karst areas in Kentucky.

REFERENCES

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Accession A#ID	CaveName	CountyCode	CountyName	Creationdate	DecDegrees	Source	Declar	Declong	EntDepth	EntElev
24-0023	Watts Cave	24	Christian	01/27/2016	36.68417		-87.32889			
24-0028	Lost Cave	24	CHRISTIAN	01/27/2016	36.68484		-87.34740			
24-0030	Turner Cave	24	CHRISTIAN	01/27/2016	36.68589		-87.34920			
24-0060	Twin Level C	24	CHRISTIAN	01/27/2016	36.68607		-87.34066			
24-0001	Buzzard Cave	24	Christian	01/27/2016	36.68917		-87.34417			
24-0060	Twin Level C	24	CHRISTIAN	01/27/2016	36.68993		-87.34431			
24-0042	Gillhams Well	24	CHRISTIAN	01/27/2016	36.69302		-87.40644			
24-0004	Dry Cave	24	Christian	01/27/2016	36.69972		-87.33639			
24-0024	Dry Ford Cave	24	CHRISTIAN	01/27/2016	36.69978		-87.34909			
24-0031	Gates Spring C (approx)	24	CHRISTIAN	01/27/2016	36.70102		-87.35406			
24-0014	Gates Log Jam Swallet (FRO?)	24	CHRISTIAN	01/27/2016	36.70272		-87.36305			
24-0002	Glovers Cave	24	Christian	01/27/2016	36.70278		-87.33139			
24-0011	Cedar Bluff Natural Bridge (F	24	CHRISTIAN	01/27/2016	36.70321		-87.35366			
24-0029	Cedar Bluff Church C (approx)	24	CHRISTIAN	01/27/2016	36.70355		-87.35039			
24-0016	Buzzards Folley Cave	24	Christian	01/27/2016	36.70719		-87.33301			
24-0007	Cambells Cave	24	CHRISTIAN	01/27/2016	36.75696		-87.32747			
24-0048	Hunt Spring C	24	CHRISTIAN	01/27/2016	36.76326		-87.35573			
24-0020	Bonds Cave No. 1	24	CHRISTIAN	01/27/2016	36.78047		-87.32215			
24-0021	Bonds Cave No. 2	24	CHRISTIAN	01/27/2016	36.78051		-87.32169			
24-0006	Cave Spring C	24	CHRISTIAN	01/27/2016	36.83029		-87.30897			
24-0034	Cave Spring Cave	24	Christian	01/27/2016	36.83056		-87.30889			

EntHeight	EntID	EntName	EntQuant	EntWidth	IndicField	IndicQuad	KSS	Lastchecked	Location	Quality	Modificationdate	Modified Time
1	1		1				23				11/13/2016	1:20 PM
1	1		1				28				11/06/2016	1:21 PM
1	1		1				30				11/06/2016	1:21 PM
4	4	Turner Window E	4				60				11/13/2016	1:28 PM
1	1		1				1				11/06/2016	1:21 PM
3	3	Spring Ent	4				60				11/13/2016	1:27 PM
1	1		1				42				11/06/2016	1:21 PM
1	1		1				4				11/06/2016	1:21 PM
1	1		1				24				11/06/2016	1:21 PM
1	1		1				31				11/06/2016	1:21 PM
1	1		1				14				11/06/2016	1:21 PM
1	1		1				2				11/06/2016	1:21 PM
1	1		1				11				11/06/2016	1:21 PM
1	1		1				29				11/06/2016	1:21 PM
1	1		1				16				11/06/2016	1:21 PM
1	1		1				7				11/06/2016	1:21 PM
1	1		1				48				11/06/2016	1:21 PM
1	1		1				20				11/06/2016	1:21 PM
1	1		1				21				11/06/2016	1:21 PM
1	1		1				6				11/13/2016	1:53 PM
1	1		1				34				11/06/2016	1:21 PM

Notes	Directions	Quad	Reported by	Reported Year	SecondName	Whocreated	WhomModified
		TRENTON	GIS	2015	Carnearl's		Howard Kalnitz
		TRENTON	GIS	2015			
		TRENTON	GIS	2015			
		TRENTON	GIS	2015	Double Level Cave		Howard Kalnitz
		TRENTON	GIS	2015			
		TRENTON	GIS	2015	Double Level Cave		Howard Kalnitz
		OAK GROVE	GIS	2015			
		TRENTON	GIS	2015			
		TRENTON	GIS	2015			
		TRENTON	GIS	2015			
		TRENTON	GIS	2015	Bells Cave		
		TRENTON	GIS	2015			
		TRENTON	GIS	2015			
		TRENTON	GIS	2015			
		PEMBROKE	GIS	2015	williams, cambel		
		PEMBROKE	GIS	2015			
		PEMBROKE	GIS	2015			
		PEMBROKE	GIS	2015			
		PEMBROKE	GIS	2015	Jeff davis Cave		Howard Kalnitz
		PEMBROKE	GIS	2015			

1-1

11

Gilley, Andy

From: Schnepf, Marcus J (KSP) <marcusj.schnepf@ky.gov>
Sent: Wednesday, April 05, 2017 10:35 AM
To: McKenzie, Shane (KYTC)
Cc: Schnepf, Marcus J (KSP)
Subject: Pembroke Planning Study, Christian County Item No.2-381.00

After review of the documents that I received and a physical review of the area in question it appears, in my opinion, that all of the concepts discussed should be put in place.

KY 115 is a single "A" highway (44,000 lbs.) that will need to be upgraded to a triple "AAA" highway (80,000 lbs.) due to the increase in heavy truck traffic that is expected. At the present time KY115 is not suitable to handle this type of traffic as seen in numerous collisions that have occurred due to the condition of the roadway.

The U.S.41 / KY115 intersection will need improvements due to the increase in traffic and to allow better traffic flow in a congested area. I would recommend "Concept B1" be put in place. By using this concept it may avoid the need to widen U.S.41 and will eliminate some truck traffic at the original intersection of U.S.41 and KY 115 in the limits of Pembroke.

Capt. Marc Schnepf, Commander
Kentucky State Police
Commercial Vehicle Enforcement Division
Region 1 / Henderson KY
Office # (270) 831-9888

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MAR 24 2017

Div. of Planning



Matthew G. Bevin
Governor

KENTUCKY STATE POLICE
919 VERSAILLES ROAD
FRANKFORT, KY 40601
www.kentuckystatepolice.org

John Tilley
Cabinet Secretary

Richard Sanders
Commissioner

March 21, 2017

Kentucky State Police
Post 2 - Madisonville
P.O. Box 1025
Nortonville, Kentucky 42442

Mr. Shane McKenzie, P.E.
Kentucky Transportation Cabinet
Division of Planning
200 Mero Street, 5th Floor West
Frankfort, Kentucky 40622

RE: Pembroke Planning Study
Christian County
Item # 2-381.00

Dear Mr. McKenzie,

I am in receipt of your letter dated March 14, 2017, and have reviewed the project information material you provided as it pertains to the Pembroke Planning Study in Christian County (2-381.000). The Madisonville Post makes no negative comments as it pertains to the purpose and need for this project. Conversely, we believe this project will improve motorists' safety on KY 115 north of Interstate 24 as this route progresses to the Pembroke community.

In December of 2014, KY 115 was added to our Post's Data Driven Enforcement Program (DDEP) list of targeted enforcement areas. This area was studied by Post 2 personnel and determined to be a high collision area worthy of increased patrol emphasis. It was also noted at the time this roadway was in fact very narrow for the amount of traffic volume it experienced; however, our Post did not feel as though it rose to the level of a traffic engineering deficiency at that time.

Our DDEP program locations are based on the previous 90 days' worth of data as it pertains to high crash areas. In this case, it simply meant prior to December of 2014, this roadway was particularly noteworthy due to crash/collision statistics. KY 115 has remained a DDEP designated area ever since; thus, the crash/collision data has supported for this location to remain in the program.

This designation further directs sworn Troopers of our Post to patrol this area in addition to the top 3 collision and top 2 crime areas, in the county, on a consistent basis. In other words, this designation allows our Troopers to know there is a problem in this part of the county, and to focus their enforcement efforts in this location.

Page 2
Business Letter
March 21, 2017

For perspective, there are currently 12 DDEP targeted areas in Christian County, which underscores KY 115 as one of the 9 most dangerous roadways in Christian County in terms of crashes/collisions. The other three areas are noted because of criminal activity.

We respectfully submit the improvements scheduled in this project with respect to widening the roadway surface and improving the intersection of US 41 and KY 115 by updating turn lanes and signaling to current standards are wise investments toward improving the safe and efficient traffic on this route. If the Kentucky State Police can ever assist you again in the future, please do not hesitate to contact us.

Sincerely yours,



Captain Brent White
Commander, Post 2 - Madisonville

cobw0002

cc: Mr. Wade Clements
Mr. John Moore

City of Pembroke
P.O. Box 162 Pembroke, Kentucky 42266

Phone: 270-475-4343
E-mail: Pembroke@mchsi.com

Fax: 270-475-9766
Website: [Http://www.PembrokeKY.com](http://www.PembrokeKY.com)

Judy R. Peterson, Mayor
David Rule, Mayor Pro Tem

Rachel Chadwick, City Clerk
Todd Darnell, Deputy City Clerk

March 27, 2017

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APR 03 2017

Div. of Planning

Shane McKenzie, P.E.
Kentucky Transportation Cabinet
Division of Planning
200 Mero Street, 5th Floor West
Frankfort, KY 40622

Dear Mr. McKenzie:

Subject: Pembroke Planning Study
Christian County
Item No. 2-381.00

Thank you for the opportunity to comment on the proposed project. The information that you provided was helpful to visualize the proposed concepts for the widening of KY 115, US 41/KY 115 intersection, widening US 41, and/or the three (3) connectors.

As shown in the attachments, KY 115 is narrow, has sight line problems and a bridge that is too narrow for two (2) way traffic. This being said, I believe that KY 115, from Carneal Lane north of I-24 to north of Mason Lane needs to be widened and the bridge replaced for the safety of car and truck traffic. I believe that widening the road needs to be done whether or not a connector route is implemented.

The intersection of US 41 and KY 115 is challenging for trucks to make the turn from KY 115 onto US 41 as well as turning from US 41 unto KY 115. The turning radius are too tight and as you are proposing both KY 115 and US 41 need to widen to make it easier to make the turns.

I believe that repairing KY 115, replacing the bridge and the reconfiguring the intersection at KY 115 and US 41 are the most needed projects for you to consider. There are trucks that come from I-24 and come into the City and make right or left hand turns at the intersection. If one (1) of the connector roads are constructed, trucks will still be coming through Pembroke and the challenges of the intersection will still be there unless the challenges are eliminated.

The area between I-24 and the City and areas along US 41 are farm lands. Year around KY 115 and US 41 are used by the farmers to bring their wheat and oats to the feed mill. During the growing season, farmers drive their big farm equipment on these roads. With KY 115 being narrow it is difficult and sometimes almost impossible to have two (2) way traffic. Many time's I

1

have had to pull over to the side of the road, almost into the ditch, so they could get past. This is a safety issue and the only solution is to widen the road.

Even if one (1) of the connector routes is used the problems will still exist on KY 115 and at the intersection of KY 115 and US 41. I believe these issues must be resolved.

I feel there are problems with the connector routes. Farmers do not like to lose their land. With the reduction of the amount of land they have it will decrease the amount of crops they can produce. If the connectors cut across part of their land they will have probably have problems going from one (1) side of the road to the other with their equipment.

Thank you again for the opportunity to comment on these proposed project(s). I strongly feel that the widening of KY 115 and correction the turning radius at the intersection of US 41 and KY 115 would be the most beneficial to people traveling through this area.

Respectfully,



Rachel Chadwick, City Clerk

Gilley, Andy

From: McKenzie, Shane (KYTC) <Shane.McKenzie@ky.gov>
Sent: Tuesday, March 21, 2017 10:51 AM
To: Russell, Jason
Cc: Hall, Nick S (KYTC-D02); Gilley, Andy
Subject: RE: Pembroke Planning Study - Christian Co.

Dear Mr. Russell,

Thank you for your feedback on this project. Your comments are important and will become part of the record.

To answer your question in your below email about how long concept – C KY 115 widening would take to complete. Here is an offering of the long answer:

At this time, widening KY 115 is developed in part as a concept solution to address the purpose and need documented in the study. If widening KY 115 becomes a viable alternative project through this study process, it would be added to a statewide database of projects. Every two years the database is prioritized based on project need. Projects with the greatest need compete for funding on the Six Year State Highway Plan. The Highway Plan is vetted through our legislature before becoming law. Even for a viably funded project, the entire process can sometimes take up to 10 years.

Please let me know if you have any questions or concerns.

Thank you,

SHANE MCKENZIE, P.E.
Transportation Engineer II



DIVISION OF PLANNING ~ STRATEGIC CORRIDOR

200 Mero Street, 5th Floor West

Frankfort, KY 40622

Phone: (502) 782-5070

Fax: (502) 564-2865

Shane.McKenzie@ky.gov



From: Russell, Jason
Sent: Monday, March 20, 2017 3:17 PM
To: Shane.McKenzie@ky.gov.
Subject: Pembroke Planning Study - Christian Co.

Mr. McKenzie, my name is Jason Russell. I am the assistant principal at Pembroke Elementary School. My principal has given me the task of responding to the planning study that you all sent us. From what we have read and understand we are in favor of Concepts B1, B2, and B3. The idea of an elevated railroad bridge is much needed. This would allow faster access for first responders if a train were on the tracks. A train is constantly blocking access to the city of Pembroke on a daily basis. This is due to the expansion of the railroad business and the new fueling center/ exchange that was built a

few years ago. We do have a question in regards to the expansion of highway 115. How long would this project take to complete?

CITY OF PEMBROKE
P.O. BOX 162 PEMBROKE, KENTUCKY 42266

Judy R. Peterson, Mayor
David Rule, Mayor Pro Tem

Rachel Chadwick, City Clerk
Todd Darnell, Deputy City Clerk

Phone: 270-475-4343
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Website: [Http://www.PembrokeKY.com](http://www.PembrokeKY.com)

March 28, 2017

Shane McKenzie, P.E.
Ky. Transportation Cabinet
Division of Planning
200 Mero Street, 5th Floor West
Frankfort, Ky. 40622

RE: Pembroke Planning Study
Item No. 2-381-00

Dear Mr. McKenzie:

The City of Pembroke is appreciative to the Ky. Transportation Cabinet for your concern as to the security of our people and area residents in southern Christian County. I have carefully screened your needs statement, study areas, data, concepts, and descriptions. I have also talked to citizens and carefully studied the areas involved in this endeavor. I have outlined below my opinion on this project.

The City of Pembroke is growing and with that movement, traffic flow has become a major issue! In order for our city to maintain its beauty and attraction, we must have movement of traffic, but at the same time, we must present our city to people as a small, attractive community. As we need to expand and update our routing, we must also preserve our heritage. The safety of our community and citizens traveling on KY.115 should be the first concern of the State.

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APR 03 2017

Div. of Planning

Issues or concerns for this project would be first the accident rate and safety concerns on the existing road, KY115. The only way to address this would be 3-4 lanes running from Interstate 24 to Pembroke. This is one of the most dangerous and traveled roads in our area. This road serves as a direct conduit between our community and Ft. Campbell Military Base. Many of our citizens travel the road daily and they voice their concern to officials of the dangers confronted on that road. Statistics support this. This should be our first concern – the widening of Ky.115!

Also the concerns of our community and farm area should be a consideration in this project. The community wants to be a progressive and growing community. In expanding KY.115 into our town along with the widening US 41 and widening US 41-Ky 115 intersection, we may maintain our community and our agriculture integrity.

The City of Pembroke plans to grow in coming years by expanding our city limits, strengthening infra-structure and meeting the needs and concerns of its citizens. The State of Kentucky and the Transportation Cabinet are an important part of the growth and we appreciate what this Cabinet has done in the past and look forward to working with them in the future.

There are no known areas, issues or reasons within the project area if the previously mentioned project concepts are followed. If the Bypass concepts are developed there are unknown issues such as cemeteries, water flow, conservation issues which could arise.

The intensity of stress and concern on the citizens and surrounding area would be greatly reduced if you chose to widen KY 115, expand US 41 and KY 115/US 41 Intersection Improvements. The Pembroke Connector is going to effect agriculture land owned by families in the area and will be a greater expense that could be avoided.

With the above information and that gathered by your personnel, I feel in the best interest of our community and its citizens that the following be priority of this project:

1. KY 115 Widening Concept C-1/C-4
2. Widening of US41 Concept A-1
3. US41 and KY115 Intersection Improvement Concept A-1
4. Pembroke Connector Concept B-3

In today's time when budgets are scrutinized and funds are limited, officials must look at funds which are available and will be available in the near future. This project should not be delayed 10-15 years but should be planned and implemented within two years. I feel that funding and time scheduling should be a consideration in this project.

As stated earlier, KY 115 is an immediate danger to our citizens and must be addressed now! This improvement cannot wait for the construction of a bypass or the improvement to an existing road. This is an emergency situation and must have attention now!

Thank you for your consideration in this matter.

Sincerely,



Judy R. Peterson

Mayor

City of Pembroke, Ky.

From: [Poore, John \(EEC\)](#)
To: [McKenzie, Shane \(KYTC\)](#)
Cc: [Maybriar, Jon \(EEC\)](#); [Winner, Edward J \(EEC\)](#); [Anderson, Danny J \(EEC\)](#); [Hughes, Larry \(EEC\)](#); [Webb, April \(EEC\)](#); [Terry, Lori \(EEC\)](#)
Subject: Pembroke Planning Study, Christian County, Item No. 2-381.00
Date: Wednesday, April 05, 2017 4:26:26 PM
Attachments: [FW Comments on Pembroke Planning Study Christian County.msg](#)
[FW Comments on Pembroke Planning Study Christian County.msg](#)
[FW Comments on Pembroke Planning Study Christian County.msg](#)

Mr. Shane McKenzie, P.E.

Attached are comments from the KY Division of Waste Management regarding the proposed project.

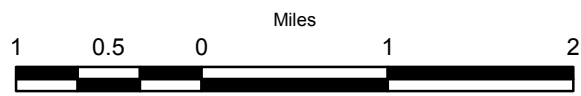
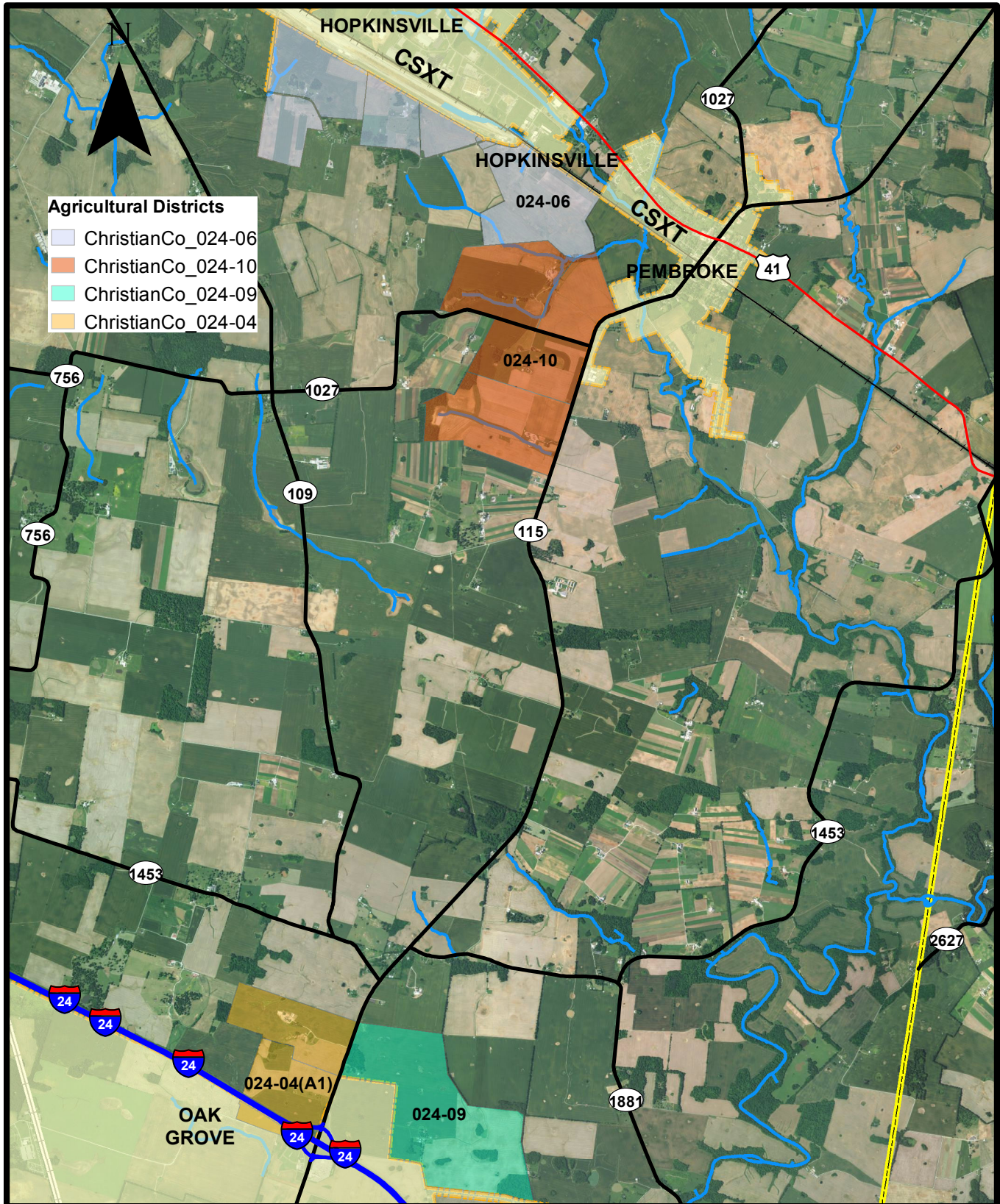
In addition there is an old city landfill near the west side of Hailes Avenue and Dewey St./City Dump Rd. near the study area.

The information provided is based on those facilities or sites that KDWM currently has in its database. If you would like additional information on any of these facilities or sites, you may contact the file room custodian at (502) 782-6357. Please keep in mind additional locations of releases, potential contamination or waste facilities may be present but unknown to the agency. Therefore, it is recommended that appropriate precautions be taken during construction activities. Please report any evidence of illegal waste disposal facilities and releases of hazardous substances, pollutants, contaminants or petroleum to the 24-hour Environmental Response Team at 1-800-928-2380.

Please contact me if you have any questions.

John Poore, P.E., P.G.
Environmental Engineer Consultant
Director's Office
KY Division of Waste Management
Phone: (502) 782-6736 direct or (502) 564-6716
john.poore@ky.gov

Pembroke Planning Study Christian County, KY



From: [Richardson, Kimberly \(EEC\)](#)
To: [McKenzie, Shane \(KYTC\)](#)
Cc: [Davis, Mark J \(EEC\)](#)
Subject: Response to Pembroke Planning Study
Date: Friday, April 07, 2017 4:14:26 PM
Attachments: [Letter to KY DOT- Pembroke Planning Study.pdf](#)
[Pembroke Planning Study 2017.pdf](#)

Kimberly Richardson, Director
KY Division of Conservation
300 Sower Blvd.
Frankfort, KY 40601
502-782-6849 phone

Commonwealth of Kentucky

HOUSE OF REPRESENTATIVES

MYRON DOSSETT
7155 Salubria Springs Road
Pembroke, Kentucky 42266
Home: 270.475.9503
State Message Line:
800.372.7181



Legislative District 9

STATE REPRESENTATIVE
Room 424D, Capitol Annex
Frankfort, Kentucky 40601
502.564.8100 EXT. 657
Fax: 502.564.1820
email: myron.dossett@lrc.ky.gov

March 21, 2017

RECEIVED

MAR 23 2017

Div. of Planning

Mr. Shane McKenzie, P.E.
Transportation Cabinet
Department of Highways
200 Mero Street
Frankfort, Kentucky 40622

Dear Mr. McKenzie:

I would like to thank you for allowing individuals from Christian County and the Pembroke community the opportunity to share their input concerning future highway upgrades in our area.

As we move forward on the planning for these upgrades, I do want to emphasize my desire that Concept C, the widening of KY115, be the priority project before we look at other concepts that would put more traffic on that particular highway. There have been more than 600 reported accidents on KY115 that have taken place since 2002, five of which were fatalities. By placing more traffic on this highway, it may increase the potential for more accidents, more people at risk. Since Pembroke is my hometown and because I have friends and family who use this highway daily, the project for widening KY115 is my personal priority.

Projects A1, A-I, and B are ideas for which I must see the actual proposed layouts to see how property owners might be impacted on each proposed project.

After reading the proposal which is shared in the planning study for Concept B--Pembroke Connector--I believe it is important to relay that there are two cemeteries located adjacent to or near the railroad right-of-way, both of which I have been personally aware of since I was a child. I believe that the proposed path for the connector road is very near both cemeteries. These cemeteries are in secluded areas, and few people, other than those who live here locally, are aware of their locations.

Mr. Shane McKenzie
Page 2
March 21, 2017

Once again, I wish to thank you for the opportunity to share our viewpoints on these proposals, and I look forward to working with the Transportation Cabinet as we move forward.

Sincerely,

A handwritten signature in black ink, appearing to read "Myron Dossett", with a long horizontal flourish extending to the right.

Myron Dossett
State Representative
9th District

MD/sh



CABINET FOR ECONOMIC DEVELOPMENT

Matthew G. Bevin
Governor

Old Capitol Annex
300 West Broadway
Frankfort, Kentucky 40601
ThinkKentucky.com

Terry R. Gill, Jr.
Secretary

Mr. John Moore, P.E.
Director / Division of Planning
Commonwealth of Kentucky
Transportation Cabinet
200 Metro Street
Frankfort, KY 40622

Dear Mr. Moore:

Subject: Pembroke Planning Study
Christian County
Item No. 2-381.00

In response to your request to the Kentucky Cabinet for Economic Development regarding the Pembroke Planning Study in Christian County, we submit the following feedback providing comments below.

These proposed improvements impact a multitude of industrial park sites in the immediate area, with the majority of traffic using the SR 115 / US 41 intersection to access I-24. Specifically, site 047-005 and site 047-026 are virtually adjacent to the intersection. (Links to sites on Select Kentucky web site: <http://www.thinkkentucky.com/edis/PDF/Site/SM047-005.pdf> , <http://www.thinkkentucky.com/edis/PDF/Site/SM047-026.pdf>)

These two sites alone currently have 10 or more active industrial facilities and an additional 766 acres immediately available for industrial expansion.

Improvements made to this corridor will have a positive effect on the economic growth in the area and within the multitude of industrial parks in the area by decreasing traffic hazards, bottlenecks and accidents, as well as attracting future industry. However, during the construction and improvement phase there will be an impact to the industrial traffic in and out of the industrial parks as well. Allowing adequate and efficient traffic flow for industrial-related traffic will be necessary during time of construction and improvements. The Cabinet is not aware of environmental or conservation issues or concerns regarding the redevelopment area.

Thank you for including the Kentucky Cabinet for Economic Development with your concerns of the Pembroke Planning Study.

Sincerely,

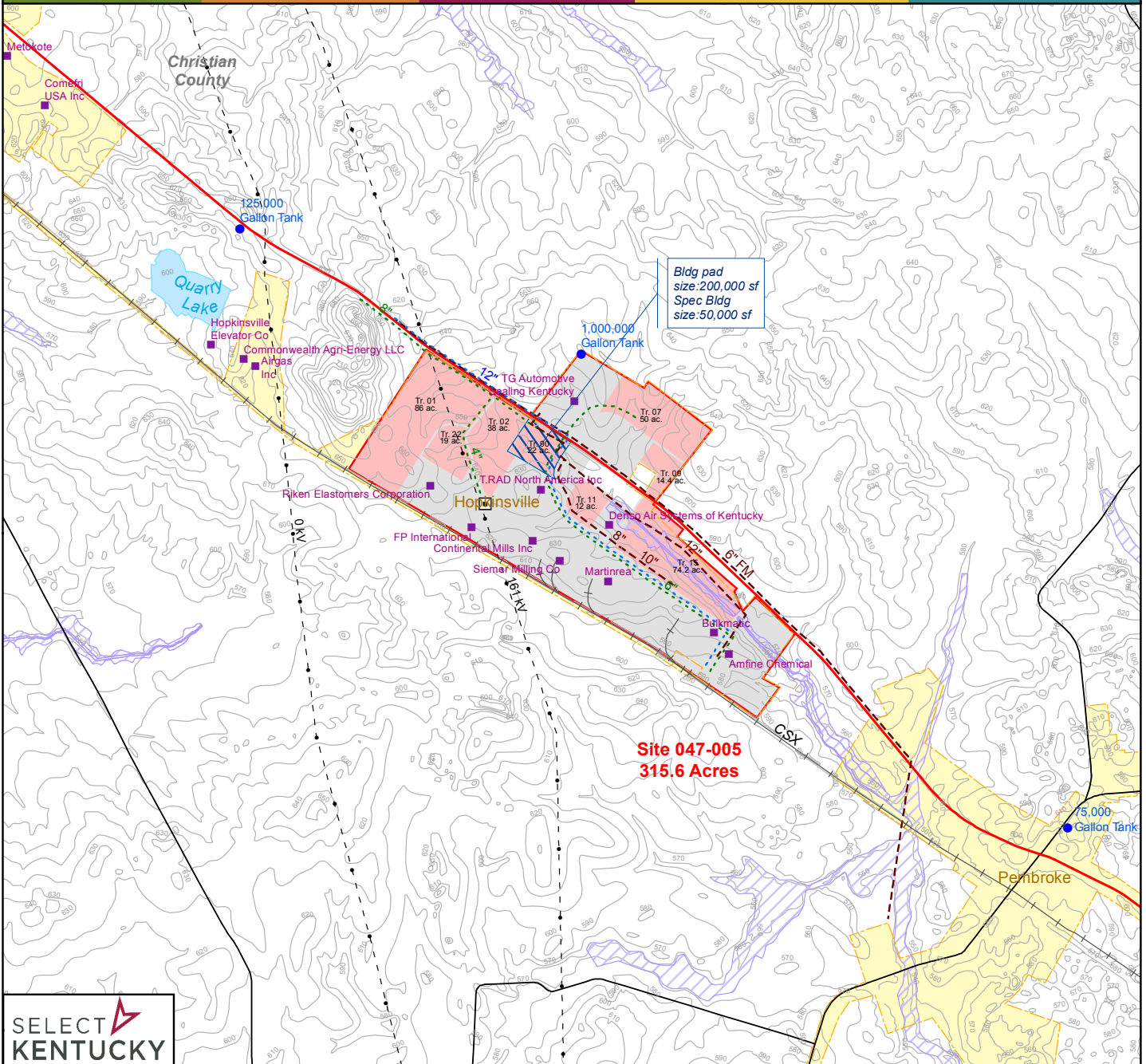
Mandy Lambert

Commissioner of Business Development

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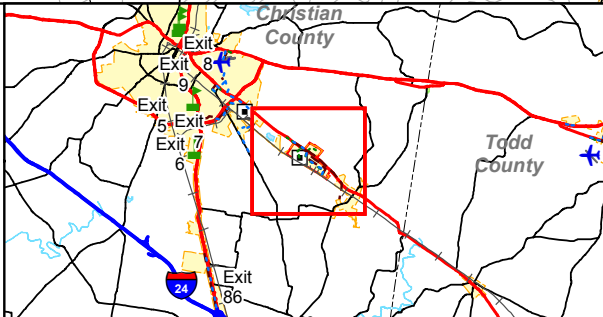
APR 17 2017

Div. of Planning

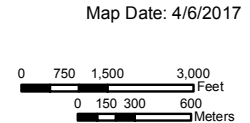


SELECT KENTUCKY

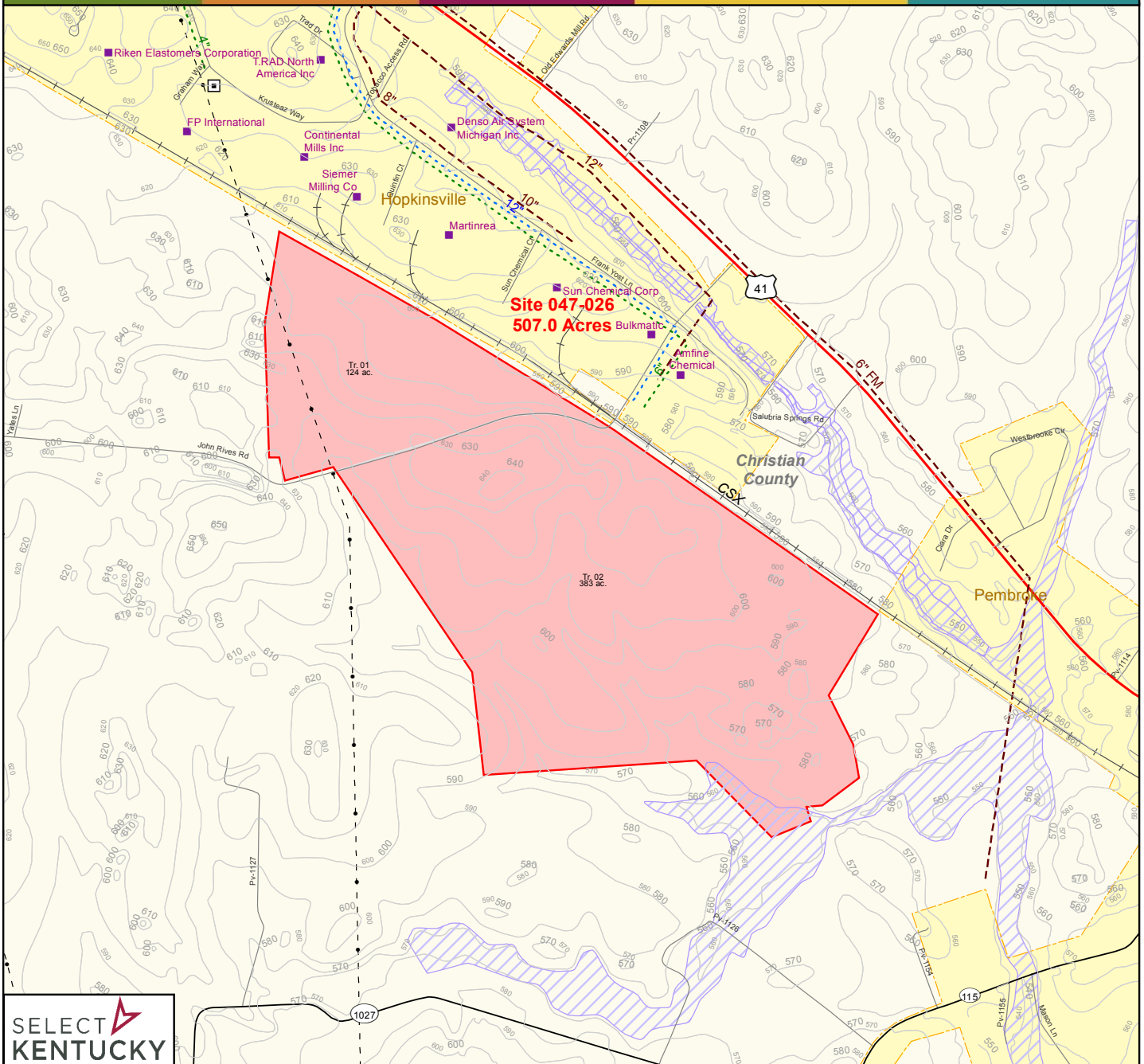
- Existing Industry
- Vacant Tract
- Rail
- Occupied Tract
- Water Tank
- Other Uses
- Water Line
- Municipal Area
- Sewer Line
- County Area
- Gas Line
- Substation
- US Highway
- State Road
- Electric Transmission Line
- Municipal Boundary
- 100 Year Flood Zone
- Elevation Contour
- Shovel Ready Site Boundary
- Build-ready Tract



Hopkinsville Community Map



All information regarding property is from sources deemed reliable, but no warranty or representation is made by the Commonwealth of Kentucky or any of its agencies as to its accuracy. It is subject to errors, omissions, change of price, prior sale, lease or withdrawal without our knowledge. Further, no warranty or representation is made as to the environmental suitability or condition of the property.



- Existing Industry
- Rail
- Water Line
- Sewer Line
- Gas Line
- Substation
- US Highway
- State Road
- Local Road
- Electric Transmission Line
- Municipal Boundary
- 100 Year Flood Zone
- Elevation Contour
- Shovel Ready Site Boundary
- Vacant Tract
- Municipal Area
- County Area

SITE ID/NAME: Site 047-026, Hopkinsville -- Commerce Industrial Park #2
SITE SIZE: 507.0 Acres, 155.0001 hectares
LOCATION: Adjacent to city limits of Hopkinsville
ZONING: Not zoned
HIGHWAY ACCESS: I-24 interchange 9.0 miles south of park; Edward T. Breathitt Pennyriple Parkway interchange 4.2 miles northwest of park
NEAREST AIRPORT: Nashville International Airport 71 miles southeast of Hopkinsville
RAIL: CSX Corporation adjacent to northern edge of site
WATER: Hopkinsville Water Environment Authority
SEWER: Hopkinsville Water Environment Authority
ELECTRIC: Pennyriple RECC
GAS: Atmos Energy Corporation
BROADBAND: Cable: Hopkinsville Electric System, Mediacom; DSL: AT&T
FLOOD DATA: Portion of site is in 100-year flood plain
OWNER: Optimized by Hopkinsville/Christian Co Economic Development Council
PRICE PER ACRE: \$25,000
DATASHEET: <http://www.thinkkentucky.com/edis/Sites/SiteProfile.aspx?SiteID=047-026>
Lat/Long: 36.78504, -87.38140

Map Date: 10/13/2015

0 250 500 1,000 Feet
 0 150 300 Meters



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MATTHEW G. BEVIN
GOVERNOR

CHARLES G. SNAVELY
SECRETARY

**ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR NATURAL RESOURCES**

ALLEN LUTTRELL
COMMISSIONER

300 SOWER BOULEVARD
FRANKFORT, KENTUCKY 40601
TELEPHONE: 502-564-6940
TELEFAX: 502-564-4245

Shane McKenzie, P.E.
Kentucky Transportation Cabinet
Division of Planning
200 Mero Street
5th Floor West
Frankfort, Ky 40622

Dear Mr. McKenzie:

Subject: Pembroke Planning Study
Christian County
Item No. 2-381.00

As requested, the Division of Conservation has reviewed the planning study to determine potential impacts of improvements to the existing transportation corridor to and from Commerce Industrial Park and I-24 near Pembroke, Kentucky. We would like to provide the following comments that may be helpful in the initial scoping process.

There are no PACE, (Purchase of Agricultural Conservation Easements) within or near the study area. However, there are portions of four agricultural districts located within or adjacent to the study area, 024-04(A1), 024-06, 024-09, and 024-10. Under KRS 262.850 (12), state agencies must mitigate any impact their programs may have on land enrolled in an agricultural district. Included is a map indicating the location of the four districts. ArcMap shape files can also be sent if requested for this study.

One other concern we would like to comment on is the control of erosion and sedimentation, during and after earth disturbing activities, if any the proposed improvements proceed to construction phase. We recommend Best Management Practices, BMP's, be utilized to prevent nonpoint source water pollution. This would protect the water quality and aquatic habitat of any perennial or intermittent streams construction activities could impact.

Mr. Shane McKenzie

Page 2

April 7, 2017

We appreciate the opportunity to comment on this study and if you have any questions, please contact this office anytime.

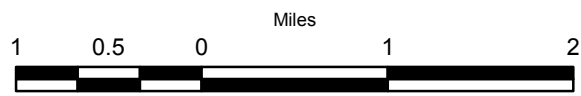
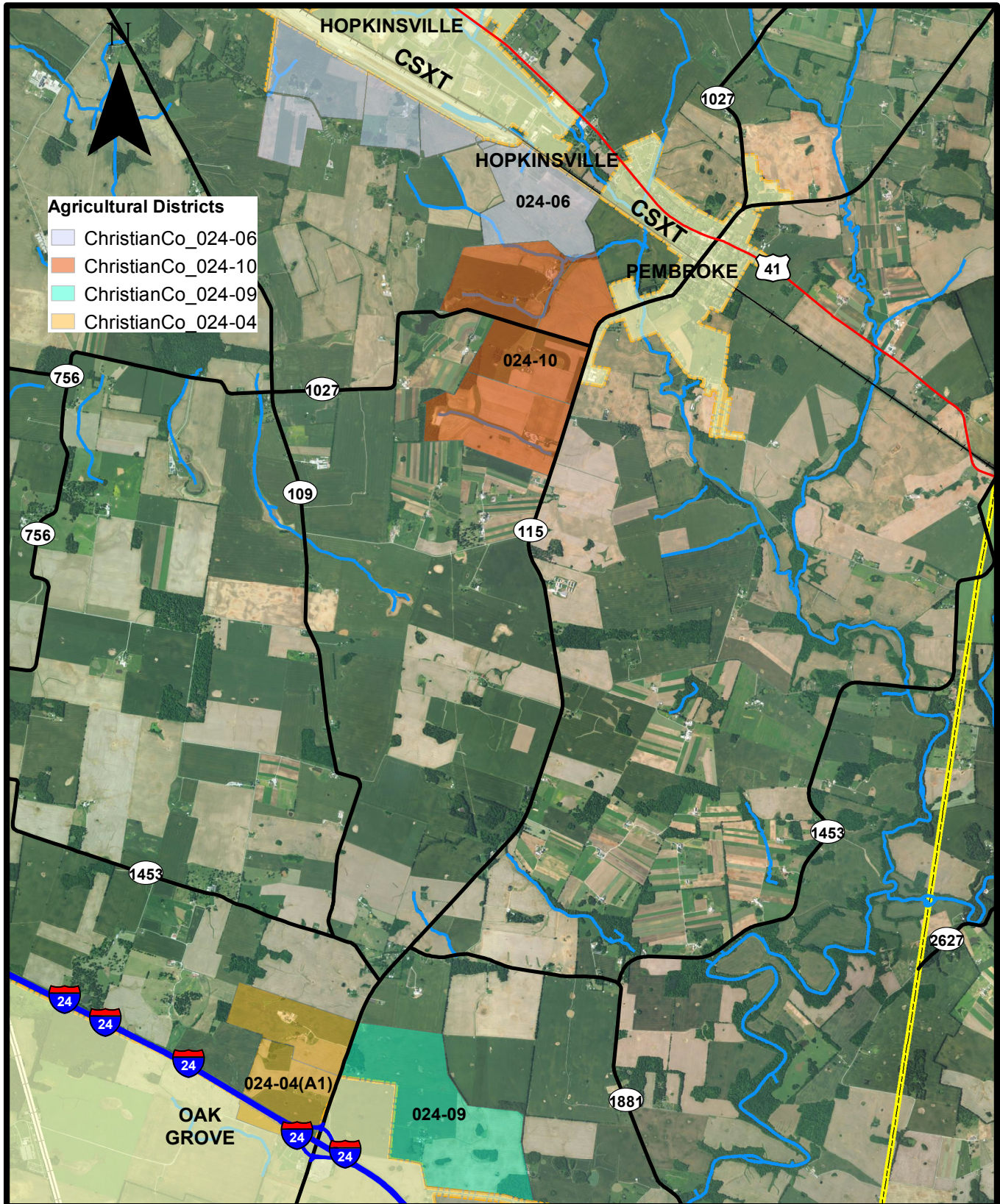
Sincerely

A handwritten signature in black ink that reads "Kimberly Richardson". The script is cursive and elegant, with the first letters of each word being capitalized and prominent.

Kimberly Richardson, Director
Kentucky Division of Conservation

KR/MD/cc

Pembroke Planning Study Christian County, KY



Gilley, Andy

From: Hughes, Larry (EEC) <Larry.Hughes@ky.gov>
Sent: Thursday, March 30, 2017 9:56 AM
To: Poore, John (EEC)
Subject: FW: Comments on Pembroke Planning Study Christian County
Attachments: I-24 Study.pdf; I-24SFB.xlsx

Here you go John.



From: Cary, Brent C (EEC)
Sent: Thursday, March 30, 2017 9:46 AM
To: Hall, Clifford (EEC) <Clifford.Hall@ky.gov>; Hancock, Nathan (EEC) <Nathan.Hancock@ky.gov>
Cc: Hughes, Larry (EEC) <Larry.Hughes@ky.gov>
Subject: RE: Comments on Pembroke Planning Study Christian County

Gentlemen,

I exported two sites that are near or in the study area.

AI 7078 Barker Family Drums closed Option C in 2005
AI 752 Amfine Chemical Corp which is still active at this time and may pose a concern. Not sure who the PM is.

Thanks

Brent Cary

Geologist III P.G. 162898
Environmental Response Team NR#33
Department for Environmental Protection
Division of Waste Management
Superfund Branch State Section
300 Sower Blvd 2nd Floor
Frankfort, KY 40601

brent.cary@ky.gov

Phone: (502) 782-6574

Fax: (502) 564-4245

Environmental Emergency, 24-hour, (502) 564-2380 or (800) 928-2380 This e-mail is intended solely for the person or entity to which it is addressed and may contain confidential and/or privileged information. Any review, dissemination,

copying, printing or other use of this e-mail by persons or entities other than the addressee is prohibited. If you have received this e-mail in error, please contact the sender immediately and delete the material from any computer



From: Hall, Clifford (EEC)
Sent: Thursday, March 30, 2017 8:55 AM
To: Cary, Brent C (EEC) <Brent.Cary@ky.gov>; Hancock, Nathan (EEC) <Nathan.Hancock@ky.gov>
Cc: Hughes, Larry (EEC) <Larry.Hughes@ky.gov>
Subject: RE: Comments on Pembroke Planning Study Christian County

I would think Brent or Nate would know the best tricks to get the job done. Surprising number of AIs in this little area, not sure if any are superfund.

Brent since you are in today would you do a search of the work/study area and give John Poore a list including locations of our sites and determine if they present any potential obstacles to the road project.

From: Hughes, Larry (EEC)
Sent: Thursday, March 30, 2017 8:40 AM
To: Hall, Clifford (EEC) <Clifford.Hall@ky.gov>
Subject: FW: Comments on Pembroke Planning Study Christian County

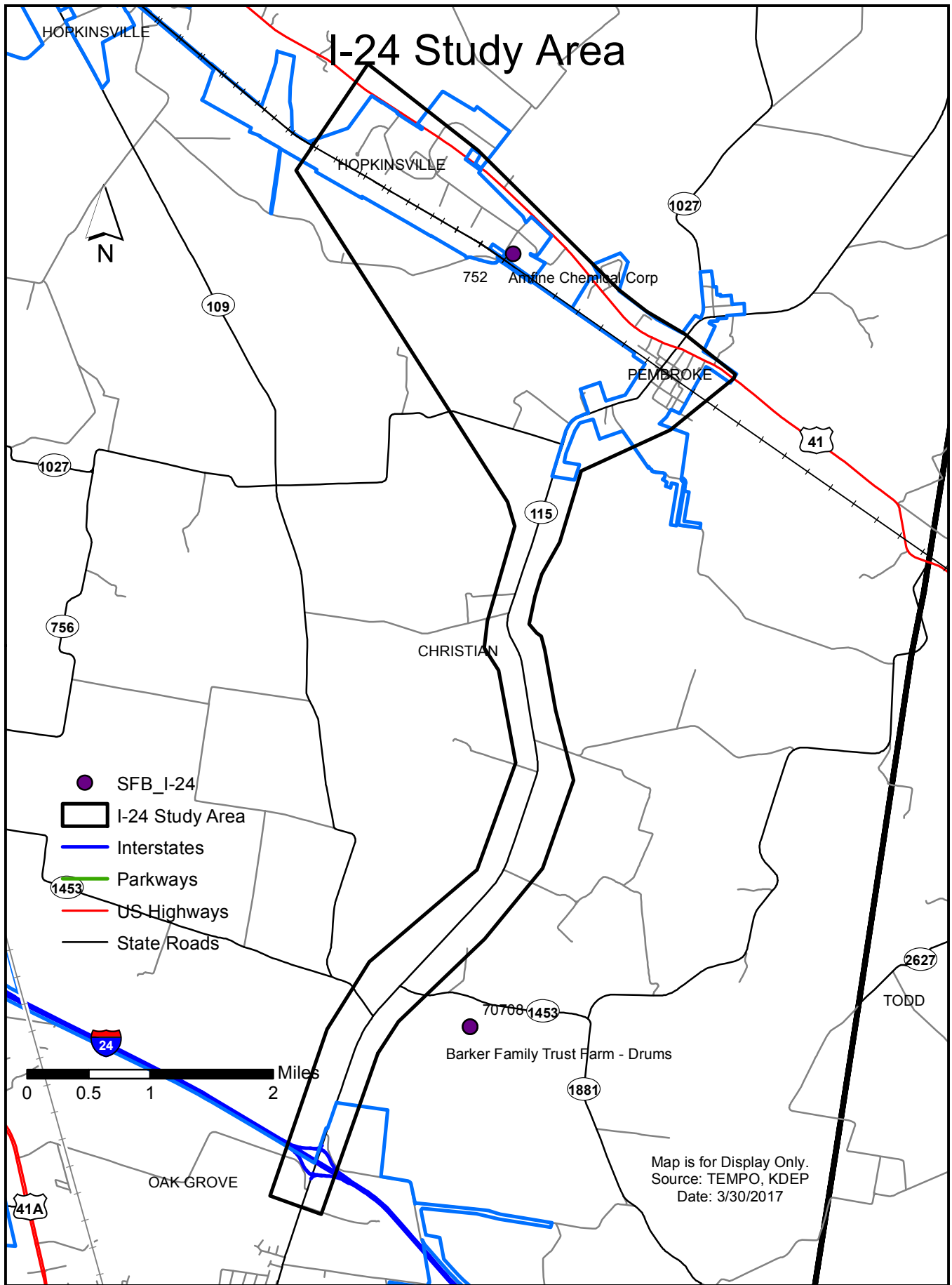
Was it Brent or Nate that looks at these? It's been a while since we had one come through.

From: Poore, John (EEC)
Sent: Tuesday, March 21, 2017 10:01 AM
To: Hughes, Larry (EEC) <Larry.Hughes@ky.gov>; Webb, April (EEC) <April.Webb@ky.gov>; Terry, Lori (EEC) <Lori.Terry@ky.gov>
Cc: Maybriar, Jon (EEC) <Jon.Maybriar@ky.gov>; Winner, Edward J (EEC) <Edward.Winner@ky.gov>; Hubbard, Tim (EEC) <Tim.Hubbard@ky.gov>
Subject: Comments on Pembroke Planning Study Christian County

I have attached a copy of the above referenced study information from the Transportation Cabinet and would like any comments you have from your respective branches. Please let me know about any known UST, Haz-waste or Superfund sites which may impact the study area including and in addition to any shown on the map with any comments. If you could get back to me with your comments by Friday, March 31 it would be greatly appreciated. I was informed that George Gilbert used to do this so you may already be familiar with the process. Please let me know if you have any questions. Thanks!

John

John Poore, P.E., P.G.
Environmental Engineer Consultant
Director's Office
KY Division of Waste Management
Phone: (502) 782-6736 direct or (502) 564-6716
john.poore@ky.gov



MASTER_AI	MASTER_AI1	SUBJECT_IT	SUBJECT__1	SITE_STATU	CLOSURE_OP	CLOSURE_DA	LAT_LONG_S	LONGITUDE	LATITUDE
752	Amfine Chemical Corp	2	chemical release	Active			SI	-87.37799200	36.78912800
70708	Barker Family Trust Farm - Drums	1	Barker Farm Drums	Closed	Option C Restored	8/18/2005	SI	-87.38236100	36.69808300
70708	Barker Family Trust Farm - Drums	2	Barker Family Trust Drums	Closed	Option C Restored	8/19/2005	SI	-87.38236100	36.69808300

Gilley, Andy

From: Poore, John (EEC) <John.Poore@ky.gov>
Sent: Wednesday, April 05, 2017 4:26 PM
To: McKenzie, Shane (KYTC)
Cc: Maybriar, Jon (EEC); Winner, Edward J (EEC); Anderson, Danny J (EEC); Hughes, Larry (EEC); Webb, April (EEC); Terry, Lori (EEC)
Subject: Pembroke Planning Study, Christian County, Item No. 2-381.00
Attachments: FW: Comments on Pembroke Planning Study Christian County; FW: Comments on Pembroke Planning Study Christian County; FW: Comments on Pembroke Planning Study Christian County

Mr. Shane McKenzie, P.E.

Attached are comments from the KY Division of Waste Management regarding the proposed project.

In addition there is an old city landfill near the west side of Hailes Avenue and Dewey St./City Dump Rd. near the study area.

The information provided is based on those facilities or sites that KDWM currently has in its database. If you would like additional information on any of these facilities or sites, you may contact the file room custodian at (502) 782-6357. Please keep in mind additional locations of releases, potential contamination or waste facilities may be present but unknown to the agency. Therefore, it is recommended that appropriate precautions be taken during construction activities. Please report any evidence of illegal waste disposal facilities and releases of hazardous substances, pollutants, contaminants or petroleum to the 24-hour Environmental Response Team at 1-800-928-2380.

Please contact me if you have any questions.

John Poore, P.E., P.G.
Environmental Engineer Consultant
Director's Office
KY Division of Waste Management
Phone: (502) 782-6736 direct or (502) 564-6716
john.poore@ky.gov

Gilley, Andy

From: Winner, Edward J (EEC) <Edward.Winner@ky.gov>
Sent: Thursday, March 23, 2017 9:49 AM
To: Poore, John (EEC)
Subject: FW: Comments on Pembroke Planning Study Christian County
Attachments: Pembroke project, Christian Co.docx

Looks like one tank missed.

From: Livingstone, Bennett (EEC)
Sent: Thursday, March 23, 2017 9:39 AM
To: Terry, Lori (EEC); Winner, Edward J (EEC)
Cc: Fink, Kris K (EEC); Mauer, Rob (EEC)
Subject: FW: Comments on Pembroke Planning Study Christian County

Lori,

Kris normally handles this now, but this was a relatively simple one so I just did it. The last time I was involved with this Rob Mauer was supposed to be coordinator for these requests from transportation. I am not sure if that has changed but I added him the CC chain just in case. Let me know if you have any questions. Thanks.

Ben

From: Terry, Lori (EEC)
Sent: Tuesday, March 21, 2017 12:50 PM
To: Livingstone, Bennett (EEC)
Subject: FW: Comments on Pembroke Planning Study Christian County

Ben,

Are you still doing these? If so, please respond and copy me. Thanks Lori

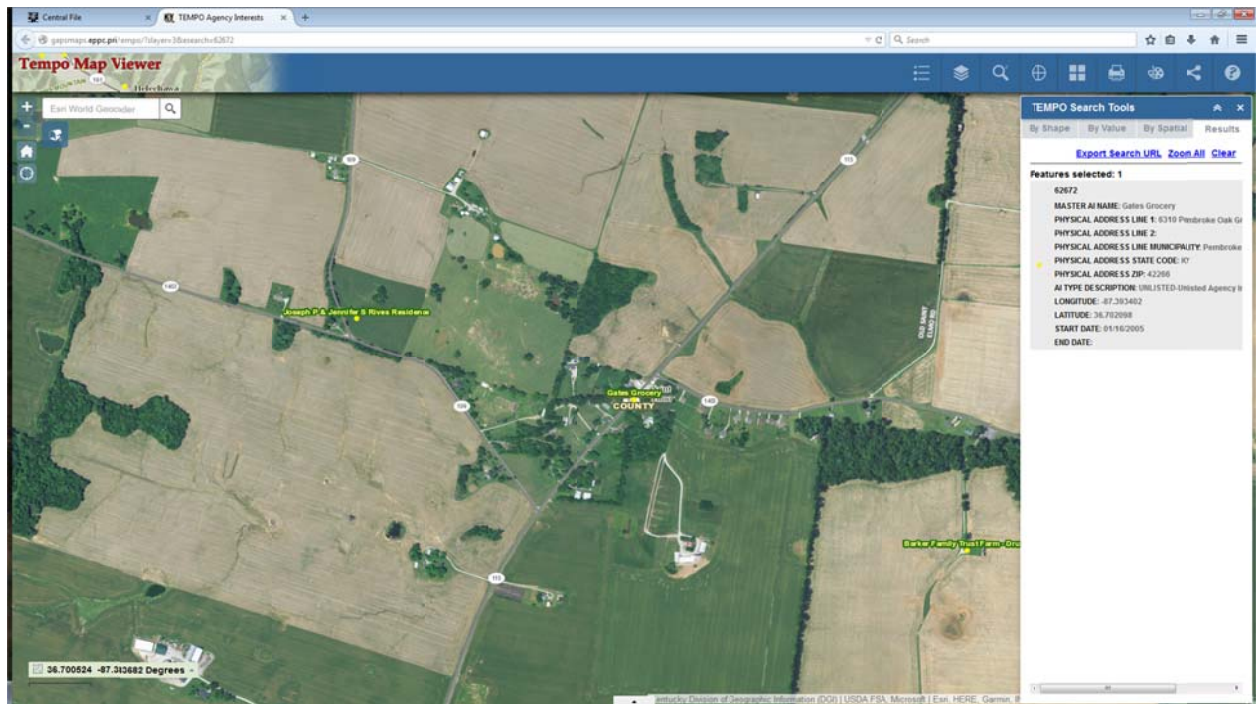
From: Poore, John (EEC)
Sent: Tuesday, March 21, 2017 10:01 AM
To: Hughes, Larry (EEC); Webb, April (EEC); Terry, Lori (EEC)
Cc: Maybriar, Jon (EEC); Winner, Edward J (EEC); Hubbard, Tim (EEC)
Subject: Comments on Pembroke Planning Study Christian County

I have attached a copy of the above referenced study information from the Transportation Cabinet and would like any comments you have from your respective branches. Please let me know about any known UST, Haz-waste or Superfund sites which may impact the study area including and in addition to any shown on the map with any comments. If you could get back to me with your comments by Friday, March 31 it would be greatly appreciated. I was informed that George Gilbert used to do this so you may already be familiar with the process. Please let me know if you have any questions. Thanks!

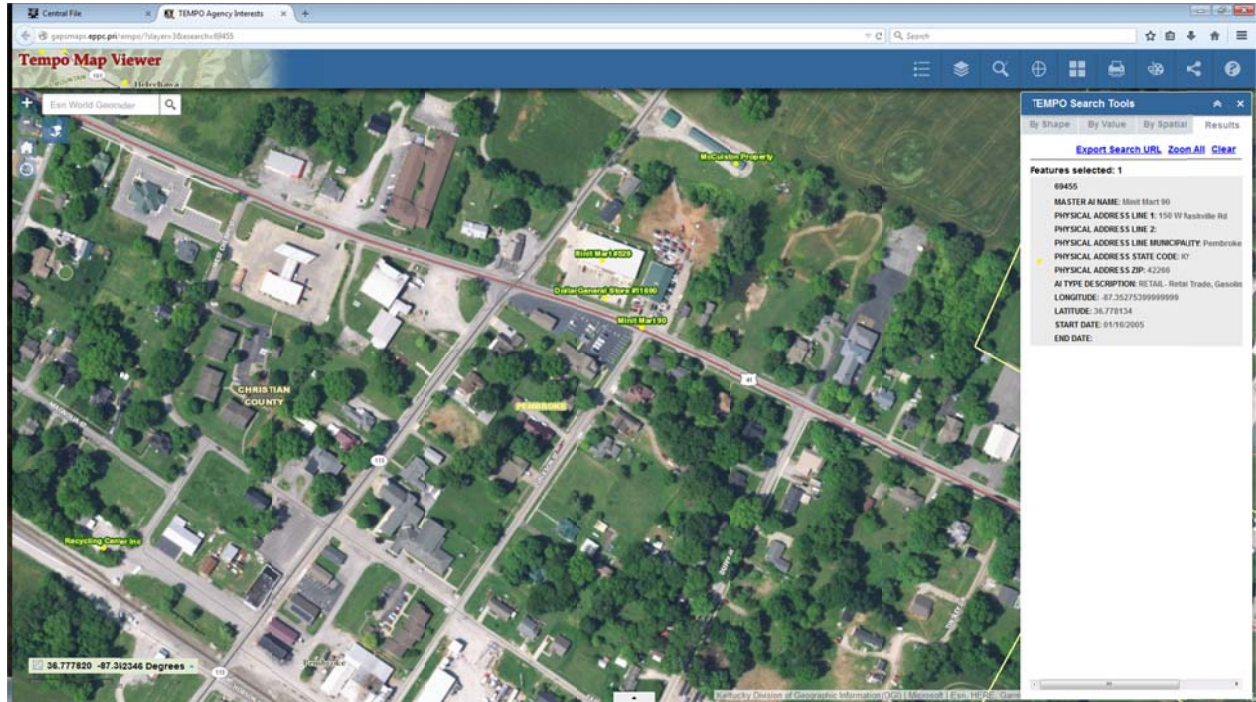
John

John Poore, P.E., P.G.
Environmental Engineer Consultant

Director's Office
KY Division of Waste Management
Phone: (502) 782-6736 direct or (502) 564-6716
john.poore@ky.gov



Gates Grocery: 1 - 560 Gallon gasoline tank – Tank removed December 17, 1998.



- Minit Mart 90:
- 1 – 8,000 Gallon gasoline - Tank removed April 21, 1995.
 - 2 – 8,000 Gallon gasoline - Tank removed April 21, 1995.
 - 3 – 6,000 Gallon gasoline – Tank removed April 21, 1995.
 - 4 – 8,000 Gallon unknown – Tank removed prior to 1988.
 - 5 – 8,000 Gallon unknown – Tank removed prior to 1988.

- Minit Mart 529:
- 1 – 10,000 Gallon gasoline – Tank active.
 - 2 – 10,000 Gallon plus gasoline – Tank active.
 - 3 – 10,000 Gallon prm gasoline – Tank active.
 - 4 – 4,000 Gallon gasoline – Tank active.

Gilley, Andy

From: Schaffer, Bart (EEC) <Bart.Schaffer@ky.gov>
Sent: Thursday, March 23, 2017 10:56 AM
To: Poore, John (EEC)
Cc: Webb, April (EEC); Jump, John (EEC)
Subject: FW: Comments on Pembroke Planning Study Christian County
Attachments: DOC.pdf

I looked in the TEMPO Map Viewer and there is nothing in the study area pertaining to any disposal activity that would have been regulated by our program. It is noteworthy that there is a city landfill shown in TEMPO, but it appears to be just outside the study area and would be a solid waste issue anyhow.

Feel free to let me know if you have any questions.

Sincerely,

Bart Schaffer, P.G.
Supervisor, Corrective Action Section
Hazardous Waste Branch
Kentucky Division of Waste Management
(502) 782-6443

From: Webb, April (EEC)
Sent: Thursday, March 23, 2017 7:02 AM
To: Schaffer, Bart (EEC); Jump, John (EEC)
Subject: FW: Comments on Pembroke Planning Study Christian County

From: Poore, John (EEC)
Sent: Tuesday, March 21, 2017 10:01 AM
To: Hughes, Larry (EEC); Webb, April (EEC); Terry, Lori (EEC)
Cc: Maybriar, Jon (EEC); Winner, Edward J (EEC); Hubbard, Tim (EEC)
Subject: Comments on Pembroke Planning Study Christian County

I have attached a copy of the above referenced study information from the Transportation Cabinet and would like any comments you have from your respective branches. Please let me know about any known UST, Haz-waste or Superfund sites which may impact the study area including and in addition to any shown on the map with any comments. If you could get back to me with your comments by Friday, March 31 it would be greatly appreciated. I was informed that George Gilbert used to do this so you may already be familiar with the process. Please let me know if you have any questions. Thanks!

John

John Poore, P.E., P.G.
Environmental Engineer Consultant

Director's Office
KY Division of Waste Management
Phone: (502) 782-6736 direct or (502) 564-6716
john.poore@ky.gov



Matthew G. Bevin
Governor

**COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET**

Frankfort, Kentucky 40622
www.transportation.ky.gov/

March 14, 2017

Greg Thomas
Secretary

Mr. Anthony Hatton
Director
DEP Division of Waste Management
200 Fair Oaks, 2nd Flr
Frankfort, KY 40601

Dear Mr. Hatton:

Subject: Pembroke Planning Study
Christian County
Item No. 2-381.00

We are requesting your agency's input and comments on a planning study to determine the need and potential impacts for a proposed highway project. The Kentucky Transportation Cabinet has assembled a study team to analyze access, primarily for freight, from the newly expanded Commerce Park to I-24. During the development of this planning study, comments will be solicited from federal, state, and local agencies, as well as other interested persons, in accordance with principles set forth in the National Environmental Policy Act (NEPA) of 1969. The Federal Highway Administration is partnering with us in these efforts.

This planning study includes a scoping process for the early identification of environmental issues and impacts related to the proposed project. We believe that early identification of issues or concerns can help us develop highway project alternatives avoiding or minimizing negative impacts. The Project Team has identified a number of alternatives with the help of Local Officials and Stakeholders by conducting meetings at various study stages.

We have enclosed the following project information for your review and comment:

- Draft Purpose and Need Statement
- Study Area, Existing Conditions Review, and Environmental Overview
- Crash Data, Average Daily Traffic and Level of Service
- Improvement Concepts in Study Area:
 - Concept A1 – Widen US 41
 - Concept A-I – US 41/KY 115 Intersection Improvements
 - Concept B – Pembroke Connector
 - Concept C – KY 115 Widening
- Concept Descriptions



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Mr. Anthony Hatton
Page 2
March 14, 2017

We are requesting that you provide comments on the proposed improvement alternatives and/or specific comments concerning the bulleted items below as they relate to the proposed improvement alternatives.

- Comments on the purpose and need for the project,
- Significant issues or concerns in the project area that may need to be addressed so that the project can be adequately scoped,
- Any conservation or development plans your agency or organization has ongoing or is aware of in the project area,
- Locations of any known areas, issues, or resources within the project area that should be considered when developing alternatives so that impacts can be avoided, minimized, or mitigated early in the process, and
- Any mitigation strategies that should be considered in the development of the project.

We respectfully ask that you provide us with your comments by *April 7, 2017*, to ensure timely progress in this planning effort. We appreciate any input you can provide concerning this project. Please direct any comments, questions, or requests for additional information to the following: Shane McKenzie, P.E., Kentucky Transportation Cabinet, Division of Planning, 200 Mero Street, 5th Floor West, Frankfort, KY 40622, (502) 564-7183, Shane.McKenzie@ky.gov.

Please include a return address on such correspondence. Thank you in advance for your response.

Sincerely,

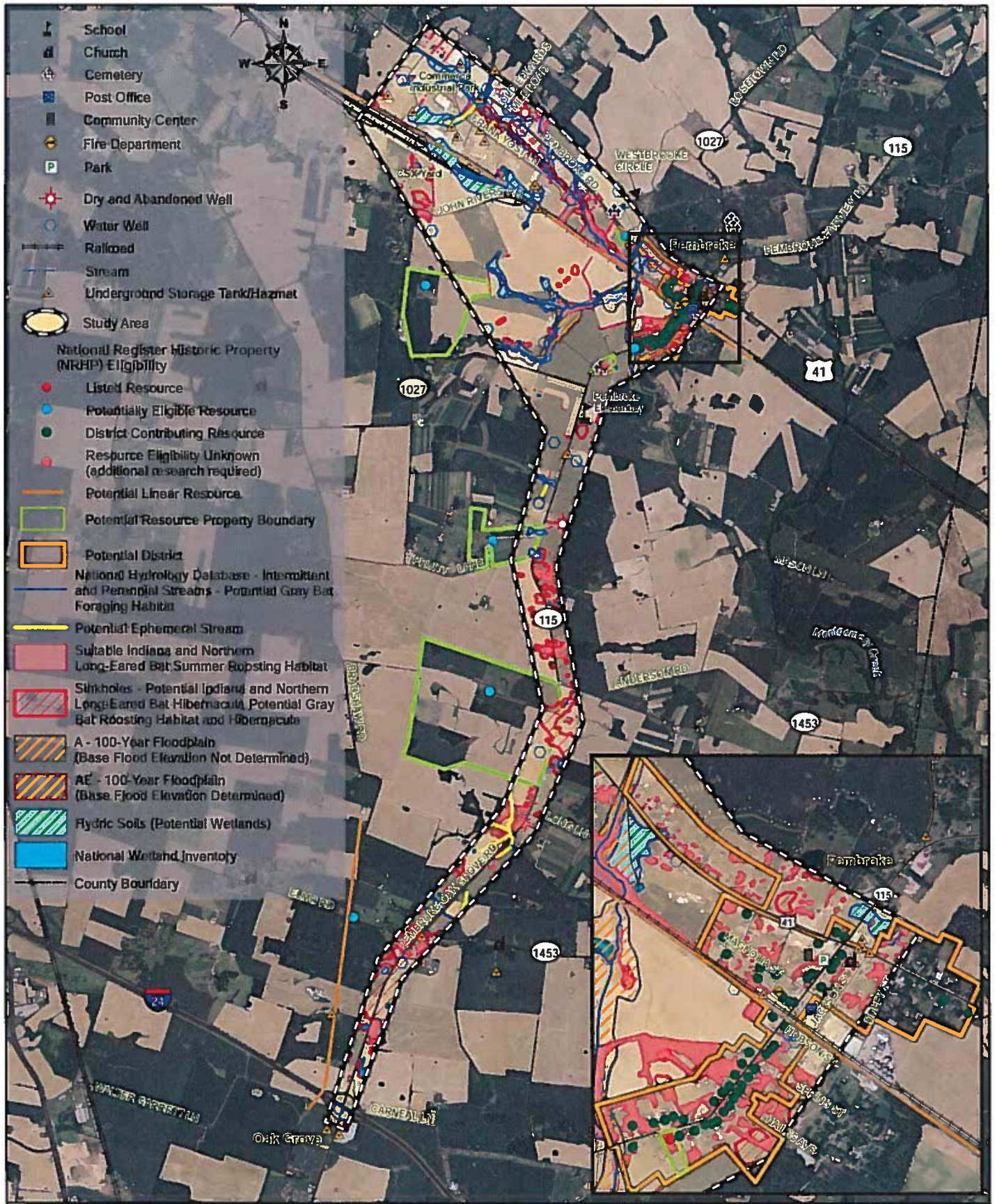


John Moore, P.E.
Director
Division of Planning

JM/SM/NH

Enclosures

c: Thomas L. Nelson, FHWA (w/enc)
John Ballantyne, FHWA (w/enc)
Paul Looney (w/enc)
Wade Clements
John Rudd
Nick Hall
Steve Ross
Joe Van Zee
Greg Preece (w/enc)
Ryan Griffith (w/enc)
David Waldner (w/enc)
Jeff Wolfe (w/enc)
Bart Asher (w/enc)
William Gulick



Environmental Overview
 Pembroke Corridor Study
 Christian County
 Item No. 2-381.00