Appendix L – Waters Technical Report

Job No. 100512, Walnut Ridge – Missouri State Line (Future I-57) P.E.

Prepared by Garver for the
Arkansas Department of Transportation
In cooperation with the Federal Hwy Administration

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Chapter 1 – Introduction

1.1 Project Overview

A Draft Environmental Impact Statement (DEIS) is being conducted to study transportation improvements between Walnut Ridge in Arkansas and the Missouri State line. The Arkansas Department of Transportation (ARDOT) is providing direct oversight and management of the proposed project on behalf of the Federal Highway Administration (FHWA).

The study area is located in Clay, Greene, Lawrence, and Randolph Counties in northeast Arkansas. Construction of the proposed project would complete the improvements of future Interstate 57 (I-57) within Arkansas. The project includes improvements to the United States Highway (Hwy.) 67 corridor in northeastern Arkansas between the Hwy. 67/Hwy. 412 interchange in Walnut Ridge, Arkansas and the Missouri State line. The purpose of the project is to enhance connectivity and continuity of the National Highway System, provide a more resilient roadway, and provide for increased opportunity for economic development in northeast Arkansas.

The proposed project is needed to address a deficiency in the National Highway System in northeast Arkansas. The project is needed because there is a gap in the system linkage which diminishes connectivity and mobility of the National Highway System. Construction of the action alternative would complete the improvements of Future I-57 within Arkansas. Additionally, there is a lack of reliable transportation infrastructure to support economic development and a need to enhance resiliency to extreme weather events along the route. Furthermore, legislation designated this route as future Interstate Route 57. The project purpose, needs, and supporting information are discussed further in Chapter 1 of the DEIS.

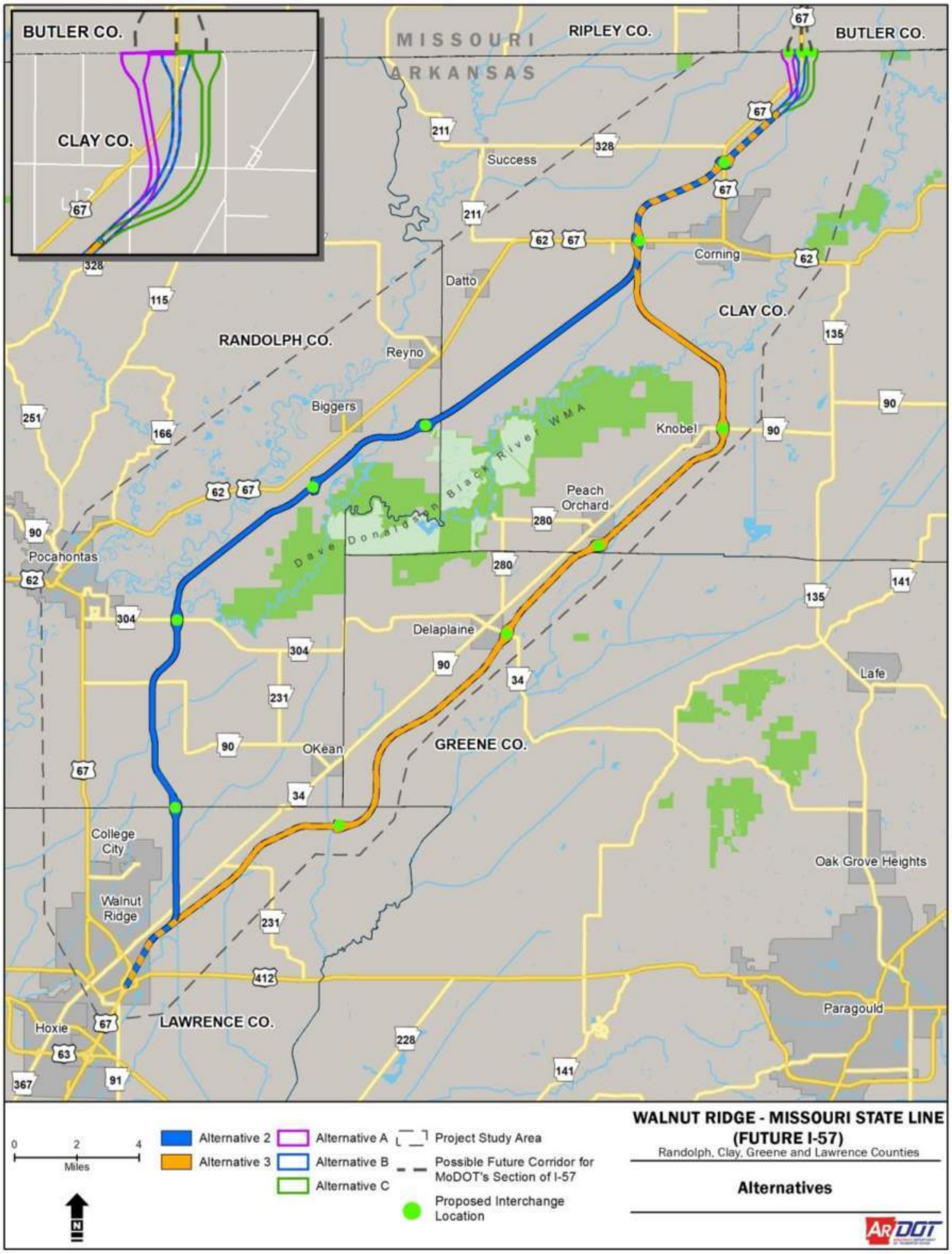
1.2 Project Alternatives

Five action alternatives and a No Action Alternative are be considered and evaluated for the proposed project. Each of the action alternatives is shown in **Figure 1**.

The No Action Alternative would not involve the construction of the proposed highway but would include normal activities that involve providing for the safety and maintenance of local roadways. The No Action Alternative was compared against the action alternatives developed for this project. Selection of the No Action Alterative would avoid major state and federal spending but would not achieve project goals.

Project impacts were quantified based on the anticipated right of way (ROW) footprint of each action alternative. The footprint of each action alternative is defined as a consistent 400-foot-wide ROW with larger areas at the proposed interchanges. The footprints of Alternatives A and C also include a 0.29-mile and 0.17-mile section, respectively, of County Road 278 to accommodate a temporary, two-lane roadway that would tie each alternative back to Hwy. 67. The two-lane section to Hwy. 67 would be an interim condition that would be replaced with the proposed interchange connecting to MoDOT's proposed future corridor. The interim sections of Alternatives A and C that are along County Road 278, would be a two-lane highway with an approximately 140 foot and 120 foot wide ROW, respectively. Detailed views of the alternative footprints are provided in **Attachment A**. The locations of the proposed interchanges can be seen in **Figure 1**. Unless otherwise noted, it is assumed that all areas within the ROW footprint would be directly affected by construction activities.

Figure 1: Future I-57 Action Alternatives



The size of each action alternative's footprint is listed below:

- Alternative 2 (Western alignment on new location – 39.2 miles) – 2,249 acres
- Alternative 3 (Eastern alignment on new location – 41.3 miles) – 2,337 acres
- Alternative A (Missouri connector to west of Hwy. 67 – 2.5 miles) – 142 acres
- Alternative B (Missouri connector partially centered on Hwy. 67 – 2.3 miles) – 139 acres
- Alternative C (Missouri connector to east of Hwy. 67 – 2.8 miles) – 159 acres

1.3 Resources Evaluated in this Technical Report

This technical report includes the evaluation of the following resources:

- Chapter 2 – Water Quality
- Chapter 3 – Streams and Wetlands
- Chapter 4 – Floodplains

Chapter 2 – Water Quality

2.1 Regulatory Context, Methodology, and Data Sources

A desktop level analysis was used to determine the presence of water resources located within or flowing through the project area. This included a review of U.S. Geological Survey (USGS) topographic maps and aerial photography. A review of various technical reports prepared by the USGS provided general and specific information about the water quality of surface water and groundwater resources. Secondary sources prepared by the USGS and the Arkansas Geological Survey provided specific information about the hydrogeologic nature of the underlying geological units. The Arkansas Division of Environmental Quality (DEQ) website was used to obtain information about any streams that did not meet the water quality standards for the state. A preliminary visual assessment of the hydrologic features within the alternative corridors was performed the week of March 1, 2021. Hydrologic features identified during the desktop analysis were then field confirmed through a preliminary visual assessment to the extent practicable at public right of way (ROW) locations where the action alternatives intersect these hydrologic features.

The Federal and State governments have enacted laws that help to avoid or minimize impacts to waters of the United States. Two laws, the Clean Water Act (CWA) of 1972 and the Safe Drinking Water Act, have been established to help protect the water quality of surface water and groundwater. Sections of the CWA govern discharge of pollutants into Waters of the United States which include traditional navigable waters as defined in 33 Code of Federal Regulations (CFR) 328. The following sections of the CWA and Rule 2 of the Arkansas Pollution Control and Ecology Commission (APC&EC) must be followed to minimize impacts to water quality during construction projects:

- Section 303(d) requires states to prepare a list of Section 303(d) impaired waters on which total maximum daily loads (TMDLs) or other corrective actions must be implemented. A TMDL is a calculation of the maximum amount of a specific pollutant that a waterbody can receive and still meet its water quality criteria and maintain its designated uses without violating water quality standards. The Arkansas DEQ compiles a list of impaired waterbodies and waterbodies with an assigned TMDL to comply with Section 303(d) of the CWA. To generally assess the surface water quality of the project area, the Arkansas GIS Office and the DEQ's Aqua View website were used to identify any streams within the study area that may be on the approved Arkansas list of 303(d) impaired streams.
- Rule 2 of the APC&EC outlines water quality standards and designated uses under Arkansas law.
- Section 401 requires that any federally permitted project that may result in a discharge into water of the United States, a water quality certification be issued to ensure the discharge complies with applicable water quality requirements.
- Section 402 forms the National Pollutant Discharge Elimination System (NPDES), which regulates pollutant discharges, including stormwater, into waters of the United States. NPDES permits set specific discharge limits for point-source pollutants and outline special conditions and requirements for projects to reduce water quality impacts. Permits require that projects be designed to protect waters of the United States. Construction projects that will disturb one acre of land or more must comply with the requirements of the NPDES permits issued by the DEQ for stormwater discharges.
- Section 404 regulates discharges of dredged or fill materials from construction activities into waters of the United States, including wetlands. This project will require an individual Section 404 permit issued by the U.S. Army Corps of Engineers (USACE) before dredged or fill material may be discharged into Waters of the United States.

The Safe Drinking Water Act helps protect the quality of drinking water for public water supplies. The Safe Drinking Water Act of 1974 and amendments passed in 1986 and amendments in 1996 protect public health by regulating the nation's public drinking water supply. Under the Safe Drinking Water Act, each state must conduct an assessment of its sources of drinking water to identify significant and potential sources or threats of contamination. Monitoring the quality of drinking water is the joint responsibility of the Arkansas Department of Health (ADH) and the state's public water supply systems.

The ADH was contacted to determine the location of public water supply systems within five miles of the project study area. Twelve community entities and one food plant (Peco Foods) have public water systems near the alternatives. Pocahontas receives its water source from the Black River. A total of 25 water wells provide a source of water for local communities and the Peco Food Plant.

2.2 Existing Conditions

The project area is located within the Mississippi Alluvial Plain of Arkansas. This area of eastern Arkansas is predominantly dedicated to farming and is heavily dependent on groundwater resources for irrigation and public water supplies. Both surface water resources and groundwater resources are used in concert to support agricultural practices within the project study area. Thousands of water wells are used daily.

Surface Water Resources and Associated Water Quality

The project area is located in the White River Basin and within the Mississippi Alluvial Plain. Topographic analysis indicates that surface water flow is generally to the southwest from the east side to the west side of the project area. Schrader (2015) describes groundwater flow in the general area of Crowley's Ridge that is an erosional remnant and prominent topographic feature of Tertiary age trending north-south from the Missouri-Arkansas border and is 100 to 200 feet higher than the surrounding lowlands. Crowley's Ridge is located about 5 to 10 miles east of the project area. Crowley's Ridge forms a physical barrier to groundwater flow in the Alluvial Aquifer. Regionally, west of Crowley's Ridge, groundwater flows from the northeast to the southwest (Schrader, 2015). Elevations are relatively flat and vary only by 150 feet from the Missouri to the Louisiana border with streams that are shallow, meandering, and have a low gradient.

Medium to large sized streams in the project area include Big Running Water Creek, Oak Creek Ditch, Post Oak Ditch, Water Oak Slough, Cache River Ditch Number 1, Little Village Creek Ditch, Little Running Water Ditch, Murray Creek, and Cypress Overcup Lateral. The primary pollutants in an area of agriculture would be turbidity, total phosphorous, nitrogen, and orthophosphate. Bank erosion and resulting sedimentation and turbidity would be a common issue in this area of land use. Typical causes of bank erosion are due to a lack of riparian vegetation and runoff.

The project area is located within five watersheds based on the 8-digit watershed hydrologic unit code (HUC). The 8-digit HUC watersheds located within the project area include the Cache, Upper-White-Village, Upper Black, Lower Black, and the Current. The 8-digit HUC is the most widely used hydrological unit for water resource planning and for identification of 303(d) impaired streams in Arkansas. This watershed approach is advantageous because it considers all activities within a landscape that affect watershed health.

The 303(d) report contains the following format with five assessment categories of waters.

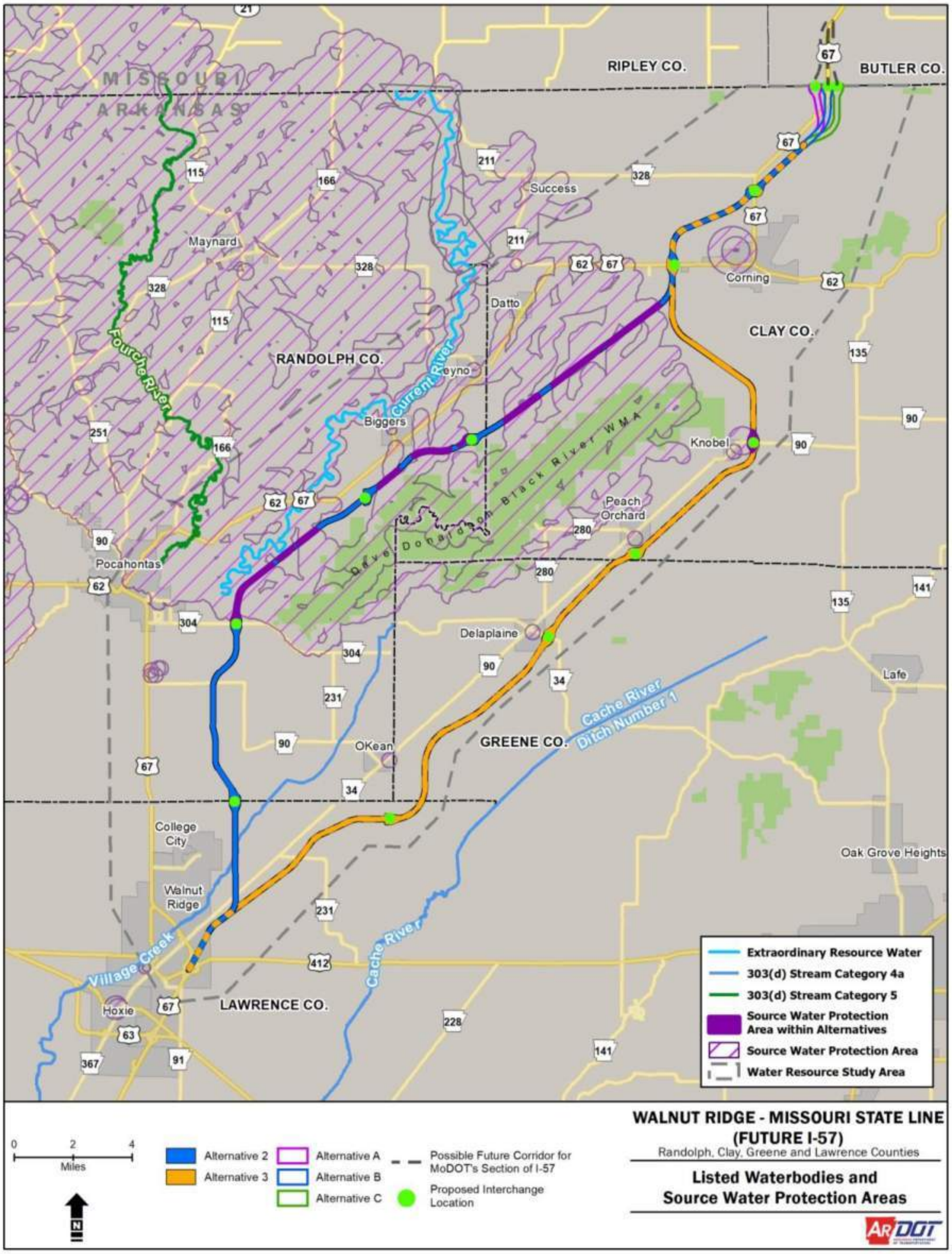
- Category 1 indicates that the waterbody is not impaired. Category 1a indicates that all designated uses and water quality standards are attained. Category 1b indicates that all designated uses and water quality standards are attained, but a TMDL exists for at least one water quality parameter.
- Category 2 indicates that some uses and standards are met, however, there is insufficient data to assess any uses.
- Category 3 indicates insufficient data to assess any uses.
- Category 4 indicates that the waterbody is impaired and does not require a TMDL. Category4a indicated that a TMDL has already been completed. Category 4b indicates that other pollution control requirements will result in water quality standards attainment. Category 4c indicates that impairment is not caused by a pollutant.
- Category 5 indicates that waters do not meet water quality standards, the waterbody is truly impaired and a TMDL is needed. Category 5 represent the worst water quality.

Waterbodies not identified on the 303(d) list are designated suitable for the propagation of fish and wildlife, primary and secondary contact recreation, agricultural and industrial types (Martin, 2021).

In accordance with Section 106 of the federal Clean Water Act and under its own authority, DEQ has established a comprehensive program for monitoring the quality of the State's surface waters. The DEQ collects surface water samples at various locations, utilizing appropriate sampling methods and procedures for ensuring the quality of the data collected. The objectives of the surface water monitoring program are to determine the quality of the state's surface waters, to develop a long-term database for long term trend analysis, and to monitor the effectiveness of pollution controls. The data obtained through the surface water monitoring program is used to develop the state's biennial 305(b) report (*Water Quality Inventory*) and the 303(d) list of impaired waters, which are issued as a single document titled Arkansas Integrated Water Quality Monitoring and Assessment Report is submitted to EPA (FTN, 2006a). Three impaired waterbodies that may receive stormwater flows were identified. These waterbodies are concerned impaired based on the 2018 EPA approved 303(d) list of impaired streams in Arkansas identified in the Integrated Water Quality Monitoring Assessment Report. **Figure 2** shows the locations of the impaired waterbodies.

The Fourche River is on the 303(d) list for turbidity (category 5). Turbidity is an expression of the optical properties in a water sample that cause light to be scattered or absorbed and may be caused by suspended matter, such as clay, silt, finely divided organic and inorganic matter, soluble colored organic compounds, and plankton and other microscopic organisms (Standard Methods, 1999). The probable source of turbidity is from surface erosion and sedimentation (EPA, 2018). Water quality in the Fourche River is from non-point source pollution (Martin, 2021). A low priority has been set for restoration to be performed on the Fourche River (Martin, 2021; Wise, 2021). This means there is minimal information available for this waterbody to develop a TMDL. Currently there are no plans in place to protect or restore water quality for this waterbody (Martin, 2021). The Arkansas Department of Agriculture Division of Natural Resources was contacted to determine if any 319 programs are implementing any projects to improve the water quality of the Fourche River. Currently none of the 319 projects are along the Fourche River in the future I-57 study area (Brown, 2021). The Fourche River is in the western portion of the study area but does not cross any of the alternatives.

Figure 2: Listed Waterbodies and Source Water Protection Areas



The Cache River and Village Creek are listed as having turbidity impairments and have been assigned a TMDL (303(d) category 4a). The Cache River is located in the southern portion of the project area and forms the Lawrence/Greene County line. The Cache River is considered a channel altered stream (FTN, 2006a). A TMDL is the amount of a pollutant that a waterbody can assimilate without exceeding the established water quality standards for that pollutant. Through a TMDL, pollutant loads can be allocated to point sources and non-point sources discharging to the waterbody. The source of turbidity for the Cache River was listed as agriculture (FTN, 2006a). Turbidity cannot be expressed as a load as preferred for TMDLs. Section 303(d) of the Clean Water Act and regulations at 40 CFR 130.7 require TMDLs to consider seasonal variations for meeting water quality standards. Analysis determined that there is not a critical season or a single critical flow for TMDLs in the Cache River (FTN, 2006a). The report prepared by FTN represents the source of information other than the 303(d) list describing efforts to improve the water quality of the Cache River (Martin, 2021). Additionally, grants can be obtained through the Clean Water Act Section 319 Program to designated states to implement their approved nonpoint source management programs. The Arkansas Department of Agriculture Division of Natural Resources was contacted to determine if any 319 programs are implementing any projects to improve the water quality of the Cache River. Currently none of the 319 projects occur along the Cache River in the future I-57 study area (Brown, 2021). The Cache River is in the southern portion of **Figure 2** but outside of the study area.

Village Creek is shown to extend from Hwy. 304 south of the Black River and flows to the southwest toward College City and then through Walnut Ridge, crossing Alternative 2. The non-point source of turbidity was listed as agriculture. Over 87% of the Village Creek watershed is cropland which typically has greater soil erosion that other land uses such as forest or pasture (FTN, 2006b). ADEQ historical water quality data were available for three locations along the impaired reaches of Village Creek. These data were analyzed for long term trends, seasonal patterns, relationships between concentration and stream flow, and relationships between turbidity and total suspended solids (TSS). These analyses showed no significant seasonal pattern or relationships between concentration and stream flow, but higher turbidity levels tended to correspond with higher TSS values. Greater details are provided in FTN (2006b). The report prepared by FTN represents another source of information other than the 303(d) list describing efforts to improve the water quality of the Cache River (Martin, 2021). The Arkansas Department of Agriculture Division of Natural Resources was contacted to determine if any 319 programs are implementing any projects to improve the water quality of the Village Creek. Currently none of the 319 projects are along the Village Creek in the future I-57 study area (Brown, 2021).

Per DEQ's February 2021 response during agency coordination for the proposed project, it is imperative that best available measures be taken to minimize sedimentation and turbidity from entering these waterbodies during this project. Agency coordination letters are provided as an appendix in the DEIS document.

The most prominent perennial surface water feature in the project area is the Black River. The Black River extends the entire length of the project area, passes through the central portion of the project area, is about 200 feet in width with substrates that consists of silt, sand, gravel, and cobbles, and ranges in depth from 2.5 feet near the Alternative 2 proposed crossing to over 5 feet deep near the Alternative 3 proposed crossing. The Black River is surrounded by wetlands encompassed with bottomland hardwood forest located in the Dave Donaldson Black River Wildlife Management Area. The Black River provides clear and good water quality and provides suitable habitat for all of the state listed mussel species. Typical intermittent stream systems flowing through the alignment corridor range from a few feet in width to 16 feet in width with estimated depths of 1 to 5 feet.

One Extraordinary Resource Water (ERW), the Current River, extends from Pocahontas to the Arkansas/Missouri state line. The designated of an ERW is defined by DEQ's Regulation 2. A waterbody is classified as an ERW based on a combination of its chemical, physical, and biological characteristics and its watershed which is characterized by scenic beauty, aesthetics, scientific values, broad scope recreation potential, and intangible social values. No Wild and Scenic Rivers are located within the study area.

Surface water quality at any location is mostly related to the type of land use practices upstream of that location. Nutrients and sediment lost in irrigation runoff from agricultural fields can impact water quality in downstream waterways (Reba et al., 2020).

Groundwater Resources and Associated Water Quality - Aquifers

Arkansas is the fourth largest user of groundwater in the United States. The largest groundwater use occurs in northeast Arkansas where row-crop agriculture is prevalent and widespread (Kresse et al., 2014). The 16 aquifers of the state were divided into two major physiographic regions, the Coastal Plain Province (referred to as Coastal Plain) of eastern and southern Arkansas, which includes 11 of the 16 aquifers, and the Interior Highlands Division (referred to as Interior Highlands) of western Arkansas, which includes the remaining five aquifers. The 11 aquifers in the Coastal Plain consist of various geologic units that are Cenozoic in age and consist primarily of Cretaceous, Tertiary, and Quaternary sands, gravels, silts, and clays, (Kresse et al., 2014). From youngest to oldest, the aquifers within this part of the state include the Mississippi River Valley Alluvial aquifer, Jackson Group, Cockfield, Sparta, Cane River, Carrizo, Wilcox, Nacatoch, Ozan, and Trinity aquifers. In most areas, these rocks and sediments are less permeable than the overlying alluvial and terrace deposits of Quaternary age form the confining unit below the alluvial aquifer (Boswell et al., 1968). The groundwater flow direction is affected by Crowley's Ridge. Crowley's Ridge is a structural high and erosional remnant of Tertiary aged geologic units that physically divides the Mississippi River Valley Alluvial aquifer in the northern part of eastern Arkansas (Kresse et al., 2014). Crowley's Ridge is a barrier to groundwater movement in the northeastern part of the state and serves as a hydraulic barrier. West of Crowley's Ridge, which is where the proposed project is located, groundwater flows from northeast to southwest. West of Crowley's Ridge, the Mississippi River Valley Alluvial aquifer serves over 70 municipalities as a public water supply (Kresse et al., 2014).

In addition to the use of the Mississippi River Valley Alluvial aquifer in northeastern Arkansas, the Nacatoch aquifer supplies ground water to Lawrence and Greene Counties and the Wilcox and Sparta aquifers supply groundwater to Greene and Clay Counties. In extensive areas of eastern Arkansas, water was withdrawn from the Mississippi River Valley Alluvial aquifer at rates that exceeded recharge; therefore, those rates could not be sustained indefinitely. In some areas, deeper wells were required into underlying formations including the Sparta, Cockfield, and Wilcox aquifers. Eastern Arkansas relies heavily on groundwater for public water supply, tapping many aquifers including the Sparta, Wilcox, Mississippi River Valley Alluvial, Cockfield, and Nacatoch aquifers. Below is a summary of some of the underlying aquifers that are located beneath project area counties.

The Mississippi River Valley Alluvial Aquifer

The study area is located within the Mississippi River Valley Alluvial aquifer of Arkansas and accounts for approximately 94% of all groundwater used in the state and predominantly used for agriculture (Kresse et al., 2014). This aquifer has become one of the most important agricultural regions in the United States. The Mississippi River Valley Alluvial aquifer is the uppermost aquifer and consists of 60 to 140 feet of Quaternary sand and gravel that grades from gravel at the bottom to fine sand near the top deposited in river and river-proximal environments. Annual water withdrawn from the Aquifer in 2010 ranged from 150 to 450 million gallons per day (mgd). Use of the Mississippi Embayment Aquifer

System Regional Groundwater Availability Study (USGS, 2021) indicates that in 2015, the total self-supplied groundwater withdrawals were 232 mgd in Lawrence County, 131 mgd in Randolph County, 819 mgd in Clay County, and 367 mgd in Greene County.

The aquifer effectively can be divided into two distinct units based on lithologies: a lower unit that contains the primary aquifer consisting of coarse sands and gravels derived from alluvial and terrace deposits that coarsen downward and an upper unit that consists of fine sand, silt, and clay that serves as a confining unit of varying competency which is of local importance as a lower-yield aquifer primarily for domestic use. Crowley's Ridge, a structural high and erosional remnant of the Tertiary-age units located to the east of the project area, physically divides the Mississippi River Valley Alluvial aquifer in the northern part of eastern Arkansas. Virtually all the landforms and associated sediments within the Mississippi River Valley are the direct result of fluvial processes. The dominant controls influencing the fluvial processes and resulting surface geology of the Lower Mississippi Valley were glaciation, climate, relative sea level, tectonism, and subsidence. Below are some additional details on some of the underlying aquifers.

Sedimentary rocks and unconsolidated sediments of Tertiary age or older underlie the alluvial aquifer. These rocks are less permeable that the overlying alluvial and terrace deposits of Quaternary age form the confining unit below the alluvial aquifer. The Mississippi River Valley Alluvial aquifer in some areas is hydraulically connected to underlying Tertiary aquifers. Aquifer-test data for the Mississippi River Valley Alluvial aquifer are found in numerous countywide reports dating back to the mid-1950s (Kresse et al., 2014). Reported yields throughout the Mississippi River Valley Alluvial aquifer in eastern Arkansas ranged from 400 to 3,000 gallons per minute (gal/min) with a maximum of 5,000 gal/min for Arkansas. Yields of 2,000 gal/min were cited as common, which was the most commonly reported yield cited in the earlier countywide Alluvial. **Table 1** shows the underlying geologic units and aquifers beneath the Mississippi River Valley alluvial aquifer.

Table 1: Geologic Units and Aquifers Beneath the Mississippi River Valley Alluvial Aquifer

<table>
<tr><th colspan="3">Time Stratigraphic Unit</th><th rowspan="2">Group</th><th rowspan="2" colspan="2">Formation</th><th rowspan="2">Aquifer</th></tr>
<tr><th>Era</th><th>System</th><th>Series</th></tr>
<tr><td rowspan="11">Cenozoic</td><td rowspan="4">Quaternary</td><td>Holocene</td><td></td><td colspan="2">Alluvium</td><td rowspan="2">Mississippi River Valley</td></tr>
<tr><td>Pleistocene</td><td>Jackson</td><td colspan="2">Terrace Deposits</td></tr>
<tr><td rowspan="6">Eocene</td><td></td><td colspan="2">Jackson Group</td><td>Vicksburg-Jackson confining unit</td></tr>
<tr><td rowspan="4">Claiborne</td><td colspan="2">Cockfield Formation</td><td>Upper Claiborne Aquifer</td></tr>
<tr><td rowspan="7">Tertiary</td><td colspan="2">Cook Mountain Formation</td><td>Middle Clairborne confining unit</td></tr>
<tr><td>Sparta Sand</td><td rowspan="3">Memphis Sand</td><td>Middle Claiborne confining Aquifer</td></tr>
<tr><td>Cane River Formation</td><td>Lower Clairborne Aquifer</td></tr>
<tr><td rowspan="2">Wilcox</td><td>Carrizo Sand</td><td rowspan="2">Upper, middle, lower Wilcox Aquifers</td></tr>
<tr><td rowspan="3">Paleocene</td><td colspan="2">Undifferentiated</td></tr>
<tr><td>Midway</td><td colspan="2">Porters Creek Clay</td><td>Midway Confining Unit</td></tr>
<tr><td>Midway</td><td colspan="2">Clayton Formation</td><td>Midway Confining Unit</td></tr>
</table>

Source: Modified from Hart et al., 2008.

Pumping from the most productive aquifers in Arkansas—the Mississippi River Valley Alluvial and Sparta aquifers—has led to declining water levels, reduced well yields, and the deterioration of the water quality in areas throughout the Coastal Plain of eastern and southern Arkansas. These aquifers are the principal sources of water for irrigation, industrial, and public drinking-water supplies in this region. Since enactment of the Arkansas Ground Water Protection and Management Act, the ANRC has designated three critical groundwater areas in Arkansas. The ANRC is the state's water resources planning and management agency. A "critical groundwater area" is an area determined by ANRC to have significant groundwater depletion or degradation. Specific criteria used in designating a critical groundwater area include water levels declining at a rate of one foot per year (ft/yr) or more, water levels declining below the top of a confined aquifer or below the 50% saturated thickness for an unconfined aquifer, and groundwater-quality degradation. Designating an area indicates that ANRC may later determine that limiting groundwater withdrawals by users within the critical groundwater area may become necessary to maximize the area's remaining groundwater resources. Designation also enhances awareness of the groundwater problems within the area and makes it easier to obtain local, state, and federal funds to resolve the area's groundwater problems. Although ANRC has the authority to initiate regulation in critical groundwater areas by following a process similar to that required for designation of an area, the ANRC has never taken steps to regulate these areas.

One of the three critical groundwater areas designated in Arkansas is the Cache critical groundwater area. The project study area is located within the Cache critical groundwater area. The Cache critical groundwater area, designated in 2009, includes the Mississippi River Valley Alluvial and Sparta aquifers within parts of Clay, Craighead, Cross, Greene, Lee, Poinsett, and St. Francis Counties lying west of Crowley's Ridge. Water-level data from this area continue to show declines.

The Sparta Aquifer

The Sparta aquifer is the second most important aquifer in terms of use, and the aquifer was used in the past dominantly as a water source for public and industrial supply, although increasing irrigation use is occurring because of critically declining water levels in the Mississippi River Valley Alluvial aquifer. The Sparta aquifer system is used in Clay and Greene Counties. Other aquifers of the Coastal Plain generally are used as important local sources of domestic, industrial, and public supply, in addition to other minor uses. Water quality generally is good for all aquifers of the Coastal Plain, except for elevated iron concentrations and localized areas of high salinity. The high salinity results from intrusion from underlying formations, evapotranspiration processes in areas of low recharge, and inadequate flushing in downgradient areas of residual salinity from deposition in marine environments (Kresse et al., 2014). Groundwater generally trended from a calcium- to a sodium-bicarbonate water type with increasing cation exchange along the flow path.

The Sparta aquifer of Tertiary age is the thickest sand in the Mississippi embayment and its importance as an aquifer is recognized by the fact that it is second in use only to the Mississippi River Valley Alluvial aquifer (Kresse et al., 2014). In northeastern Arkansas, the Sparta aquifer locally is referred to as the Sparta-Memphis aquifer (Schrader, 2015; Holland, 2007). The aquifer is an extremely important source of groundwater in eastern Arkansas. The Sparta Sand consists of varying amounts of well-sorted, rounded to subrounded, fine- to medium-grained quartz sand interspersed with silt, clay, shale, and lignite. Layers of coarse sand and fine gravel occur in some areas. The lower part of the unit generally contains more sand, and the upper part generally contains more clay and shale. The Sparta Sand in northeastern Arkansas is mainly composed of thick-bedded, very fine to gravely, well-sorted sand, with some argillaceous, micaceous, and lignitic materials. In the Sparta Sand subcrop area, the Sparta aquifer and overlying Mississippi River Valley Alluvial aquifer are hydraulically connected. This area serves as an important recharge area to the Sparta aquifer. The Sparta aquifer provides water of excellent quality, and wells often yield hundreds to thousands of gal/min. The Sparta aquifer provided 196.64 mgd in 2010, which was 2.5% of all groundwater used in Arkansas (Kresse et al., 2014).

The Nacatoch Aquifer

Northeastern and southwestern Arkansas generally exhibited the same patterns of water use from the Nacatoch aquifer. Northeastern Arkansas had the greater use in 1990. Clay County Regional Water District is the largest user of the Nacatoch aquifer for public supply with a total of 0.64 mgd, which accounted for approximately 19% of total Nacatoch water use in 2010. In northeastern Arkansas, the sand content of the Nacatoch aquifer increases from 40–60%. The Nacatoch aquifer is clean, medium- to coarse-grained sand in Clay, Greene, and Lawrence Counties. The aquifer thickens in these counties to approximately 200 feet and yields are as much as 500 gal/min. Rock/water interactions in the aquifer can change the major chemical composition and resulting water type along the groundwater-flow path. Generally, sites with sodium less than 50% of the total cations, which indicate a calcium-bicarbonate water type, were located in or less than about one mile from the outcrop area. An outcrop is when the rocks of the aquifer are exposed at the surface. Sites further downgradient had sodium percentages more than 50% and ranging upward to 99%.

Wilcox Aquifer

The groundwater quality of the Wilcox aquifer is of very good quality, with the exception of high salinity and elevated dissolved solids downgradient from the outcrop and subcrop areas for most of the western extent of the aquifer. The portions of the aquifer beneath the surface are called subcrops. The water becomes brackish or saline within a short distance downdip from the outcrop and is unfit for most purposes. The nearest water quality data available were located in an area to the east of Crowley's Ridge. The aquifer is considered to be an aquifer dominated by a sodium-bicarbonate water type with calcium-bicarbonate as a secondary water type depending on location. The exchange of calcium for sodium occurs on solid-phase exchange sites as groundwater travels through the unsaturated and saturated zones. Groundwater from the Wilcox aquifer generally does not show a well-defined trend in its western extent, although most of the calcium-dominated groundwater occurs in the outcrop areas. In the eastern extent of the aquifer, practically all of the sites exhibit a strongly sodium-bicarbonate water type. Nearly half of the sites have sodium constituting greater than 90% of the total cations, which reflects a more geochemically evolved groundwater at greater distances from the subcrop area. Sulfate, chloride, and dissolved solid concentrations are generally low. Generally, the overall best water quality is located in the eastern extent of the aquifer in northeastern Arkansas.

Water use from the aquifer has been greatest in Greene County within the project area. Wells completed in the Wilcox aquifer typically yield from 500 to more than 2,000 gal/min. The annual water withdrawn for the Wilcox aquifer in 2010 was 0.1-2.0 mgd for Clay County and 6.1-8.0 mgd for Greene County (Kresse et al., 2014).

Ozark Aquifer

The Ozark aquifer is located on the western side of the study area. The lateral extent of the Ozark aquifer is govern by a geologic feature known as the fall line. The Ozark aquifer is west of the Mississippi River Valley Alluvial aquifer. The aquifer comprises a sequence of formations predominated by dolostones along with minor limestone, sandstone, and shale intervals of Ordovician age. These formations contribute to the unique and complex hydrogeology and physiography of the Ozarks. The karst of the carbonates in the upper Ozark aquifer presents a physiographic and hydrologic environment in the Salem Plateau similar in aspect and complexity to that seen for the Springfield Plateau (Kresse et al., 2014). Karst-development processes and history are an important aspect of the geology controlling groundwater hydrology in the Ozarks. The exposed formations of the Ozark aquifer present an example of a dynamic and developing karst aquifer. Also evident are episodes of karst development through geologic time that results in overlap and interplay of recent and paleokarst features. Karst aquifers are typified by a combination of diffuse and focused flow. The slower flow occurs through diffuse flow paths and allows for sustained groundwater input to streams and springs, even during dry periods. Extremely rapid response and transit times occur during precipitation events and are provided through preferential flow paths and karst features. In karst systems, large cavernous conduits allow for deep and rapid circulation of recharge. Conduits and dissolution-enhanced fracturing help integrate flow to spring resurgences (Harvey, 1980). As a result, springs are common throughout the exposed sections of the Ozark aquifer (Kresse et al., 2014). Historical hydrogeological data indicated the potential for groundwater to move from the Ozarks aquifer system to beneath the Fall Line or escarpment into the northern Mississippi embayment, ultimately to discharge to overlying embayment aquifers or directly to streams. Groundwater from the carbonate rocks constituting the Ozark aquifer is of a hard to very hard, calcium-magnesium-bicarbonate type. Sulfate concentrations generally are low in the Ozark aquifer and were below the Federal secondary drinking-water regulation of 250 milligrams per liter (mg/L) in all samples from the upper and lower Ozark aquifer and chloride concentrations generally are low throughout the Ozark aquifer (Kresse et al., 2014). Primary use of the Ozark aquifer is for public supply with 76.45 mgd withdrawn for public supply in 2010. Irrigation use from the Ozark aquifers was estimated at approximately 20 mgd in 2010 (Kresse et al., 2014). No karst areas or features would be impacted by the action alternatives.

Groundwater Resources – Public Water Supplies

As identified by the ADH, 12 community entities and one food plant (Peco Foods) have public water systems near the alternatives (**Figure 2**). The community entities include Walnut Ridge Waterworks, Biggers Waterworks, Reyno Waterworks, Success Waterworks, Corning Waterworks, O'Kean Waterworks, Delaplaine Waterworks, Peach Orchard Waterworks, Knobel Waterworks, Pocahontas Waterworks, Clay County Regional Water District, and Peco Foods. Each of these public water supplies has an associated source water assessment/protection area that surrounds it. Source water assessment areas are areas ADH define or delineate that could possibly be more harmful or sensitive to a water source if contaminated. They can depend on many things and cover larger or smaller areas depending on the type of source (well, lake, river, spring, etc.). These areas are referred to as "source water protection areas" in **Figure 2**. Additionally, hundreds of ANRC-identified water wells occur within the project study area.

2.3 Environmental Consequences

Surface Water Quality

Village Creek, which is on the 303(d) list as being impaired for silt and turbidity, crosses through Alternative 2's alignment. Approximately 918 linear feet (LF) of Village Creek occur within Alternative 2. A bridge over Village Creek is proposed at this location; the precise quantity of stream impacts is not known at this point in the design process. No other 303(d) listed streams would be impacted by the action alternatives.

Construction activities would include removal of existing vegetation during clearing and grubbing and would expose soils adjacent to stream crossings and within the ROW. As a result, a temporary increase in stream sedimentation could occur due to stormwater runoff and would be the greatest in the immediate vicinity if the crossings. All alignments would cross the same soil types and associated slopes adjacent to impacted streams. The substrate within stream segments crossed is nearly identical from location to location and therefore, potential construction impacts to the surface water quality would be non-alternative specific and could occur regardless of the alternative selected. Impacts from any action alternative would be temporary in nature and would be minimized through site specific erosion and sedimentation control measures at all stream crossings.

The operation and maintenance of a highway would produce additional sources of surface water pollutants. During highway operation, sources of potential pollutants from vehicles includes heavy metals such as copper, zinc, and lead from tire and brake wear, motor oil additives, and roadway maintenance practicing such as sanding, deicing, and applications of herbicides on ROW. The rate of deposition and magnitude of these pollutants in highway runoff are site specific and are affected by traffic volumes, highway design, maintenance activities, surrounding land use, climate, and accidental spills.

Groundwater

Construction would increase the amount of impervious cover within the local watershed which would reduce the amount of infiltration. However, the change in land use associated with the construction of the proposed project would have low to negligible effect on recharge to the underlying aquifer because of the remaining amount of the undeveloped land available for groundwater recharge.

With regards to public water supplies and wells, impacts are summarized below for each alternative.

No Action Alternative

No impacts to water resources would occur as a result of the No Action Alternative as it would require no impacts public water supplies or wells.

Alternative 2

Alternative 2 would impact a total of approximately 549 acres of the Pocahontas Waterworks source water protection area located northeast of Pocahontas. As Pocahontas's drinking water is surface water sourced, any stormwater from construction associated with Alternative 2 would have to travel many stream miles to have an impact on the water supply. The primary pollutant of concern would be turbidity. Alternative 2 would impact one ANRC-identified domestic well (a private well); proper well abandonment would be required.

Alternative 3

Alternative 3 would impact a total of approximately 68 acres of the Clay County Regional Water District wellhead protection area located near the community of Knobel. A wellhead protection area special provision would be required if this wellhead protection area is impacted. Coordination is required with the ADH to ensure no damage would occur to the well itself nor the water table/aquifer.

Alternatives A, B, and C

Alternative A, B, and C would not impact any public water supplies.

2.4 Avoidance, Minimization, and Mitigation

Erosion and sediment control would follow ARDOT's BMPs to minimize sedimentation during construction and help to minimize sediment and pollutant runoff into surrounding wildlife habitat and/or from entering the Black River or other surrounding streams. BMPs would also include protecting natural stream buffers where feasible.

During work near Village Creek, a 303(d) listed stream, best available measures would be used to minimize sedimentation and turbidity from entering the waterbody during construction activities.

Avoidance and minimization measures would be implemented through the ARDOT special provision (SP) for water pollution control.

Project construction would comply with all provisions of the NPDES Construction Stormwater General Permit ARR150000 and submit a Stormwater Pollution Prevention Plan to the DEQ Office of Water Quality. A Short Term Activity Authorization from DEQ would be obtained for any instream activity associated with this project. This allows for the temporary exceedance of the water quality standards for activity that is essential to the protection or promotion of the public interest and where no permanent or long term impairment of beneficial uses is likely to result.

ARDOT would take special measures during construction activities within source water protection areas. If any wellhead protection areas are impacted, avoidance and minimization measures would be implemented through the ARDOT SP for wellhead protection. When an ARDOT project intersects a wellhead protection area, coordination is required with the ADH to ensure no damage would occur to the well itself nor the water table/aquifer. Appropriate coordination with the ADH will occur, if required, for the Preferred Alternative.

Chapter 3 – Streams and Wetlands

3.1 Regulatory Context, Methods, and Data Sources

Regulatory Context

There are five primary water resources addressed in this section: wetlands, streams, ponds, springs, and other surface waters (i.e., reservoirs). Federal and state statutes identified below are in place to regulate impacts to these water resources.

- Executive Order (EO) 11990 – Protection of Wetlands
- Section 404 of the Clean Water Act (CWA)
- Section 401 Water Quality Certification regulated within the purview of the CWA
- Section 402 National Pollutant Discharge Elimination System (NPDES), also within the purview of the CWA
- Rivers and Harbors Act of 1899
- 7 Code of Federal Regulations (CFR) Part 12 - Farmed Wetlands and Prior Converted Cropland
- Agricultural Act of 2014 – Agricultural Conservation Easement Program

These statutes aim to prevent or minimize the loss of wetlands and streams, control discharges and pollution sources, establish water quality standards, protect drinking water systems, and protect aquifers and other sensitive ecological areas. Wetlands are areas typically inundated or saturated by surface or groundwater to the extent that they can support vegetation adapted for life in wet soil conditions. Wetlands are protected under Section 404 of the CWA because they provide flood control, aid in water quality, and provide wildlife habitat.

Discharges of dredged or fill material into waters of the U.S. are regulated under Section 404 of the CWA. Any such action proposed in wetlands or other waters of the U.S. are subject to review by the U.S. Army Corps of Engineers (USACE) and other federal and state agencies and require authorization by USACE. For jurisdictional purposes, USACE and the U.S. Environmental Protection Agency (EPA) jointly define wetlands as follows: "*Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas*" (USACE, 1987).

According to 7 CFR part 12.2, a Farmed Wetland (FW) *"is a wetland that prior to December 23, 1985, was manipulated and used to produce an agricultural commodity at least once before December 23, 1985, and on December 23, 1985, did not support woody vegetation and met the following hydrologic criteria:*

(i) If not a playa, pocosin, or pothole, experienced inundation for 15 consecutive days or more during the growing season or 10 percent of the growing season, whichever is less, in most years (50 percent chance or more), which requisite inundation is determined through:

(A) Observation of wetland hydrology indicators as identified in the local NRCS Field Office Technical Guide;

(B) Procedures identified in State Off-Site Methods for wetland identification set forth in the local NRCS Field Office Technical Guide; or

(C) The use of analytic techniques, such as the use of drainage equations or the evaluation of monitoring data.

(ii) If a playa, pocosin, or pothole experienced ponding for 7 or more consecutive days during the growing season in most years (50-percent chance of more) or saturation for 14 or more consecutive days during the growing season in most years (50-percent chance or more). Wetlands which are found to support wetland hydrology through Step 1 of the wetland determination process in

§12.30(c)(7) and application of the procedures described in §12.31(c) will be determined to meet the requisite criteria."

According to 7 CFR part 12.2, Prior-converted cropland (PC) *"is a converted wetland where the conversion occurred prior to December 23, 1985, an agricultural commodity had been produced at least once before December 23, 1985, and as of December 23, 1985, the converted wetland did not support woody vegetation and did not meet the hydrologic criteria for farmed wetland"*.

FWs are generally regulated by the USACE. PCs that are certified by NRCS are exempt from Section 404 wetland regulations. However, if the land changes to a non-agricultural use, or is abandoned, according to the criteria established by USACE and EPA, it may be regulated under the CWA.

As authorized through the 2008 Farm Bill, Natural Resources Conservation Service (NRCS) manages the Wetland Reserve Program (WRP) which is a voluntary incentive program offering landowners technical and financial support to protect, restore, and enhance wetlands on their property (NRCS, 2021). All action alternatives have been designed to avoid WRP sites.

Methodology and Data Sources

A desktop level analysis was initially completed to determine the presence of streams, wetlands, ponds, springs, reservoirs, and WRP sites located within or flowing through the proposed action alternatives. Stream locations are shown in **Attachment A**. The desktop level analysis included detailed review of environmental databases and GIS resources including, but not limited to National Wetland Inventory (NWI), NRCS soils data, LIDAR mapping, historic aerial photography, and U.S. Geological Survey (USGS) historic topography. **Attachment B** contains an overview of the soils data collected for the action alternatives.

Water resources identified during the desktop analysis were then field confirmed the week of March 1, 2021 through a preliminary visual assessment to the extent practicable at public rights of way (ROW) where the proposed action alternatives intersected water resources, which were classified by qualified wetland biologists based on Cowardin et al. (1979). Representative photographs of wetlands and streams observed within the action alternatives are provided in **Attachment C**.

Vegetation and hydrology characteristics of each wetland were documented and overlaid with NRCS hydric soils data, which resulted in high confidence data for identification of wetlands. Detailed wetland delineations of these high confidence areas shall be completed for the Preferred Alternative in accordance with the routine approach described in the USACE Wetlands Delineation Manual (1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0; USACE, 2010).

The proposed action alternatives are located within the delta plains of the Mississippi River, which is extensively farmed. As a result, evaluation of FWs were evaluated in this report. Landowner rights prevented the use of USDA/NRCS data to be reviewed for locations of FW and PC wetlands; however, these resources were identified by overlaying NRCS hydric soils data, USGS topographic mapping, land use data, and historic aerial photography. By adjusting the transparency of these data, and delineating areas saturated for multiple years that were cleared of trees prior to 1985, overlapping areas are shown, which reveal high confidence areas that are likely FWs. As a result of the entire action alternatives being extensively farmed, farmland not identified as FW, wetlands, streams, roads, upland forested areas, and structures are considered PC. Coordination to obtain landowner permission for hundreds of properties within the action alternatives to obtain more detailed information regarding FW and PC areas would not fit the schedule associated with this EIS.

The preliminary visual assessment included field reviews of stream crossings identified as Other Waters (OW) that were evaluated regarding flow regime and observable ordinary high water marks (OHWM), and were also classified according to Cowardin et al. (1979). **Attachment A** shows detailed locations of preliminary identified wetlands, streams, ponds, and FWs within the action alternatives. USGS 7.5-minute topographic maps are provided in **Attachment D.**

3.2 Existing Conditions

As noted in previous chapters, the proposed action alternatives are extensively farmed, primarily confining wetlands to areas within field transition areas, windrows, and within the floodplain associated with the Black River. Major crops in the area include cotton, rice, corn, soybeans, maize, and wheat. Seasonal variations and crop rotations are common farming practices, which result in different irrigation strategies depending on the crop planted in each field. Rice crops require seasonal inundation/saturation for best crop yields; however, as rice had already been harvested from the area, many of the fields were not flooded. As the site visit occurred during the first week of March, all crops had been harvested within the alternative footprints. The most active harvesting times of year in Arkansas (USDA, NASS, 2021) for the following crops is identified below:

- Wheat – June
- Corn – August to September
- Rice – September
- Cotton - October
- Soybeans – November

Soils within all action alternatives are predominantly considered silt loam, loam, sandy loam, or fine sandy loam as classified by NRCS (Web Soil Survey, accessed June 2021). All soil types identified within the action alternatives were identified on the NRCS hydric soils list for Arkansas.

Streams

Alternatives 2 and 3 contain ephemeral, intermittent, and perennial stream systems, all of which have been rerouted or channelized (term used interchangeably with “ditched”) in the past, with the exception of the Black River and Murray Creek. Alternatives A, B, and C contain intermittent stream systems. Typical intermittent stream systems flowing through the alignment corridor range from a few feet in width to 16 feet in width with estimated depths of 1 to 5 feet. **Attachment A** shows an overview of stream locations.

Figure 3 and **Figure 4** represent one example of a historically rerouted natural channel, which is common in the region. The action alternatives also contain numerous canals/ditches constructed to aid in water movement off or onto cropland. These created channels were also determined to be ephemeral, intermittent, or perennial based on USGS topographic mapping. Natural stream courses that have been re-routed and channelized over time through man-made drainage ditches created for the primary purpose of draining and/or retaining hydrology in agricultural fields were also noted. Hydrology within all the stream and canal systems in the general area are continually influenced by pumping activities and directly related to irrigation associated with farming practices (primarily for rice crops). These manipulated hydrology schemes were observed throughout the study area. Additionally, the area received 3.84 inches of rain within the two weeks prior to the site visit.

Figure 3: Re-routed Stream (White Oak Slough) – Topographic View

Figure 4: Re-routed Stream (White Oak Slough) – LIDAR

The Black River flows east to west and has a substantial wooded riparian zone on its south bank and very minimal to no riparian zone on its north bank at the proposed Alternative 2 crossing. Conversely, at the proposed Alternative 3 crossing, the river has a very narrow wooded riparian zone along its south bank (estimated at 20 feet wide) but has an average 100-foot-wide riparian zone on the north bank. Combined, approximately 830 linear feet (LF) of flow line of the river are located within the

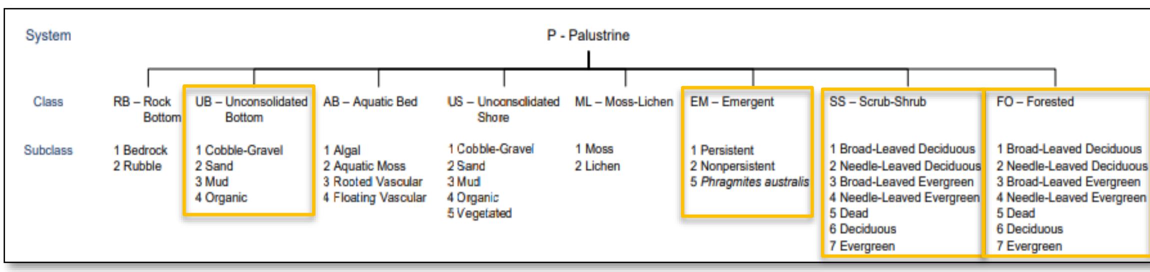
Alternative 2 and 3 proposed crossings. The Black River ranges in width from approximately 198 feet wide near the Alternative 2 proposed crossing to 180 feet wide near the Alternative 3 proposed crossing. A USGS bathymetric survey of the Black River indicates that the river ranges in depths from 2.5 feet near the Alternative 2 proposed crossing to over 5 feet deep near Alternative 3 proposed crossing.

The ecological nature of the streams within the action areas is limited due to the partially impaired status due to the turbid waters observed. Within the action areas, the Black River provides the highest level of aquatic habitat and as a result, fish and aquatic species diversity. Ecological discussions of the water resources within the action alternatives are discussed further in Biological Technical Report prepared for the EIS.

Wetlands

As mentioned earlier in this Chapter, several wetland types were documented to occur within the alternative corridors and classified according to Cowardin et al. (1979). This naming system consists of classifying wetlands into one of the five hydrology systems identified by Cowardin, one of which is palustrine wetlands. Palustrine wetland systems include all nontidal wetlands dominated by trees, shrubs, persistent emergent, emergent mosses, or lichens (Cowardin et al., 1979). Palustrine systems are broken down further into eight hydrological regimes, four of which are identified within the action alternatives and are highlighted in **Figure 5**.

Figure 5: Wetland and Deepwater Habitats Classification



Unconsolidated bottom wetlands (i.e., PUB wetlands) are those that have 25% ground cover of cobble or gravel, sand, mud, or organics with less than 30% vegetative cover. These wetland types are generally characterized by the lack of stable surfaces for plant establishment, which is also affected by temperature and light penetration. Only a few PUB wetlands were identified within the action alternatives and were associated with ponds. These ponds have some ecological value such as providing foraging habitat for waterfowl. Due to the relatively isolated nature of the ponds in the action area in connection to streams or other wetlands and their small size, ecological contributions to the area as a whole are limited.

Emergent wetlands (i.e., PEM wetlands) are those wetlands characterized by rooted herbaceous vegetation that is adapted to wetter growing conditions and present for most of the growing season in most years. These wetlands are typically dominated by rooted perennial plant communities and can include both persistent and nonpersistent species. Due to the extensive farming of the landscape, there are few emergent wetlands within the action alternatives. These wetlands within the action alternatives provide some wildlife value for foraging, cover, and nesting habitat.

Scrub-shrub wetlands (i.e., PSS wetlands) are dominated by shrubs, young trees, and woody vegetation that is stunted due to environmental conditions that are less than 20 feet in height. These wetland types are often representative of the successional stage leading to forested wetlands. PSS wetlands within the action alternatives were minor and small. Although limited based on size, these wetlands would also provide habitat for wildlife. If left unmanaged or undisturbed, they would mature into forested wetlands.

Forested wetlands (i.e., PFO wetlands) consist of woody vegetation that is taller than 20 feet in height and are also known as bottomland hardwoods. Forested wetlands comprise the majority of wetland types within the action alternatives and are associated with lower areas in the landscape not suitable for farming. The forested wetlands within the action alternatives provide nesting, foraging, and protection habitat for wildlife.

Observable wetlands appeared to be confined to windrows and field edges between major crop fields. Dominant wetland plant species observed during the early March preliminary visual assessment in the wetland types include:

- Palustrine Emergent Wetlands (PEM):
  Common rush (*Juncus effusus*), yellow foxtail (*Setaria pumila*), curly dock (*Rumex crispus*), buttercup (*Ranunculus* species), pennywort (*Hydrocotyle* species), bushy bluestem (*Andropogon glomeratus*), cattail (*Typha* species), sedges (*Carex* species), tridens (*Tridens* species), panicgrass (*Panicum* species), spikerush (*Eleocharis* species) , rosemallow (*Hibiscus* species), hemlock (*Cicuta* species), smartweed (*Persicaria* species), scouringrush horsetail (*Equisetum hyemale*), iris (*Iris* species), goldenrod (*Solidago* species), great ragweed (*Ambrosia trifida*), woodoats (*Chasmanthium* species), and aster (*Symphyotrichum* species).

- Palustrine Scrub-Shrub Wetlands (PSS):
  Buttonbush (*Cephalanthus occidentalis*), trumpet creeper (*Campsis radicans*), greenbrier (*Smilax rotundifolia* and *S. bona-nox*), winter creeper (*Euonymus fortunei*), eastern poison ivy (*Toxicodendron radicans*), and blackberry (*Rubus* species).

- Palustrine Forested Wetlands (PFO):
  Willow oak (*Quercus phellos*), cherrybark oak (*Quercus pagoda*), black willow (*Salix nigra*), green ash (*Fraxinus pennsylvanica*), elm (*Ulmus* species), bald cypress (*Taxodium distichum*), honey locust (*Gleditsia triacanthos*), and sugarberry (*Celtis laevigata*).

Dominant upland plant species observed in field transitions and windrows included: Bermuda grass (*Cynodon dactylon*), johnsongrass (*Sorghum halepense*), vetch (*Vicia* species), broomsedge (*Andropogon virginicus*), little barley (*Hordeum pusillum*), giant foxtail (*Setaria faberi*), annual bluegrass (*Poa* species), henbit (*Lamium amplexicaule*), plantain (*Plantago* species), daffodil (*Narcissus pseudonarcissus*), wild onion (*Allium* species), American pokeweed (*Phytolacca americana*), white clover (*Trifolium repens*), ragweed (*Ambrosia* species), sumac (*Rhus* species), post oak (*Quercus stellata*), eastern red-cedar (*Juniperus virginiana*), pine (*Pinus* species), hickory (*Carya* species), winged elm (*Ulmus alata*), and three awn (*Aristida* species).

Ecologically, wetlands are considered some of the most species rich ecosystems. Fully functional wetlands can support a wide variety of wildlife species including wood ducks, geese, some raptors wading birds, migratory birds, song-birds, reptiles and amphibians, fish and other aquatic species. Wetlands provide an important forage, breeding, nesting base for migratory waterfowl (USFWS, 2019). Inundated wetlands also provide important spawning and nursery areas as well as food cycle support for commercial and recreational fish industries (NRCS, 1995). They also provide habitat for federal and state listed threatened and endangered species, including plants, such as the Pondberry.

Wetlands within the area of the project also contribute to flood protection in that they serve as natural sponges that release surface water slowly (USFWS, 2019). The root mass provided in wetlands help slow the flood flow velocities, which aids in reducing flood heights and erosion. The capacity of wetlands to retain rainwater and runoff also provides for water filtration during flood events by trapping sediment.

Wetlands also contribute to carbon sequestration, which is the capture and storage of carbon dioxide and other elements and gasses (USGS, 2021). All wetlands sequester carbon through photosynthesis and by trapping runoff. The actual amount of carbon storage of wetlands is affected by wetland type, size, vegetation, soils, and other factors (MNBWSR, 2019).

FWs comprise the vast majority of the wetland impacts for the project and are identified as possible FW (PFW) impacts are summarized below in **Table 2** for each alternative. Although PFWs are almost void of natural successional vegetation and less waste grain being a major goal of farming, some of the ecological benefits of PFWs include providing seasonal grain field foraging areas, temporary flooded field wildlife habitat, flood storage, and water filtration area. Numerous waterfowl species and wading birds frequent grain fields during crop production and offseason months for both foraging and stopover habitat during migration (AGFC, 2020).

3.3 Environmental Effects

Streams

Alternatives 2 and 3 contain ephemeral, intermittent, and perennial stream systems, all of which have been channelized or rerouted in the past, with the exception of the Black River and Murray Creek. Alternatives A, B, and C contain intermittent stream systems. **Table 2** summarizes the quantities of those water resources located within the ROW of each action alternative. The streams naming convention as indicated in **Attachment A** includes the alternative number, followed by OW, and sequentially numbered (south to north).

Table 2: Summary of Streams within Alternative Footprints

Alternative	Streams (LF)			
	Perennial	Intermittent	Ephemeral	Total
Alternative 2	3,769	20,671 (6,208 ditched)	3,023 (44,291 ditched)	77,963
Alternative 3	10,742	31,943 (5,161 ditched)	3,742 (50,149)	101,736
Alternative A	0	847	0 (8,453 ditched)	9,299
Alternative B	0	1,340	0 (7,462 ditched)	8,803
Alternative C	0	4,003 (184 ditched)	0 (3,481 ditched)	7,667

Wetlands

Wetland impacts were evaluated based on the acreage of anticipated wetland loss. The emergent and scrub-shrub wetlands identified within the action areas have been directly or indirectly impacted in the past and are therefore considered partially impaired or partially functional. Forested wetland areas with the action alternatives appear to be relatively fully functional, although they may be influenced by offsite sediment runoff from adjacent farm fields. Direct wetland impacts include fill for embankment, temporary clearing, and grading. All action alternatives were determined to have wetlands of varying classifications and therefore the ecological impact for each alternative are similar in varying degrees as discussed in this section. Wetland impacts (including impacts to FW) include reductions in flood storage, water quality filtration area, wildlife foraging and nesting habitat, and aquatic ecology. **Table 3** provides a summary of the acreages of each wetland type found within the ROW of the action alternatives.

Table 3: Summary of Open Water and Wetlands within Alternative Footprints

Alternative	Wetlands (Acres)*					
	PEM	PSS	PFO	PUB	PFW	Total
Alternative 2	4.5	0	33.2	0.3	593.6	631.6
Alternative 3	2.0	2.9	19.7	0.9	552.3	577.8
Alternative A	0.6	0	2.8	0	58.7	62.1
Alternative B	0.3	0	10.0	0	30.9	41.2
Alternative C	0	0	4.5	0	25.0	29.5

*PEM-Emergent Wetland; PSS-Scrub-Shrub Wetlands; PFO-Forested Wetland; PUB-Pond/Open Water Wetlands; PFW-Possible Farmed Wetlands; These are estimates since USDA records are not releasable unless permission from landowner is granted.

No Action Alternative

The No Action Alternative would have no effects on water resources beyond what would be proposed for improvements deemed necessary by governing officials.

Alternative 2

Streams

Alternative 2 could have direct impacts to an estimated 77,963 LF of streams (other waters), approximately 50,499 LF would be considered intermittent or ephemeral ditches. Direct impacts to streams could include filling, grading, culvert installation, channel realignment, and channel widening improvements. Indirect stream impacts related to threatened and endangered species, migratory birds, terrestrial wildlife, aquatic environments, and water quality are discussed in separate technical reports prepared for the EIS. A summary of stream impacts per classification is provided in **Table 2**.

Notable stream impacts associated with Alternative 2 are associated with an intermittent paralleling stream (2OW110 - located just west of Corning and shown on Sheets 20 and 21 of **Attachment A**) and the crossing associated with the Black River (2OW48 - located just west of approximately 3 miles east of the Pocahontas Municipal Airport and shown on Sheet 8 of **Attachment A**) as shown on the detail sheets provided in **Attachment A**. Approximately 2,281 LF of 2OW110 flows through the Alternative 2 footprint in an almost parallel state. The Black River is proposed to be crossed with a perpendicular crossing and spanned by a new bridge; however, the potential for bridge piers to be placed within the OHWM of the river. Pier placement will be determined upon further design. Stream impacts are detailed in **Attachment E** and include location, and classifications of each stream segment within the proposed ROW footprint of Alternative 2.

Wetlands

Alternative 2 would directly impact an estimated 37.9 acres of emergent, forested, and pond or open water wetlands. Additionally, an estimated 593.6 acres of PFW would be impacted by Alternative 2. Overall wetland impacts would decrease the acreages available to wildlife for breeding, nesting, foraging and stopover habitat, as well as flood storage and water infiltration area. Direct impacts to wetlands would occur as a result of direct fill for embankment construction, temporary clearing, and grading. **Table 3** provides a summary of the wetland impacts for Alternative 2. Indirect impacts would include sedimentation from runoff during construction and fragmentation of wetlands, which might alter hydrologic connections to downstream waters. Indirect impacts could also include decreased stormwater capacity and reduction in surface water infiltration.

Attachment F provides details of potential wetland impacts identified within Alternative 2 and includes the specific locations, classification, and acreage of impacts.

Potential impacts to water quality resulting from stormwater runoff during construction were also assessed. Temporary, short-term impacts to surface waters within the disturbed areas may occur from stormwater runoff during construction. These impacts, which may occur as a result of increased sedimentation and offsite siltation resulting from land disturbance, may temporarily decrease water quality. However, these impacts are not anticipated to be significant as BMP measures would be implemented.

Alternative 3

Streams

Alternative 3 could directly impact an estimated 101,736 LF of streams, approximately 55,310 LF would be considered intermittent or ephemeral ditches. Direct and indirect impacts include those identified in Alternative 2. A summary of LF of stream impacts per classification is provided in **Table 2.**

Notable stream impacts associated with Alternative 3 as identified in **Attachment A** include a paralleling perennial stream (3OW106 **-** located just northeast of Knobel and shown on Sheet 39 of **Attachment A**), an intermittent stream (3OW136 **-** located just west of Corning and shown on Sheets 20 and 21 of **Attachment A**), and the crossing associated with the Black River (3OW118 **-** located southwest of Corning and shown on Sheet 41 of **Attachment A**). Typical intermittent stream systems flowing through the alternative footprint range from five feet in width to 16 feet in width.

The Black River is the largest stream crossing in the alternative and its proposed crossing would be relatively perpendicular with a new span bridge. Potential bridge piers could be placed within the OHWM of the River, which will be determined upon further design. Approximately 421 LF of the river is located within the alternative footprint and could be directly impacted as a result of direct fill, pier placement, and/or temporary work road construction. The OHWM associated with the Black River is estimated at 208 LF in width and ranges from four feet to greater than 10 feet in depth. Additional details, such as location, stream classification, and estimated impacts of each stream segment, are provided in **Attachment E.**

Wetlands

Alternative 3 would directly impact an estimated 25.4 acres of emergent, scrub-shrub, forested, and pond/open water wetlands. Additionally, an estimated 552.3 acres of PFW would be impacted. Direct and indirect impacts include those identified in Alternative 2. **Table 3** provides a summary of the wetland and open water impacts for Alternative 3.

Attachment F provides a detailed summary of the wetlands and open water areas identified within the alternative and includes the specific locations, classification, and acreage of impacts.

Alternative A

Streams

Alternative A would impact approximately 9,299 LF of streams that include approximately 847 LF of an intermittent stream, Hobson Lateral (AOW14), and 14 other ephemeral ditches that would be impacted. Hobson Lateral has been redirected from its natural course, channelized, and does not have a riparian zone. The proposed crossing would be almost perpendicular to the stream's orientation, which would minimize impacts to the water course. Alternative A would also impact an estimated 8,453 LF of ephemeral man-made ditches associated with road crossings and field divisions. Direct and indirect impacts include those identified in Alternative 2.

Wetlands
Alternative A would impact approximately 3.4 acres of forested and emergent wetlands, and an estimated 58.7 acres of PFW. Direct and indirect impacts include those identified in Alternative 2. Indirect impacts could include off-site sedimentation resulting from construction activities, decreased stormwater capacity and reduction in surface water infiltration.

Alternative B

Streams
Alternative B is parallel to and would impact an estimated 1,340 LF of Hobson Lateral (BOW17). Approximately 7,462 LF of ephemeral man-made ditches are present within Alternative B, most of which are associated with existing roadside ditches along Hwy. 67. Direct and indirect impacts include those identified in Alternative 2.

Wetlands
Alternative B would impact an estimated 0.3 acre of a PEM wetland and 10.0 acres of PFO wetlands. Approximately 30.9 acres of PFW would be impacted. Direct and indirect impacts include those identified in Alternative 2. Indirect impacts could include off-site sedimentation resulting from construction activities, decreased stormwater capacity and reduction in surface water infiltration.

Alternative C

Streams
Alternative C is also parallel to and would impact approximately 4,003 LF of Moark Ditch (COW9) and Cypress Creek Ditch (COW5), both are intermittent streams located within the alternative. Approximately 3,665 LF of ephemeral and intermittent man-made ditches associated with roadside ditches and field divisions are present within the alternative. Direct and indirect impacts include those identified in Alternative 2.

Wetlands
Alternative C would impact approximately 4.5 acres of a forested wetland located near Clay County Road 155 and approximately 25 acres of PFW. Direct and indirect impacts include those identified in Alternative 2. Indirect impacts could include off-site sedimentation resulting from construction activities, decreased stormwater capacity and reduction in surface water infiltration.

3.4 Avoidance, Minimization, and Mitigation

The overall study area was first evaluated to identify large, 1,000-foot-wide corridors. Within the larger corridors, environmental and other constraining resources were identified, which allowed for further avoidance to narrow the corridors to 400-foot-wide ROW footprints. Avoidance measures evaluated during alternative alignment corridor selections included consideration for paralleling streams and larger forested wetlands. Minimization measures for streams and wetlands included spanning streams, installation of culverts to keep wetlands hydrologically connected, and incorporating perpendicular stream crossings where possible. Additional minimization measures considered as design progresses include reducing construction impacts and using a divided median and/or cable median barriers rather than concrete barriers for the approaches and crossings of wetlands and streams.

Avoiding impacts to all streams and wetlands is not practical. Any impacts to streams and wetlands would be minimized to the extent practicable; however, unavoidable impacts would be mitigated at an approved stream and wetland mitigation site(s). Compensatory mitigation shall be determined according to USACE approved methodology during the Section 404 permitting process. As overall impacts to streams and wetlands are likely to exceed Section 404 Nationwide permit impact thresholds, a Section 404 Individual permit would be required. Submittal of a Section 404 permit application is anticipated to occur in 2023.

For work in or over the Black River, a Section 10 permit (USACE) will be required.

Chapter 4 – Floodplains

4.1 Regulatory Context, Methods, and Data Sources

The protection of floodplains and floodways is required by Executive Order 11988, Floodplain Management; U.S. DOT Order 5640.2, Floodplain Management and Protection; and 23 Code of Federal Regulations 650. The intent of these regulations is to avoid or minimize, where practicable, encroachments within the 100-year (base) floodplain and to avoid supporting land use development that is incompatible with floodplain values.

Floodplains are areas that become covered by water in a flood event. A 100-year floodplain would be covered by a flood event that has a 1% chance of occurring (or being exceeded) each year, and is the category commonly used for insurance and regulatory purposes. Floodplains have many natural and beneficial values. Floodplain beneficiaries include, but are not limited to, fish, wildlife, plants, open space, natural beauty, scientific study, outdoor recreation, agriculture, aquaculture, forestry, natural moderation of floods, water quality, maintenance, and groundwater recharge.

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the Federal Insurance and Mitigation Administration as the base flood for purposes of floodplain management measures. The 500-year flood is used to indicate additional areas of flood risk in the community. Encroachment on floodplains, such as placement of fill material, has the potential to reduce the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. Under the concept used by the National Flood Insurance Program (NFIP), the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so the 100-year flood may be carried without substantial increases in flood heights. The floodway fringe is the remaining portion of the floodplain outside of the regulated floodway. The NFIP permits up to a 1.0-foot rise in water surface elevation for the 100-year flood, provided that hazardous velocities are not produced.

Clay, Greene, Randolph, and Lawrence Counties participate in the NFIP. The NFIP establishes the Flood Insurance Rate Maps (FIRM), which correspond to the Flood Insurance Study Reports (FIS) that establish the 100-year recurrence flood elevation on flooding sources. The FIRMs are used to make flood insurance available for homes within the 100-year flood boundary. The FIRMs, Flood Hazard Boundary Maps, and National Flood Hazard Layer for GIS were obtained for these communities. The ROW footprint of each action alternative used to determine the anticipated area of floodplain impacts. Alternatives were analyzed for total floodplain area and stream crossings impacted.

Levees, which reduce flood risks for people and property, are present within the project extent and are civil works projects constructed by and under the jurisdiction of the USACE. The USACE civil works projects are embedded within many communities and may need to be altered or occupied by others for purposes of improvements, relocation, or other non-project features. To ensure that these projects continue to provide their intended benefits to the public, Congress has mandated that any use or alteration of a civil works project by another party is subject to approval of USACE. This requirement was established in Section 14 of the Rivers and Harbors Act of 1899 and is codified at 33 USC 408 (Section 408). Section 408 provides that USACE may grant permission for another party to alter a civil works project upon a determination that the alteration proposed will not be injurious to the public interest and will not impair the usefulness of the civil works project. Therefore, as the levees within the project extent are regulated under Section 408, review and encroachment permission under Section 408 would be required for impacts to the federal levee projects to ensure that the proposed roadway project would not be injurious to the public interest and the levees would continue to function as intended.

The data sources used for this evaluation are:

1. Federal Emergency Management Agency (FEMA). August 3, 2016, Flood Insurance Study, Clay County, Arkansas and Incorporated Areas. 41 pages. Available online at: https://msc.fema.gov/portal
2. Federal Emergency Management Agency (FEMA). May 16, 2013, Flood Insurance Study, Greene County, Arkansas and Incorporated Areas. 37 pages. Available online at: https://msc.fema.gov/portal
3. Federal Emergency Management Agency (FEMA). December 18, 2012, Flood Insurance Study, Lawrence County, Arkansas and Incorporated Areas. 38 pages. Available online at: https://msc.fema.gov/portal
4. Federal Emergency Management Agency (FEMA). May 2, 2012, Flood Insurance Study, Randolph County, Arkansas and Incorporated Areas. 30 pages. Available online at: https://msc.fema.gov/portal
5. National Flood Hazard Layer. Available online at: http://www. https://www.fema.gov/flood-maps/national-flood-hazard-layer
6. The National Levee Database (USACE, 2016) and USACE correspondence.

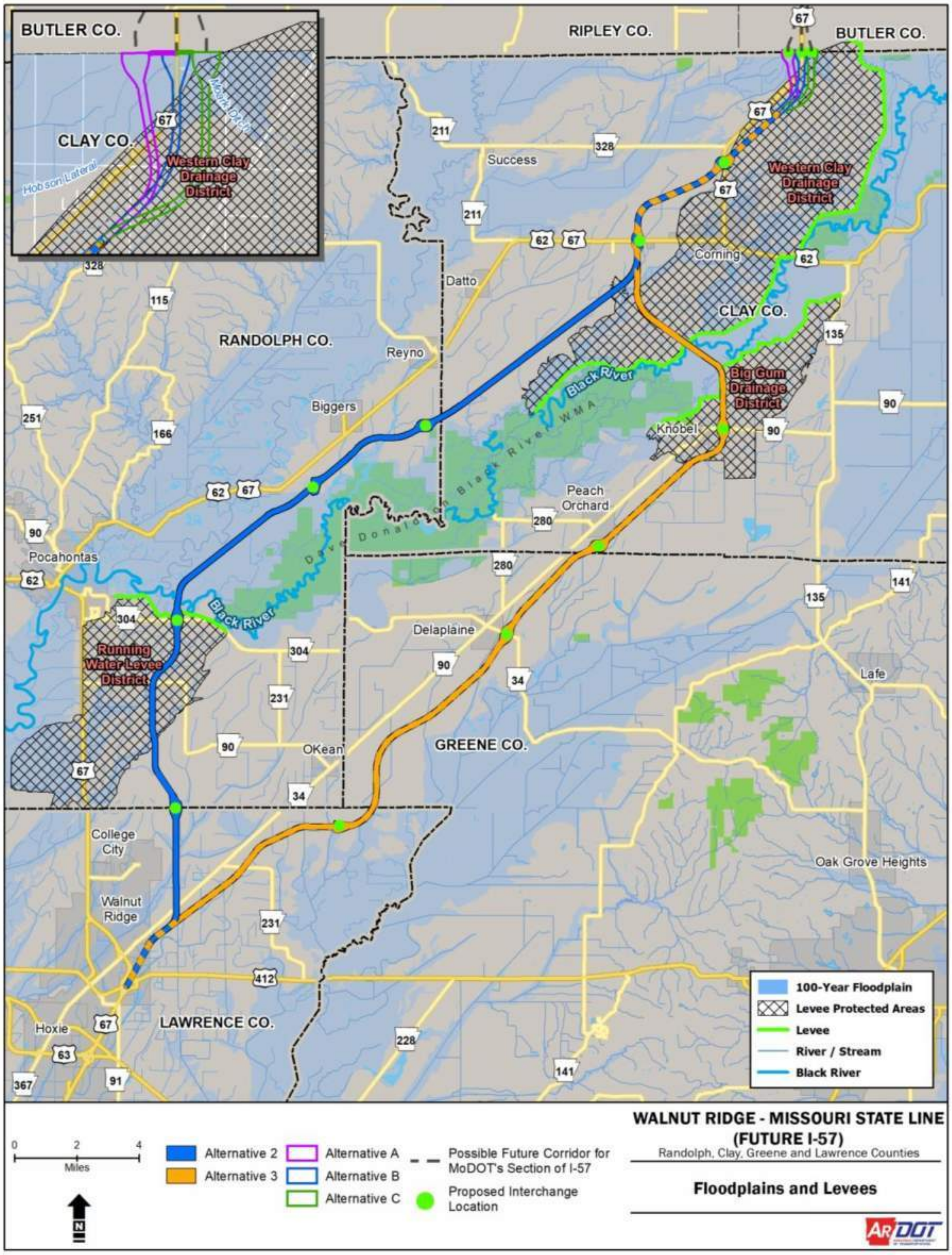
4.2 Existing Conditions

There are several streams, creeks, tributaries, rivers, and their corresponding floodplains that occur within the ROW footprints of the action alternatives. Floodplains surrounding the action alternatives are shown in **Figure 6**. The roadway encroachments can be categorized as two different types, transverse or longitudinal. Transverse encroachments cross perpendicular to the direction of flow in the floodplain (often crossing the stream that is conveying the flow). Transverse encroachments are likely to require a hydraulic structure (e.g., a bridge) to mitigate flooding impacts upstream of the encroachment due to blocking the floodplain in the direction of flood propagation. Longitudinal encroachments run parallel to the flow direction of the floodplain and are associated with storage loss within the floodplain. Longitudinal encroachment mitigation is dependent on the area of storage loss and any tributaries that are contributing to the floodplain nearby.

Three levees occur in the project vicinity, each belonging to one of the following levee systems: Running Water Levee District, Western Clay Drainage District, and Big Gum Drainage District. No other USACE civil works projects occur within or near the alternative footprints. The primary purpose of all three levees is flood risk reduction and each are USACE civil works projects and would require a Section 408 review if the proposed project crosses them. Each of these levees and their associated protected areas (i.e., leveed areas) are shown in **Figure 6** and details on each are provided below.

The Running Water Levee District system is a federally authorized non-federally operated and maintained rural flood protection project. The USACE constructed this levee in 1938 and turned it over to a public sponsor, the Running Water Levee District, which is responsible for operations and maintenance. The minimum height for the levee is 3.0 feet, the maximum is 11.0 feet, and the average is 7.0 feet. The Running Water Levee District Levee System serves as flood damage reduction for about 65,000 acres of primarily agricultural land within the unincorporated Randolph County protected area. The Running Water Levee System is located south of, and on the left bank of, the Black River. The system segment is 8.7 miles in total length, is comprised entirely of earthen levee, and has a leveed area of 23.51 square miles. This levee system currently has an active USACE rehabilitation status.

Figure 6: Floodplains and Levees

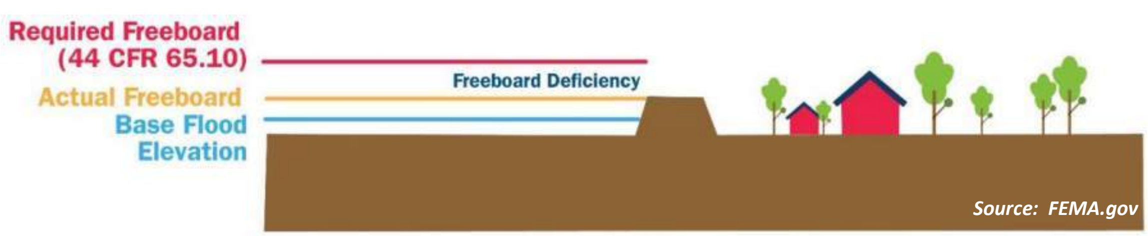


The Western Clay levee system is a federally authorized non-federally operated and maintained rural flood protection project. The USACE constructed this levee in 1940 and turned it over to a public sponsor, the Western Clay Drainage District, which is responsible for operations and maintenance. The minimum height for the levee is 8.5 feet, the maximum is 18.2 feet, and the average is 13.3 feet. The levee system serves to protect the Town of Corning within Clay County and is located northwest of, and on the right bank of, the Black River. The system is 22.5 miles in total length, is comprised entirely of earthen levee, and has a leveed area of 43.01 square miles. This levee system currently has an inactive USACE rehabilitation status.

The Big Gum Drainage District system is comprised of two segments: the Big Gum Railroad Embankment segment and the Big Gum Drainage District segment. The proposed project crosses the Big Gum Railroad Embankment segment, which was locally constructed and is locally operated and maintained by Union Pacific Railroad. At the time of construction in 1940, the levee system was intended to provide protection from floods having a crest elevation three feet higher than a confined 1927 flood on the Black River. The minimum height for the Big Gum Railroad Embankment segment is 12.0 feet, the maximum is 16.0 feet, and the average is 14.0 feet. The Big Gum system, along with the Central Clay (located further northeast) and Western Clay levee systems, primarily serves as flood damage reduction for 175,000 acres of primarily agricultural land, including scattered farmsteads and the towns of Corning and Knobel, Arkansas. Within the protected areas are highways, major streets, residential, commercial, and industrial properties. Failure of the Big Gum system would result in the flooding of Knobel, causing property damage and potential loss of life. The Big Gum Drainage District system is located south of, and on the left Bank of, the Black River. The entire 8.8-mile system is constructed of compacted earthen fill, consists of both new levee and an existing levee, which date of construction and dimensions are unknown., and has a leveed area of 12.47 square miles. This levee system currently has an active USACE rehabilitation status.

No documentation was readily available to determine whether the three levees within the alternative footprints are certified or accredited levees. If these levees are not accredited, it could be because they currently have a freeboard deficiency or because the community has not submitted an application for them to be accredited. Freeboard is the distance between the 100-year flood event water surface elevation and the elevation of the top of the levee. As shown in **Figure 7**, a levee is freeboard deficient if it does not meet the minimum freeboard standard of 3 feet above the base flood (100-year) water surface elevation as required by 44 CFR 65.10(b)(1)(i). Furthermore, 44 CFR 65.10 also requires an additional 1 foot of freeboard above the minimum if within 100 feet of a structure such as bridge.

Figure 7: Example of a Levee that has a Freeboard Deficiency



Even a bridge with only the piers inside the levee could cause a water surface rise and the levee to be freeboard deficient. The final design of the proposed project would need coordination with the levee boards to get the as-built plans for the levees in order to verify their designed freeboard and determine if there is any room for water surface elevation increases.

4.3 Environmental Effects

No Action Alternative

The No Action Alternative would not affect any floodplains.

Alternative 2

Alternative 2 crosses through Clay, Randolph, and Lawrence Counties in northeastern Arkansas. The total project area for Alternative 2 with a 400-foot-wide footprint is 2,249 acres. Current mapping indicates that Alternative 2 would encroach on approximately 8.7 miles and approximately 423.1 acres of Zone A floodplain, which is 18.8% of the total area within its proposed ROW footprint. Alternative 2 floodplain impacts affect 15 different areas with nine transverse and six longitudinal encroachments. The individual crossing impact locations are quantified in **Table 4**.

Alternative 2 has the potential to encroach on approximately 5.9 acres of Zone A floodplains in Clay County. These floodplains are associated with three different waterbodies covering a total length of approximately 0.15 mile. There are a total of two transverse encroachments and one longitudinal encroachment, totaling three encroachments in Clay County.

Alternative 2 has the potential to encroach on approximately 362.4 acres of Zone A floodplains in Randolph County. These floodplains are associated with nine different waterbodies covering a total length of approximately 7.5 miles. There are five transverse encroachments and five longitudinal encroachments, totaling 10 encroachments in Randolph County.

Alternative 2 has the potential to encroach on approximately 54.8 acres of Zone A floodplains in Lawrence County. These floodplains are associated with two different waterbodies covering a total length of approximately 1.1 miles. There are two transverse encroachments in Lawrence County.

Table 4: Alternative 2 Area and Length of Potential Zone A Floodplain Impacts

County	River/Creek/Ditch/Lateral/Tributary Associated with Floodplain	Type*	Floodplain Impact	
			Area (acres)	Length (miles)
Lawrence	Trib of Little Village Creek Ditch	T	21.13	0.43
Lawrence	Village Creek	T	33.72	0.68
Randolph	Tupelo Ditch	L	1.48	0.09
Randolph	Big Running Water Creek	T	9.26	0.19
Randolph	Cypress Lateral	T	33.47	0.68
Randolph	Black River	T	302.62	6.07
Randolph	Black River	L	2.73	0.12
Randolph	Trib of Black River	L	0.24	0.03
Randolph	Murray Creek Ditch	L	0.31	0.04
Randolph	Trib of Murray Creek Ditch	L	0.31	0.03
Randolph	Murray Creek Ditch	T	7.34	0.15
Randolph	Trib of Black River	T	4.64	0.04
Clay	Trib of Cypress Creek Ditch	T	2.71	0.06
Clay	Trib of Cypress Creek Ditch	T	2.24	0.04
Clay	Trib of Cypress Creek Dich	L	0.94	0.05
		Total	**423.13**	**8.71**

*T = Transverse Encroachment L = Longitudinal Encroachment

Alternative 2 also crosses one levee associated with the Running Water Levee District in Randolph County, approximately 4 miles east of Pocahontas. This levee, which ties into Hwy. 304 roadway embankment near the proposed crossing, is not referenced by FEMA on the FIRM or FIS Report for Randolph County. The levee would most likely be spanned by a bridge.

Alternative 3

Alternative 3 crosses through Clay, Greene, Randolph, and Lawrence Counties in northeastern Arkansas. The total project area for Alternative 3 with a 400-foot-wide footprint is 2,337 acres. Alternative 3 would encroach on approximately 2.7 miles and approximately 117.5 acres of Zone A floodplain, which is 5.0% of the total area within its proposed ROW footprint. Alternative 3 floodplain impacts affect 10 different areas with seven transverse and three longitudinal encroachments. The individual crossing impact locations are quantified in **Table 5**.

Alternative 3 has the potential to encroach on approximately 90.1 acres of Zone A floodplains in Clay County. These floodplains are associated with five different waterbodies covering a total length of approximately 1.9 miles. There are five transverse encroachments in Clay County.

Alternative 3 has the potential to encroach on approximately 8.1 acres of Zone A floodplains in Greene County. These floodplains are associated with one waterbody covering a total length of approximately 0.2 mile. There is one transverse encroachment and one longitudinal encroachment, totaling two encroachments in Greene County.

Alternative 3 has the potential to encroach on approximately 19.4 acres of Zone A floodplain in Lawrence County. This floodplain is associated with two different waterbodies covering a total length of approximately 0.6 mile. There are three longitudinal encroachments in Lawrence County.

Table 5: Alternative 3 Locations of Potential Zone A Floodplain Impacts

County	River/Creek/Ditch/Lateral/Tributary Associated with Floodplain	Type*	Floodplain Impacts	
			Area (acres)	Length (miles)
Lawrence	Beaver Dam Ditch	T	6.77	0.14
Lawrence	Beaver Dam Ditch	L	1.48	0.08
Lawrence	Tupelo Slough	L	11.11	0.37
Greene	Lateral No. 1	L	0.96	0.08
Greene	Lateral No. 1	T	7.10	0.17
Clay	Trib of Petersburg Ditch	T	1.42	0.04
Clay	Petersburg Ditch	T	0.43	0.03
Clay	Trib of Black River	T	1.62	0.03
Clay	Black River	T	68.50	1.41
Clay	Cypress Creek Ditch	T	18.12	0.38
		Total	**117.52**	**2.74**

*T = Transverse Encroachment L = Longitudinal Encroachment

Alternative 3 also crosses two levees associated with the Western Clay Drainage District located on the west side of the Black River and the Big Gum Drainage District levee on the east side of the Black River (shown as the Black River West Bank Levee and the Black River East Bank Levee 1 on the FIRM panels). East of Corning, the Western Clay Drainage District levee ties into the Hwy. 62 roadway embankment and the Big Gum Drainage District levee ties into the Hwy. 135 roadway embankment. These levees are currently shown on the FEMA FIRM panels and documented in the FIS report as providing flood protection. Levees that are shown to provide flood protection are designed in accordance with a minimum freeboard. Based on available data, the impacted levees would need to be treated as a regulatory floodway and be developed with a no-rise condition to the 100-year flood event to prevent a decrease in the freeboard of the levee and possibly compromise the levee structure as freeboard deficient. FEMA defines a "regulatory floodway" as the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

Alternative A

Alternative A terminates at Hwy. 67 on the Arkansas-Missouri State line in Clay County on the west side of the existing Hwy. 67. The total project area for Alternative A with a 400-foot-wide footprint is 142 acres. Alternative A would encroach on approximately 0.87 mile and approximately 76.2 acres of Zone A floodplain, which is 53.7% of the total area within its proposed ROW footprint. This floodplain is associated with Hobson Lateral, which is a USGS-named stream that is part of the larger watershed of the Current River. There is one transverse encroachment in Clay County. No levees or other USACE civil works projects would be impacted by Alternative A.

Alternative B

Alternative B terminates at the Arkansas-Missouri State line in Clay County and is partially centered on the existing Hwy. 67. The total project area for Alternative B with a 400-foot-wide footprint is 139 acres. Alternative B would encroach on approximately 0.79 mile and approximately 67.2 acres of Zone A floodplain, which is 48.3% of the total area within its proposed ROW footprint. This floodplain is associated with Hobson Lateral which is part of the larger watershed of the Current River. There is one transverse encroachment in Clay County. No levees or other USACE civil works projects would be impacted by Alternative A.

Alternative C

Alternative C terminates at Hwy. 67 on the Arkansas-Missouri State line in Clay County on the east side of the existing Hwy. 67. The total project area for Alternative C with a 400-foot-wide footprint is 159 acres. Alternative C would encroach on approximately 0.68 mile and approximately 66.5 acres of Zone A floodplain, which is 41.8% of the total area within its proposed ROW footprint. Alternative C's ROW limits run parallel to the Moak Ditch channel and based on proposed ROW extents, could possibly require a channel change for approximately 1,900 feet. A channel change would occur when a roadway embankment fills in part of a parallel channel that does not cross the alignment. There is one transverse encroachment for Alternative C. No levees or other USACE civil works projects would be impacted by Alternative A.

4.4 Avoidance, Minimization, and Mitigation

A detailed hydrologic and hydraulic study would be required for final design to determine existing storm event peak discharges and stage-discharge relationship for each affected floodplain. The designated Special Flood Hazard Zone A affected area would require the establishment of base flood elevations (BFEs) for the impacted floodplains. The BFE is defined by FEMA as the computed elevation to which the flood is anticipated to rise during the base flood (100-year event). The existing conditions would then be used to design the type and size of structure to mitigate the impacts for the Preferred Alternative footprint. To protect existing structures from increased flooding risks, the hydraulic design would include hydraulic structures such as bridges, culverts, open channel ditches, and/or detention/retention ponds to accommodate the storm discharges and limit the increases compared to the BFEs. Coordination with the Local Floodplain Administrator would be necessary to determine any allowable Zone A floodplain impacts. The proposed mitigation structures would be analyzed using modern hydraulic analysis methods to ensure existing flow regimes are maintained, limit upstream flooding, and preserve existing downstream flow rates. The hydraulic analysis would also be used to design scour and erosion mitigation.

Section 408 review by USACE would occur for each of the three levees within the Preferred Alternative and Section 408 approval/clearance would be obtained from USACE prior to project construction.

Chapter 5 – References

5.1 Acronyms

ADH	Arkansas Department of Health
ANRC	Arkansas Natural Resources Commission
APC&EC	Arkansas Pollution Control and Ecology Commission
ARDOT	Arkansas Department of Transportation
BFE	Base Flood Elevations
BMP	Best Management Practices
CFR	Code of Federal Regulations
CWA	Clean Water Act
DEQ	Arkansas Division of Environmental Quality
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ERW	Extraordinary Resource Water
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Maps
FIS	Flood Insurance Study Reports
FW	Farmed Wetlands
HUC	Hydrologic Unit Code
LF	Linear Feet
LiDAR	Light Detection and Ranging
MGD	Million Gallons Per Day
NASS	National Agricultural Statistics Service
NFIP	National Flood Insurance Program
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
OHWM	Ordinary High Water Mark
PC	Prior Converted Croplands
ROW	Right of Way
SP	Special Provision
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
USACE	U.S. Army Corps of Engineers
USDA	United States Department of Agriculture
USGS	U.S. Geological Survey
WHPA	Wellhead Project Areas

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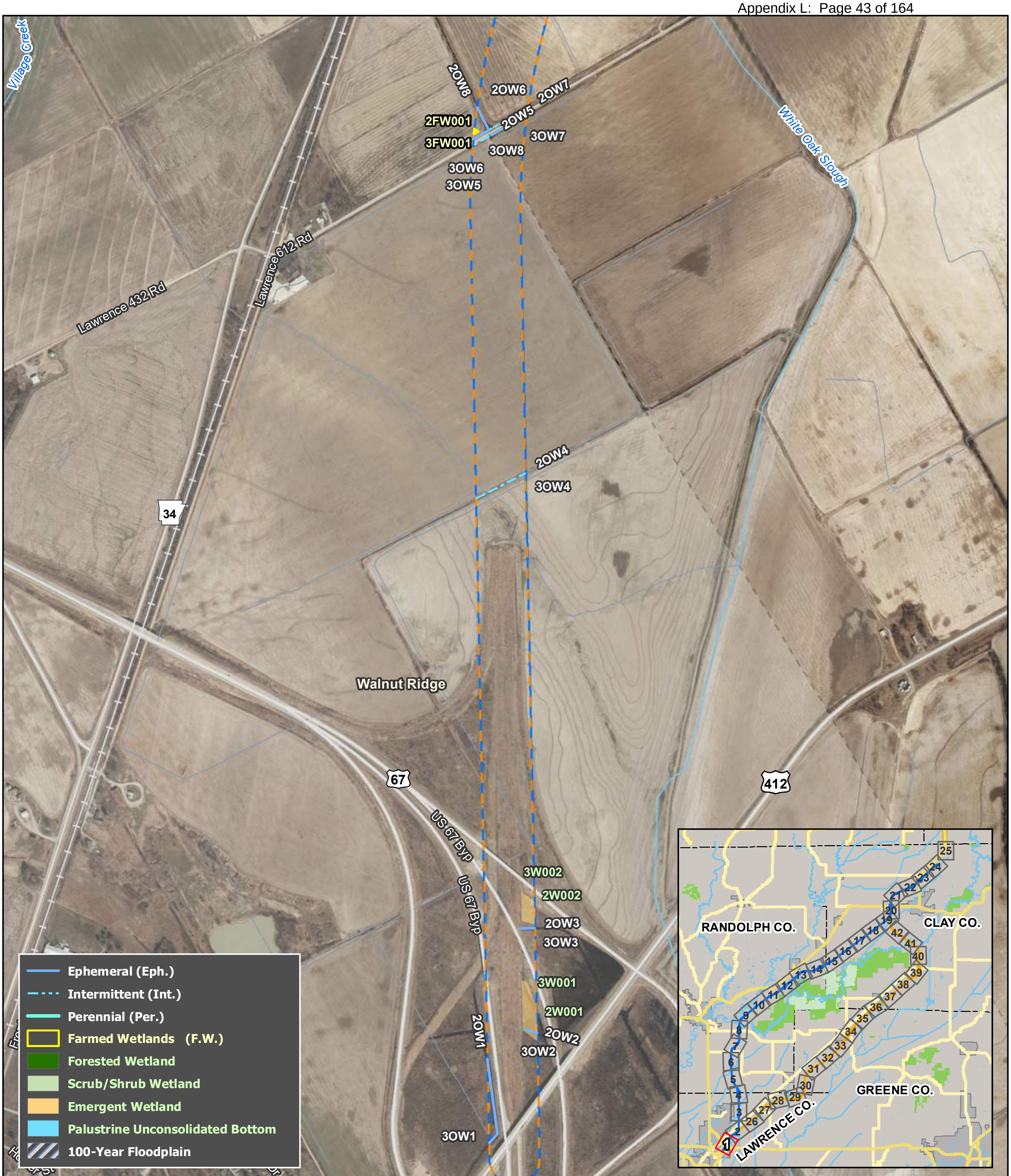
ATTACHMENT A — DETAILED WATER RESOURCES WITHIN THE ALTERNATIVE FOOTPRINTS



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Feet

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Alternatives

Alternative 2
Alternative 3
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Alternative B
Alternative C

WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 1 of 42

ARDOT

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Alternatives

Alternative 2
Alternative 3
Alternative A
Alternative B
Alternative C

WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 2 of 42

ARDOT

WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 3 of 42

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Feet

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Alternatives

Alternative 2
Alternative 3
Alternative A
Alternative B
Alternative C

WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 4 of 42

ARDOT

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Feet

Alternatives

Alternative 2	Alternative A
Alternative 3	Alternative B
	Alternative C

WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 6 of 42

Alternatives

Alternative 2 | Alternative A
Alternative 3 | Alternative B
Alternative C

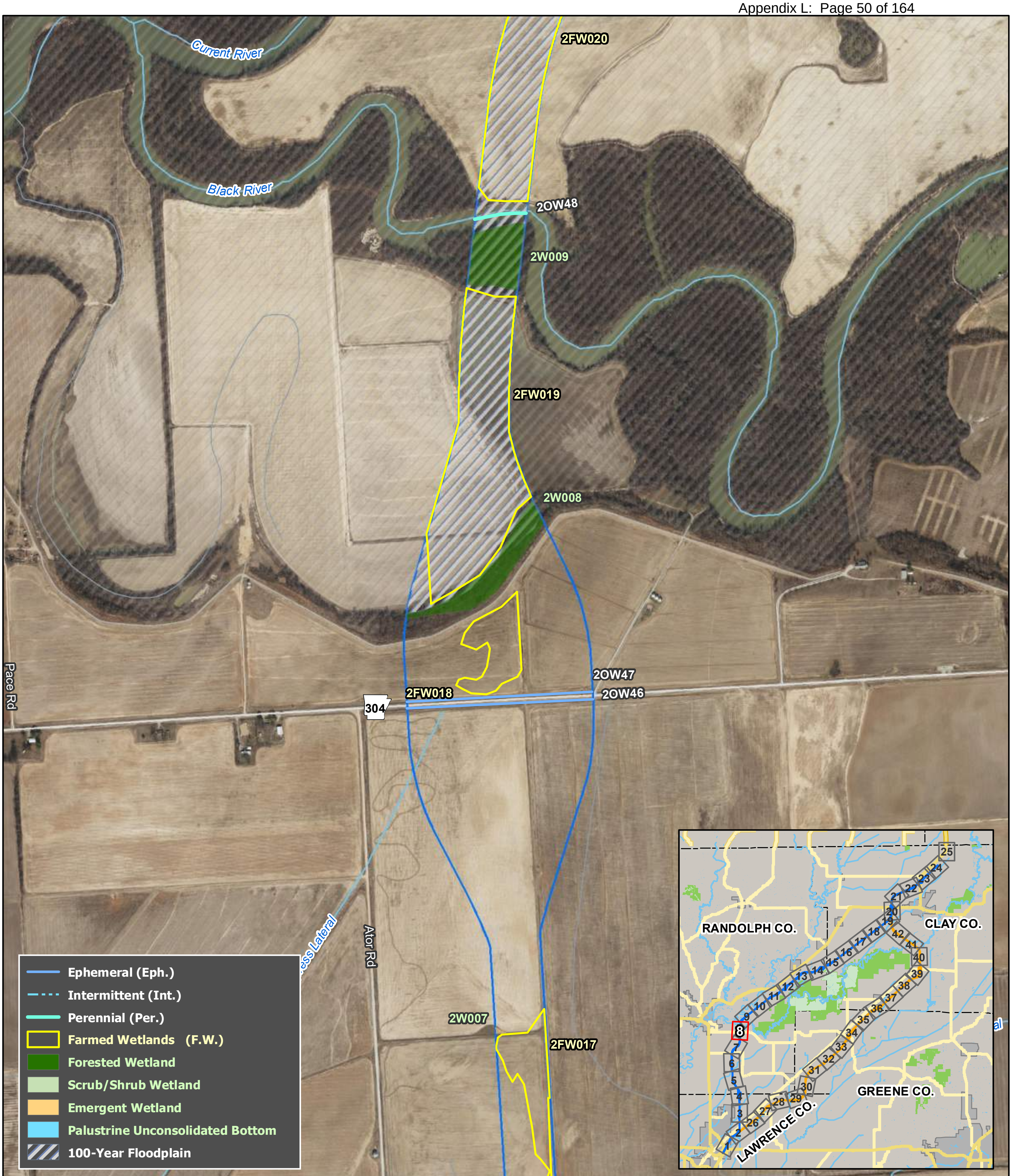
WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 7 of 42

ARDOT



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Alternatives

Alternative 2
Alternative 3
Alternative A
Alternative B
Alternative C

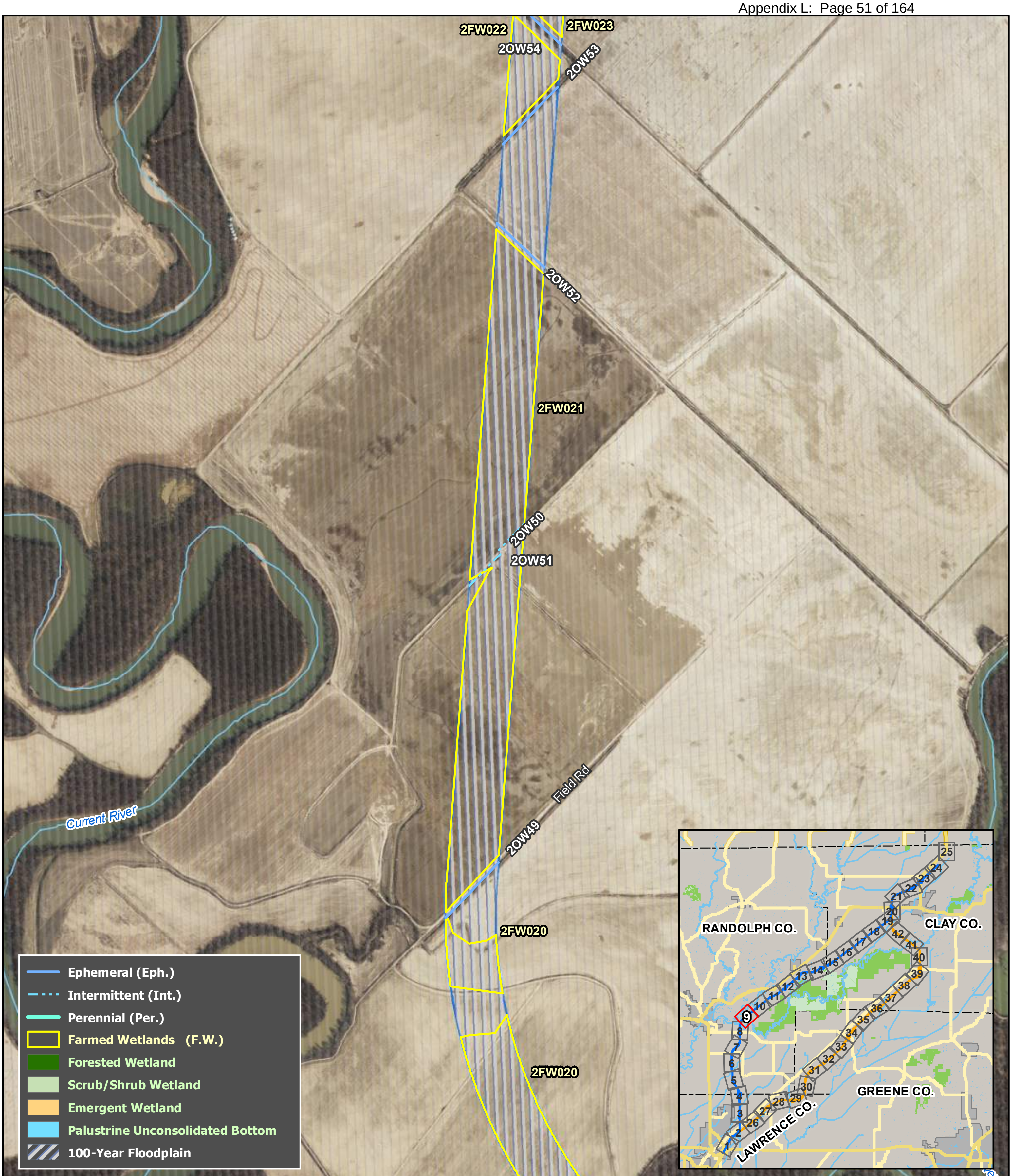
WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 8 of 42

ARDOT



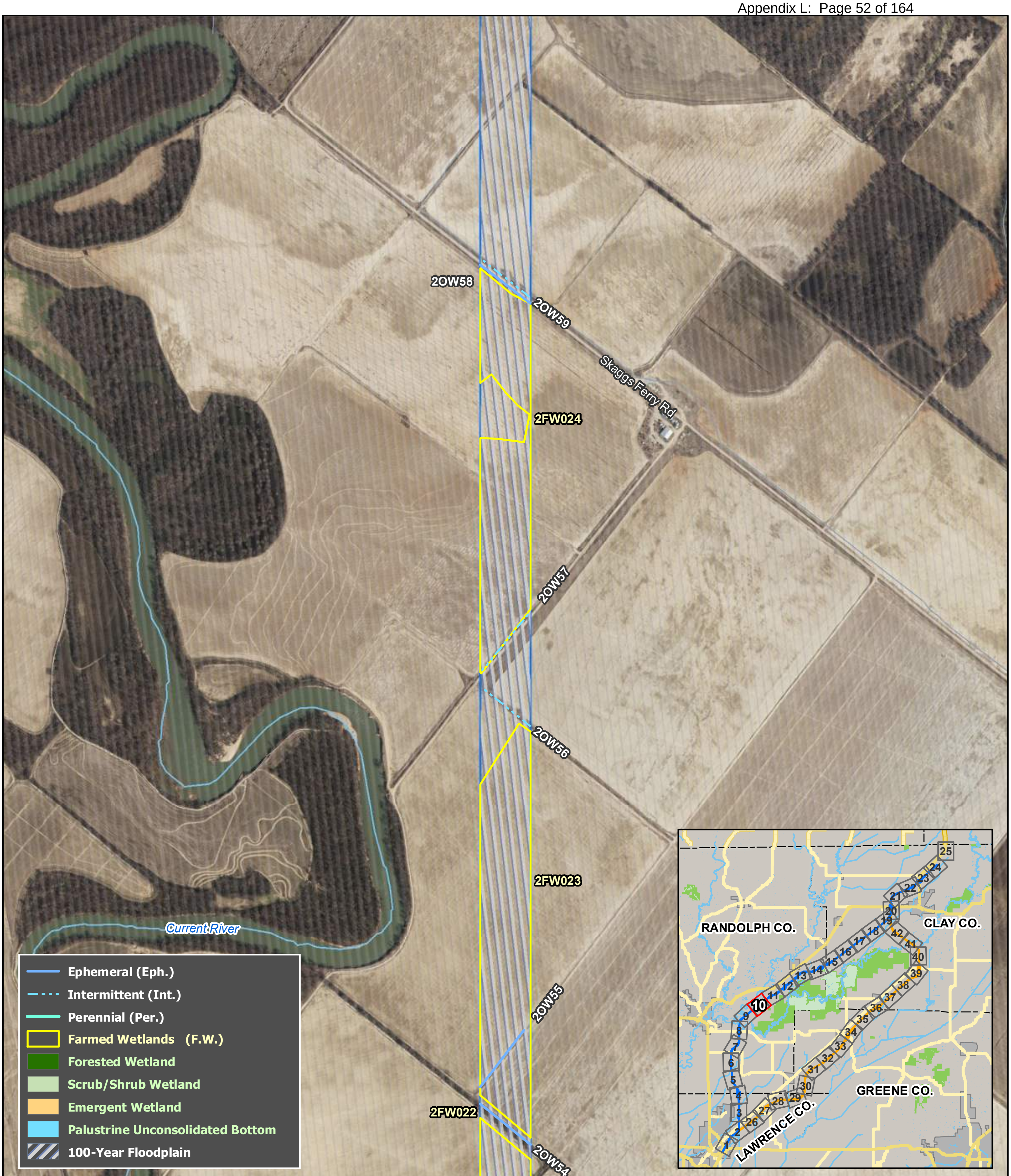
Alternatives

Alternative 2 | Alternative A
Alternative 3 | Alternative B
Alternative C

WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail



Alternatives

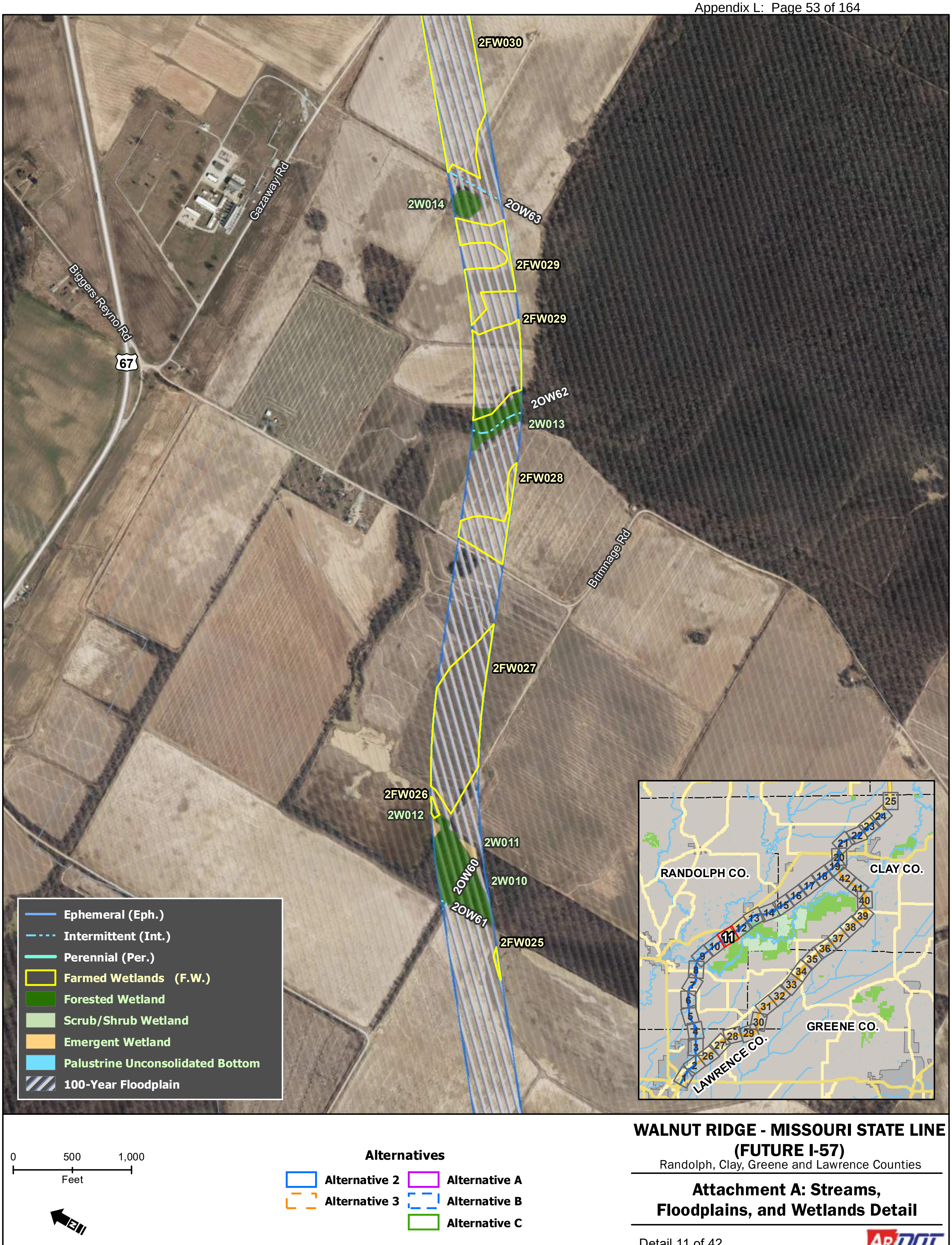
Alternative 2	Alternative A
Alternative 3	Alternative B
	Alternative C

WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 10 of 42



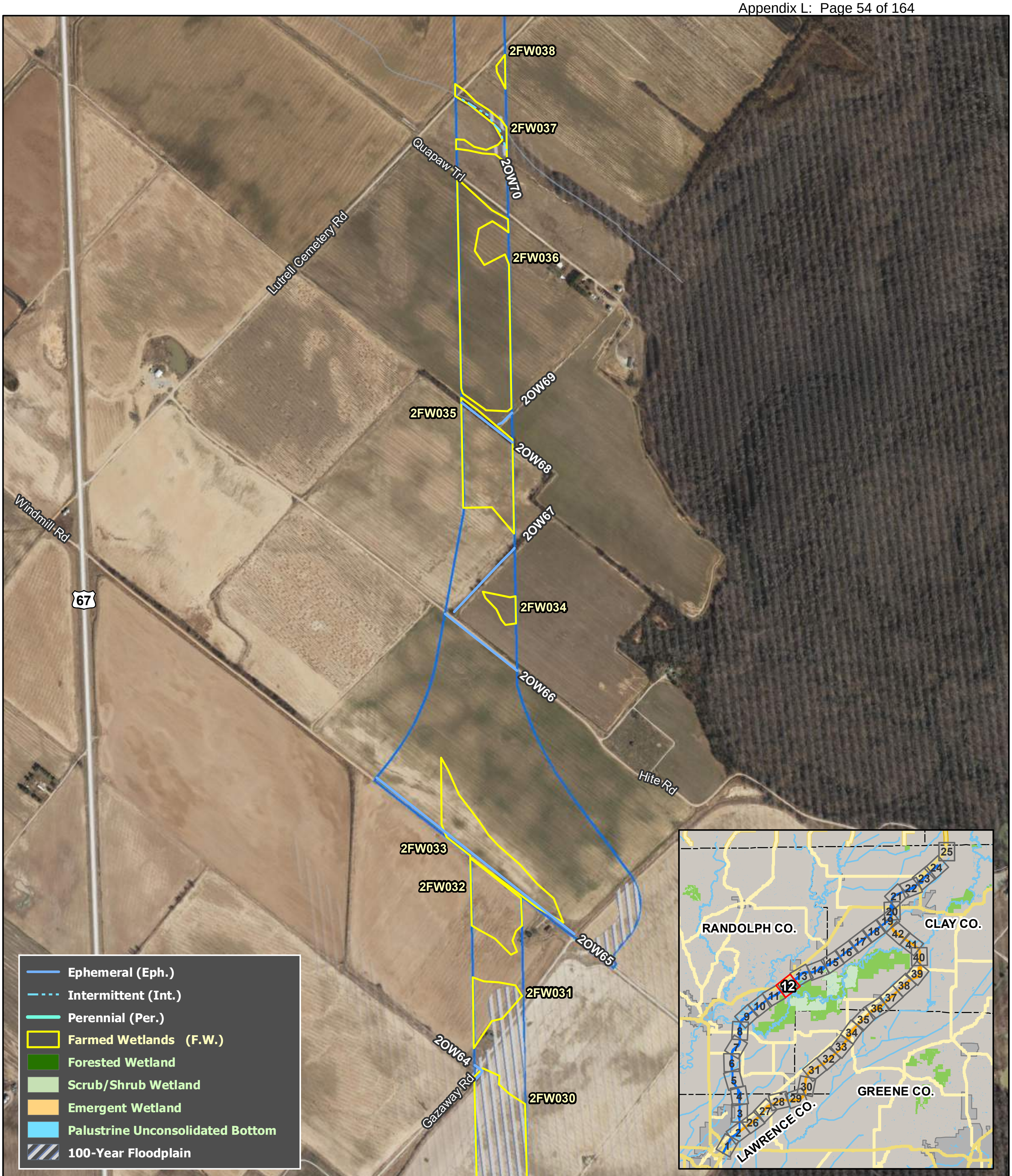
WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 11 of 42

ARDOT



Alternatives

- Alternative 2
- Alternative 3
- Alternative A
- Alternative B
- Alternative C

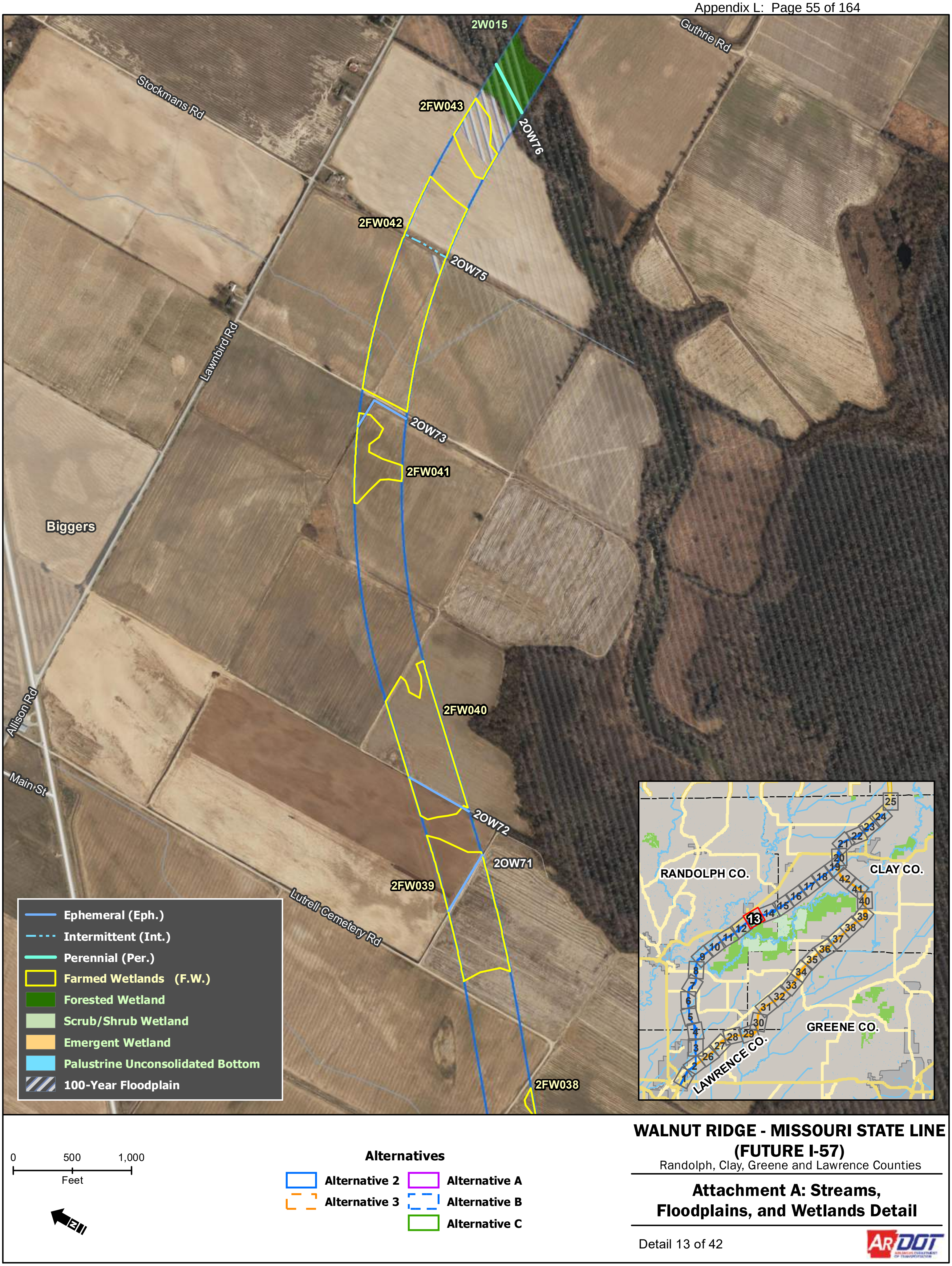
WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 12 of 42

ARDOT

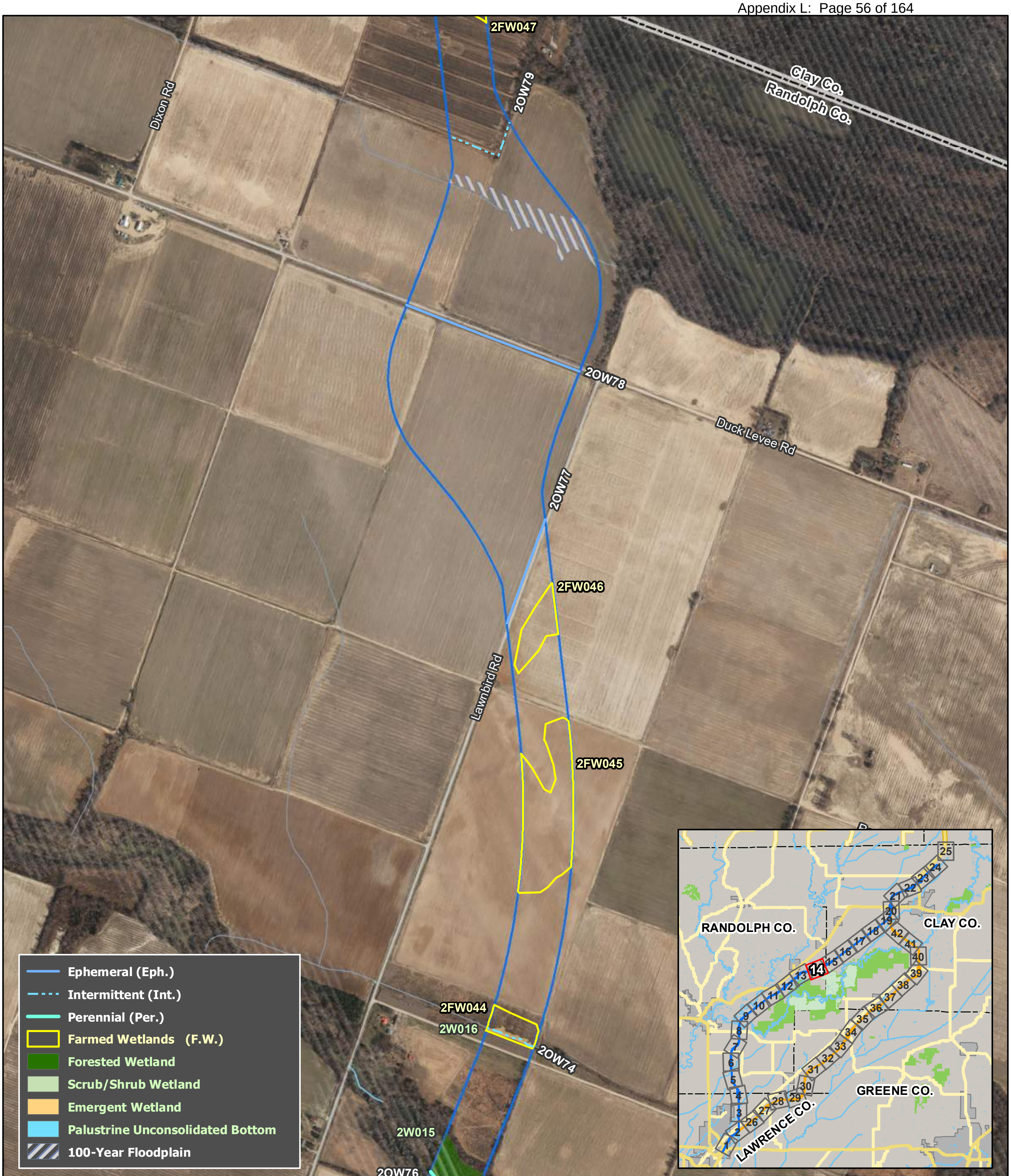


WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 13 of 42



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Feet

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Alternatives

Alternative 2
Alternative 3
Alternative A
Alternative B
Alternative C

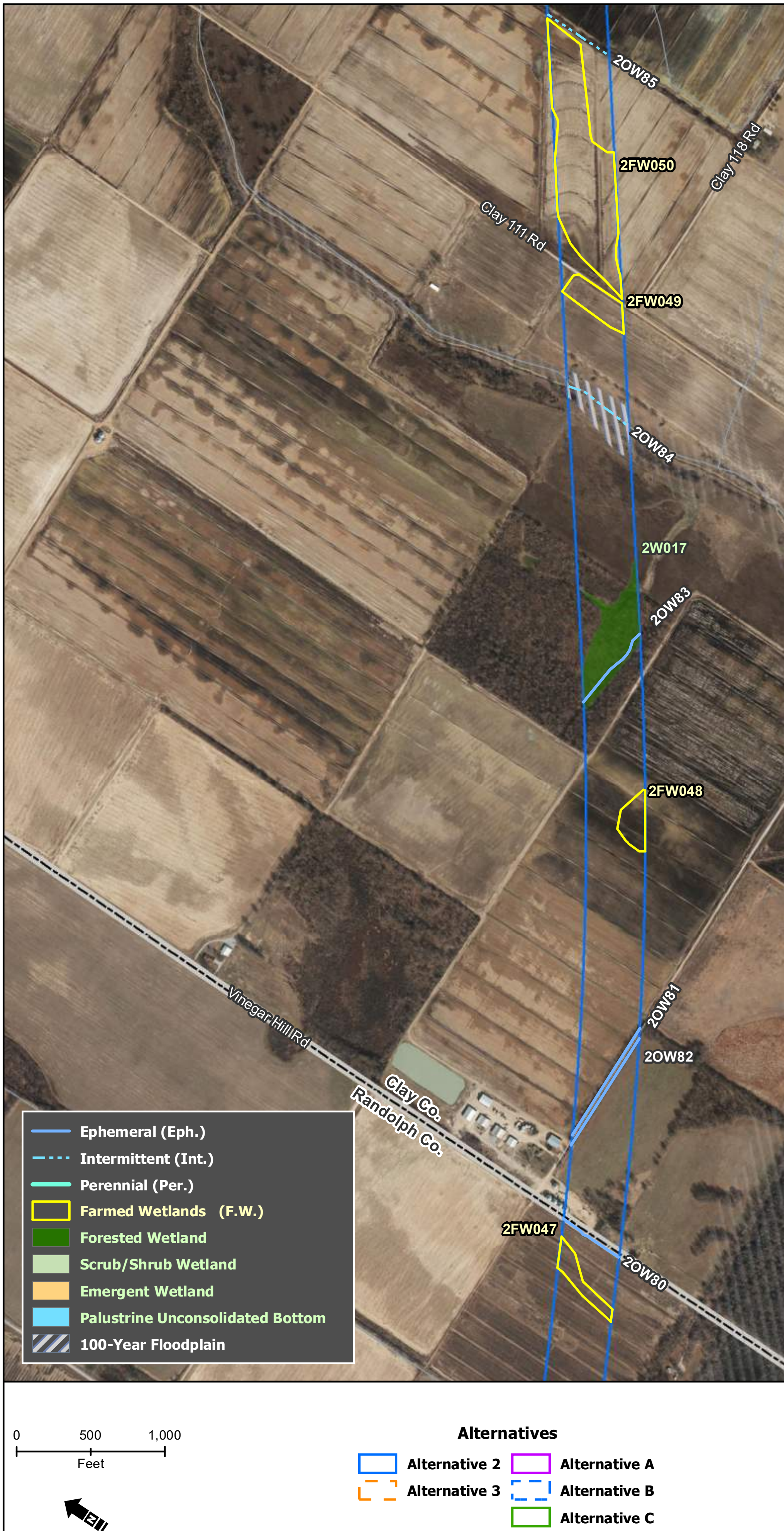
WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 14 of 42

ARDOT



WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 15 of 42

Alternatives

Alternative 2	Alternative A
Alternative 3	Alternative B
	Alternative C

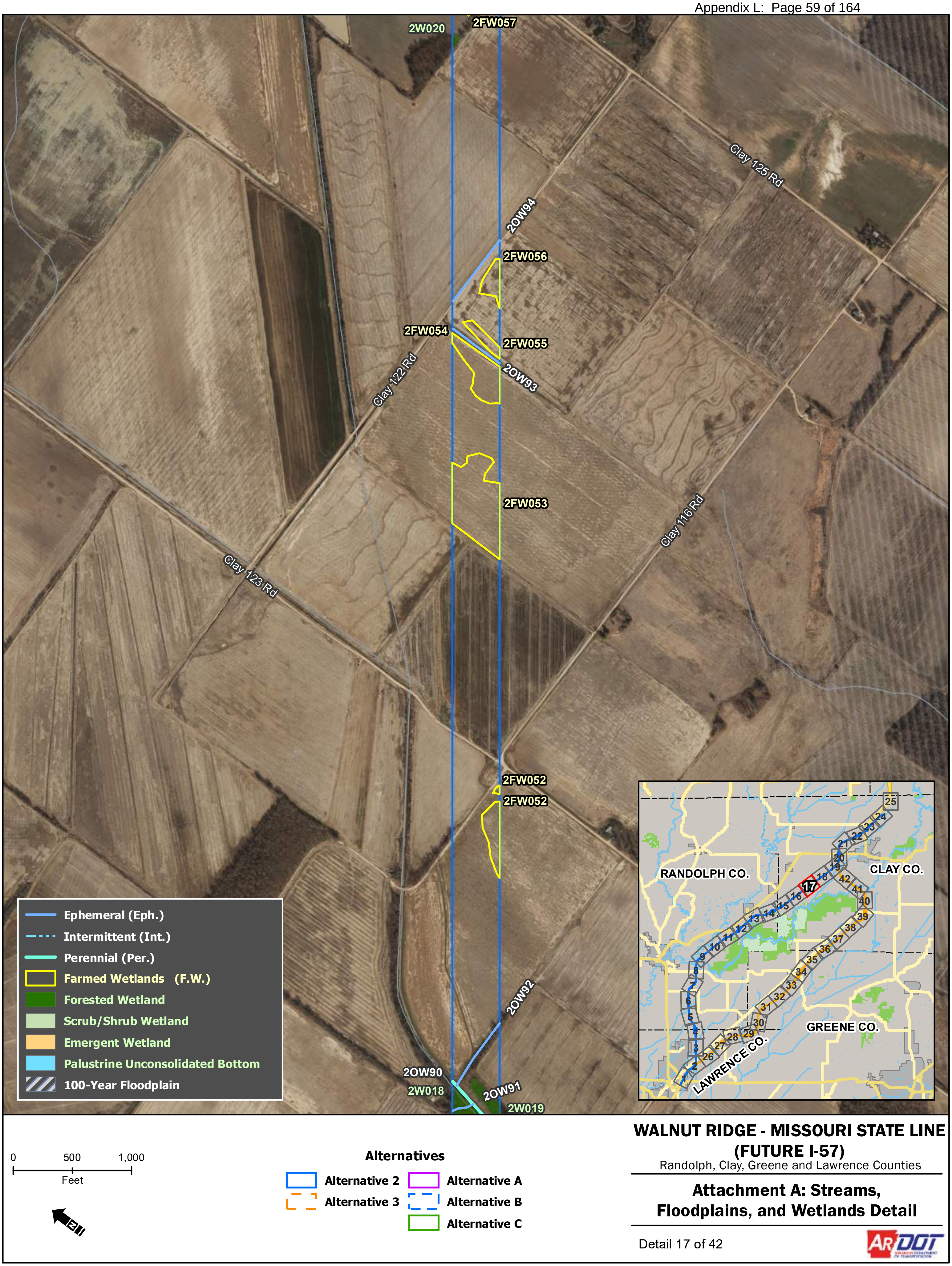
WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 16 of 42

ARDOT



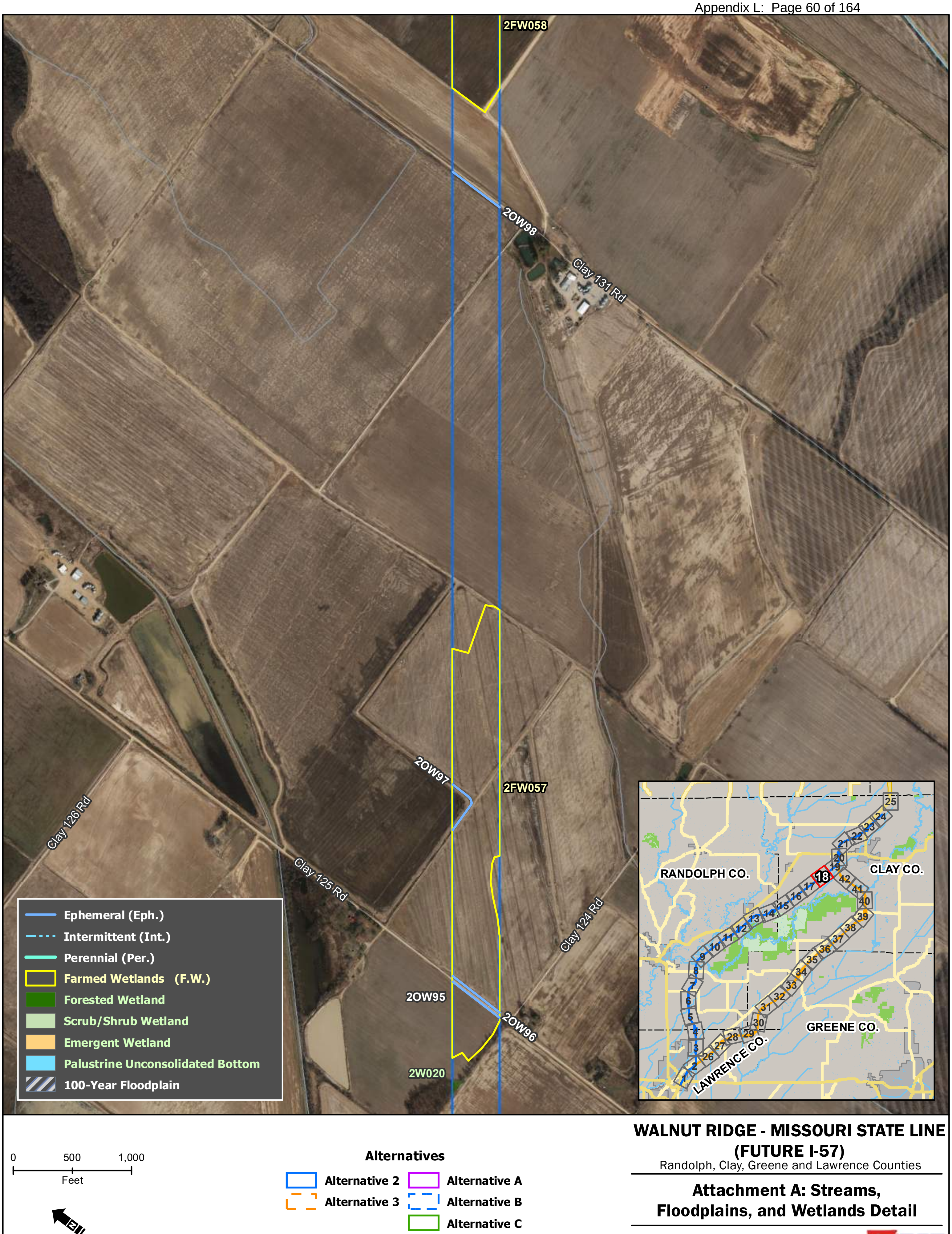
WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 17 of 42

ARDOT

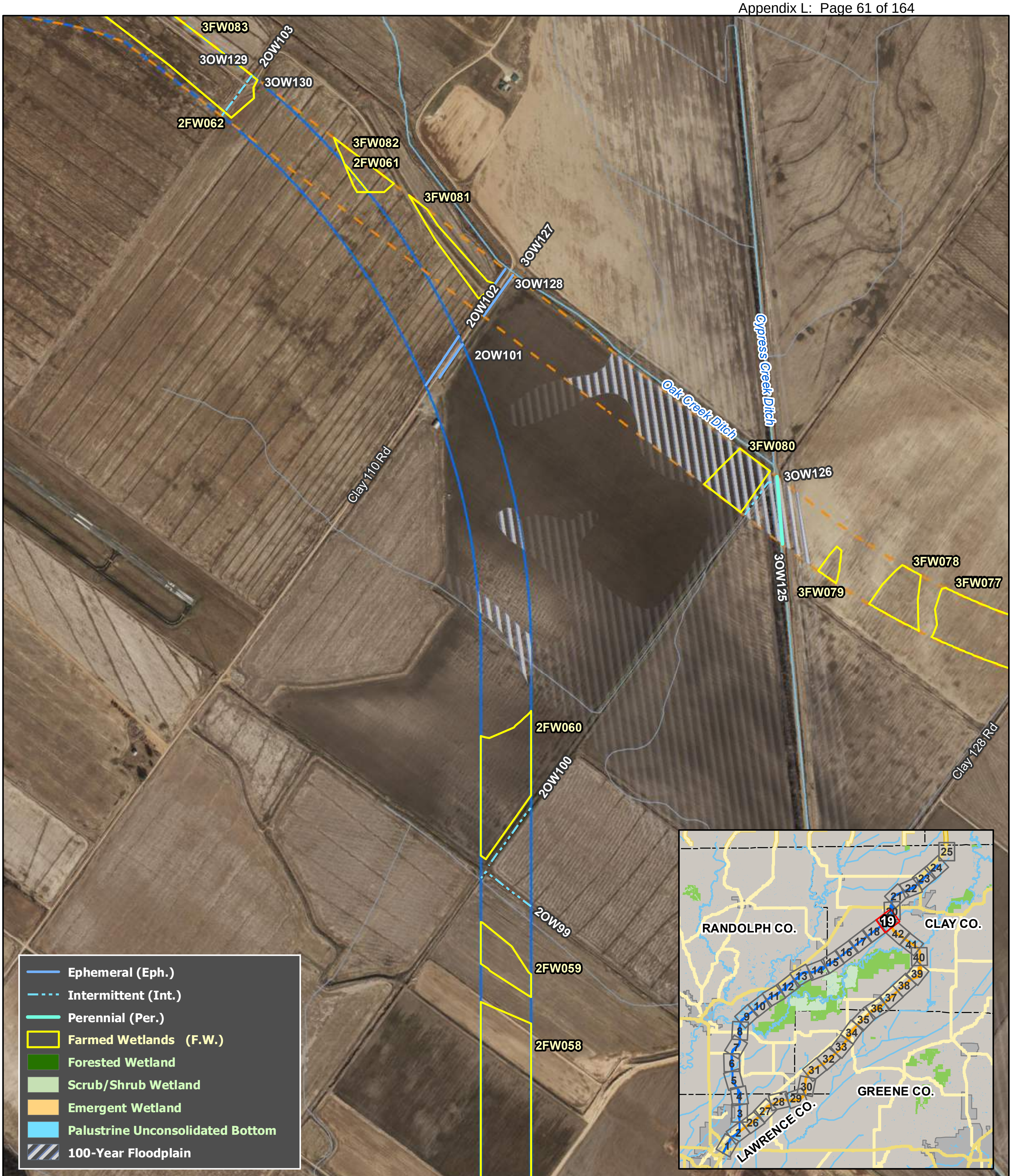


WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 18 of 42



Alternatives

- Alternative 2
- Alternative 3
- Alternative A
- Alternative B
- Alternative C

WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 19 of 42

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Feet

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Alternatives

Alternative 2
Alternative 3
Alternative A
Alternative B
Alternative C

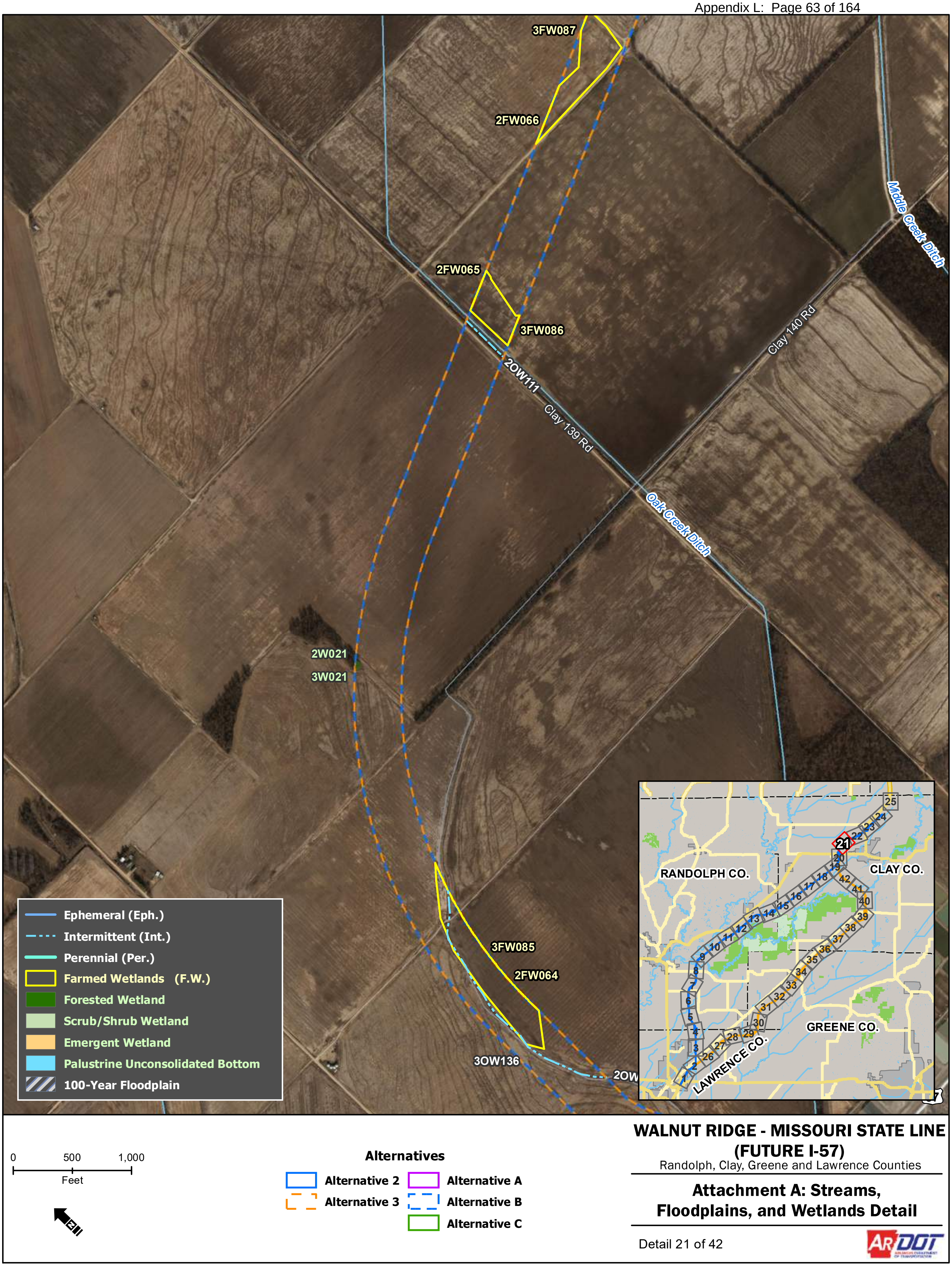
WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 20 of 42

ARDOT

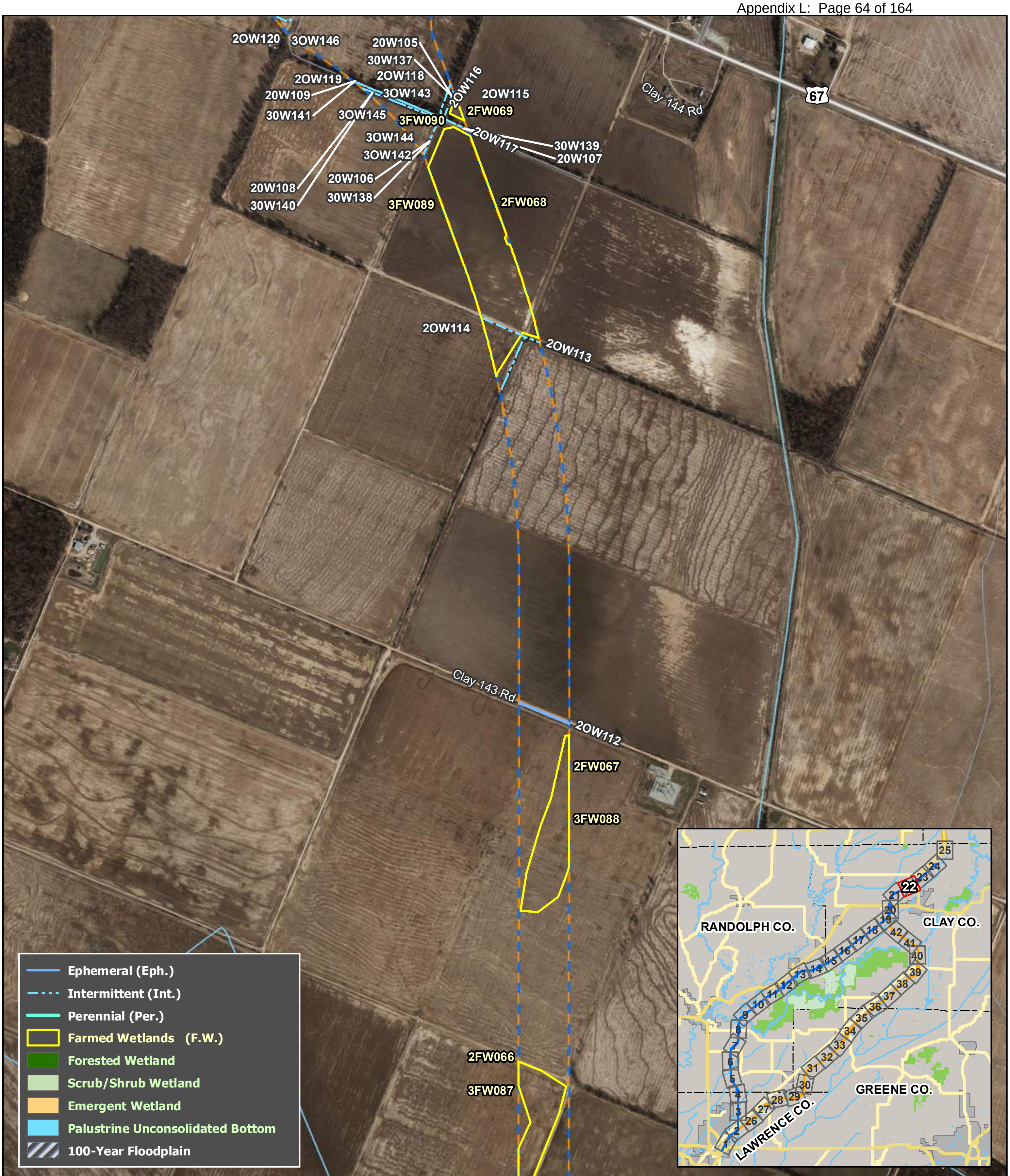


WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 21 of 42



Alternatives

- Alternative 2
- Alternative 3
- Alternative A
- Alternative B
- Alternative C

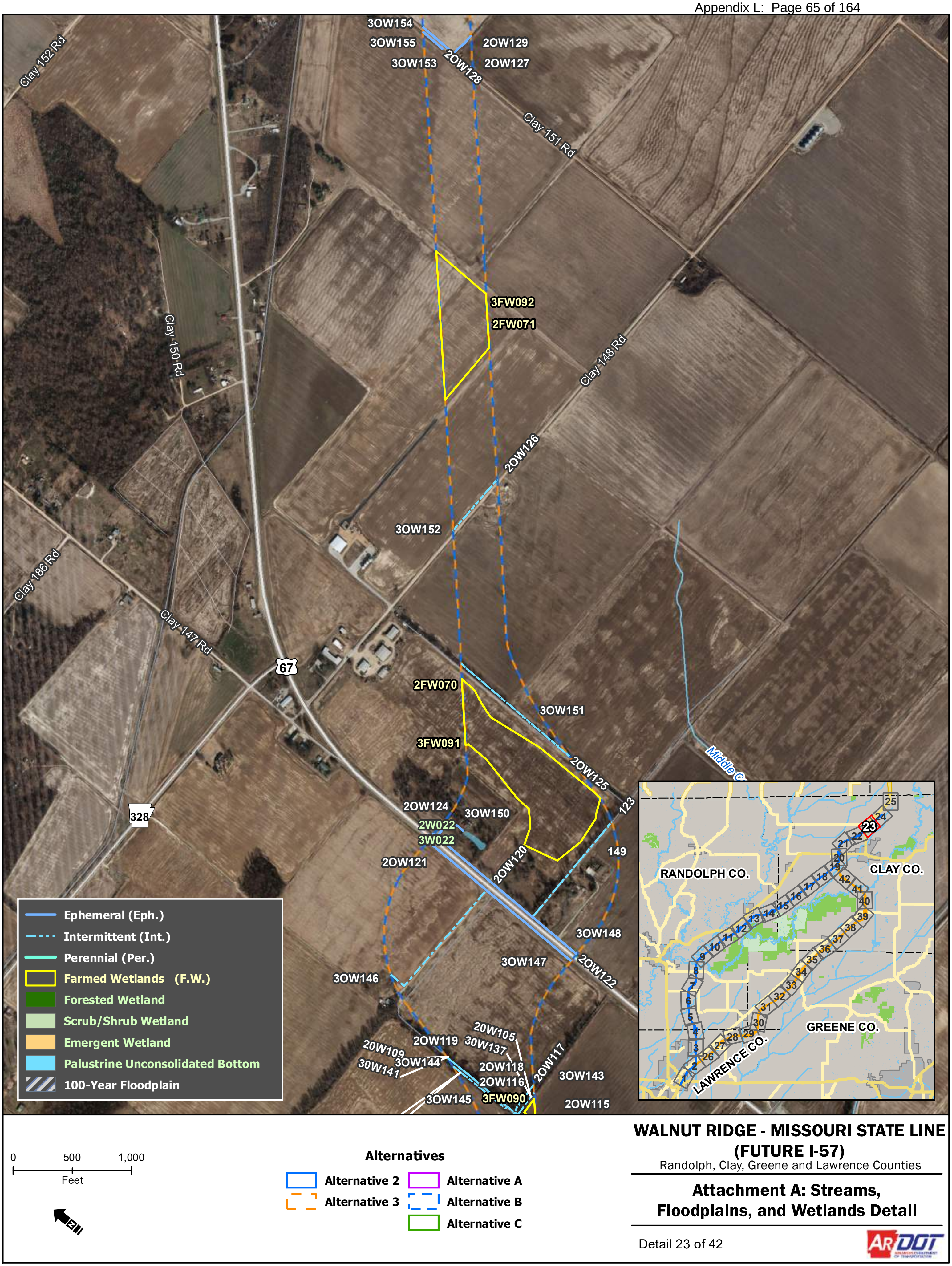
WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 22 of 42

ARDOT



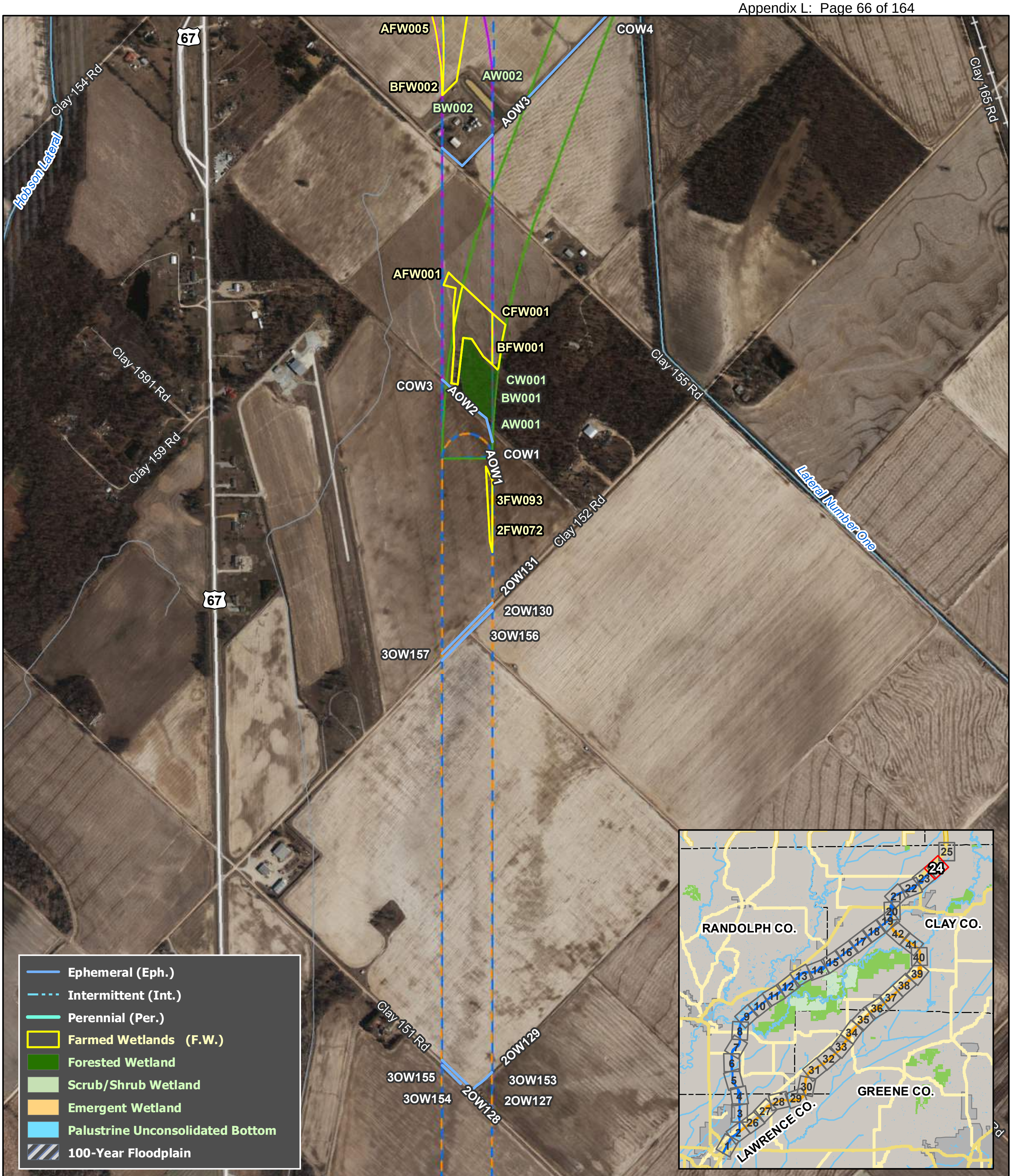
WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 23 of 42

ARDOT



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Alternatives

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Alternative 3
Alternative A
Alternative B
Alternative C

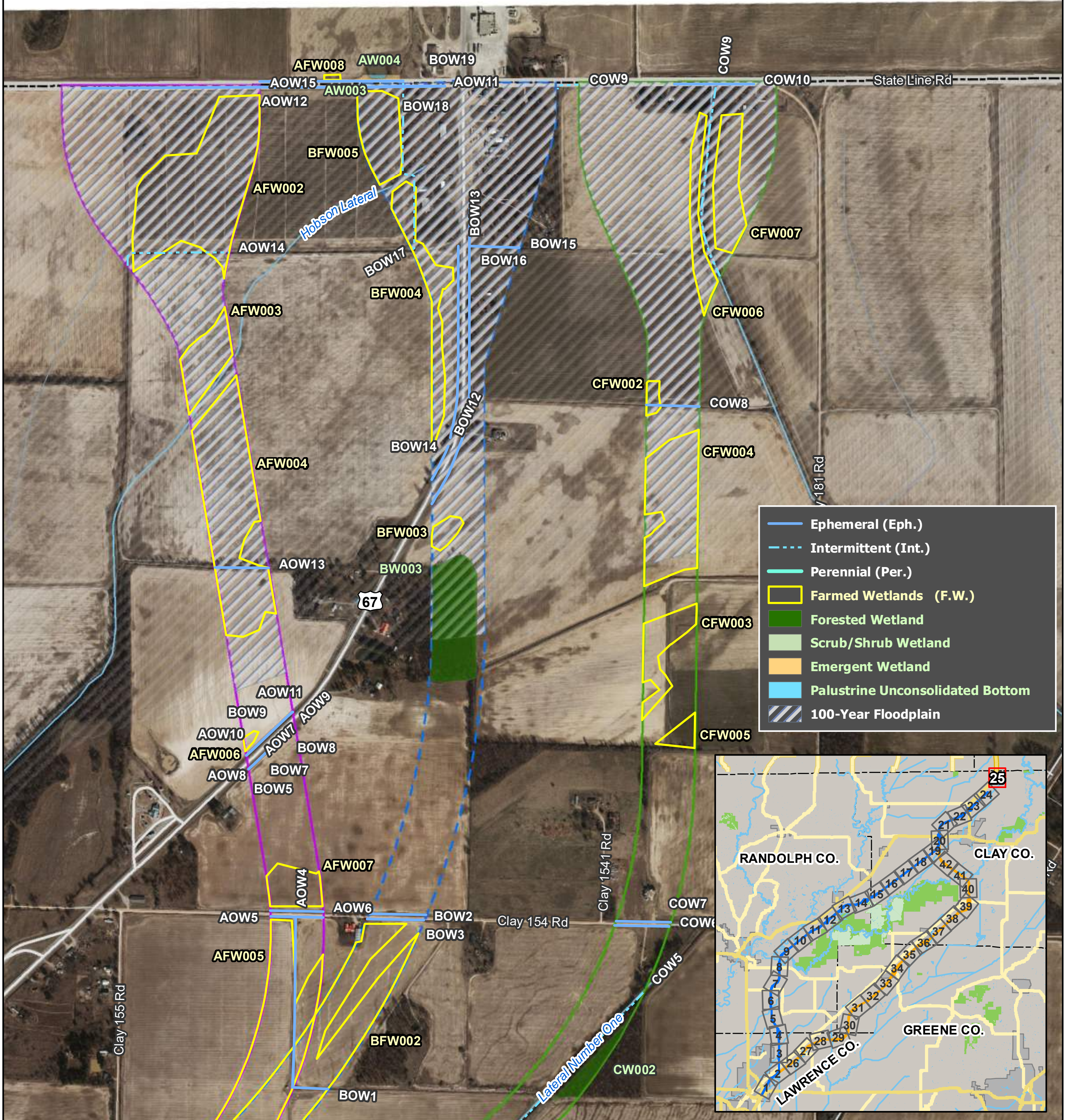
WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 24 of 42

ARDOT



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Feet

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Alternatives

Alternative 2	Alternative A
Alternative 3	Alternative B
	Alternative C

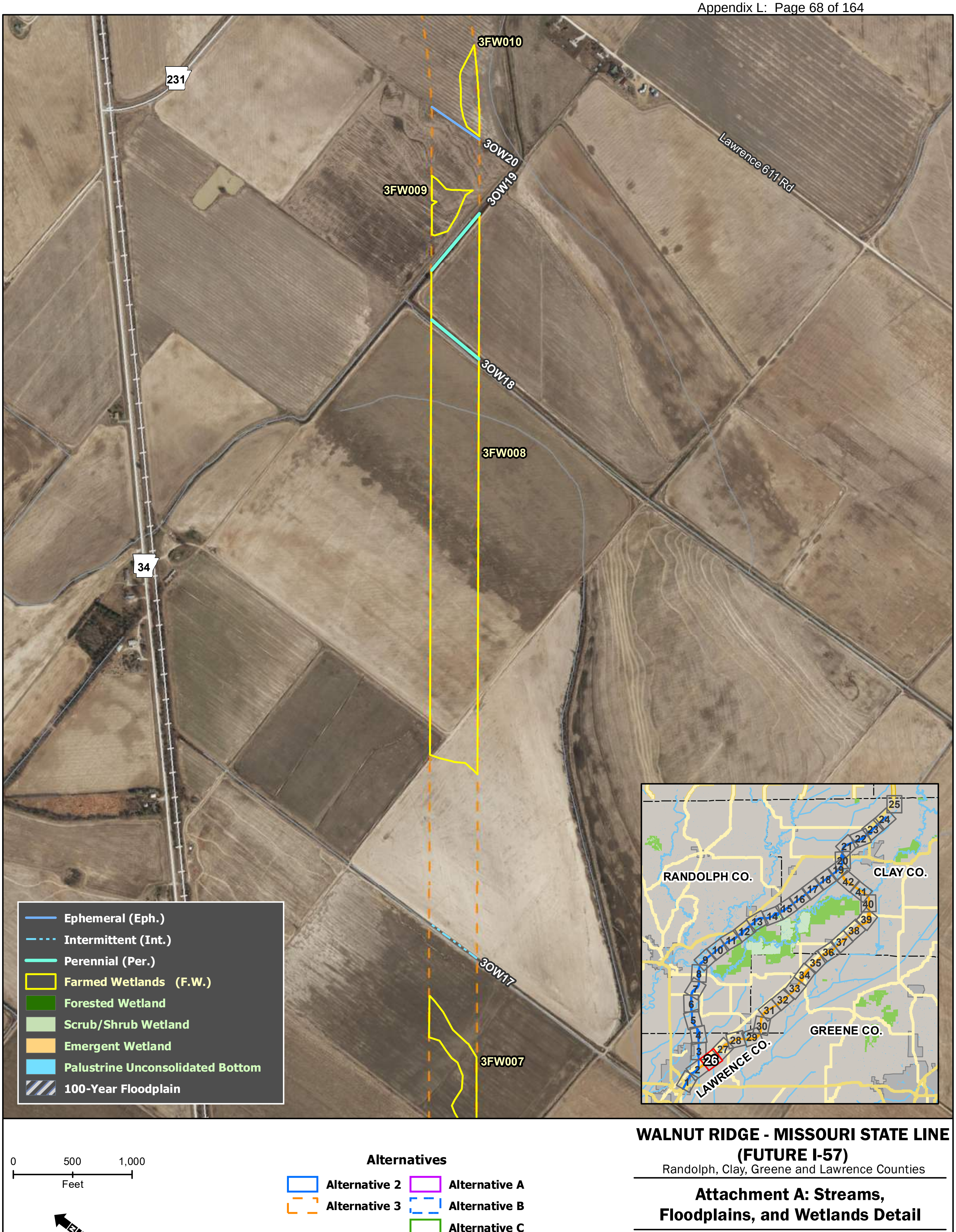
WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 25 of 42

ARDOT



Alternatives

Alternative 2	Alternative A
Alternative 3	Alternative B
	Alternative C

WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 26 of 42

ARDOT

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Feet

Alternatives

Alternative 2	Alternative A
Alternative 3	Alternative B
	Alternative C

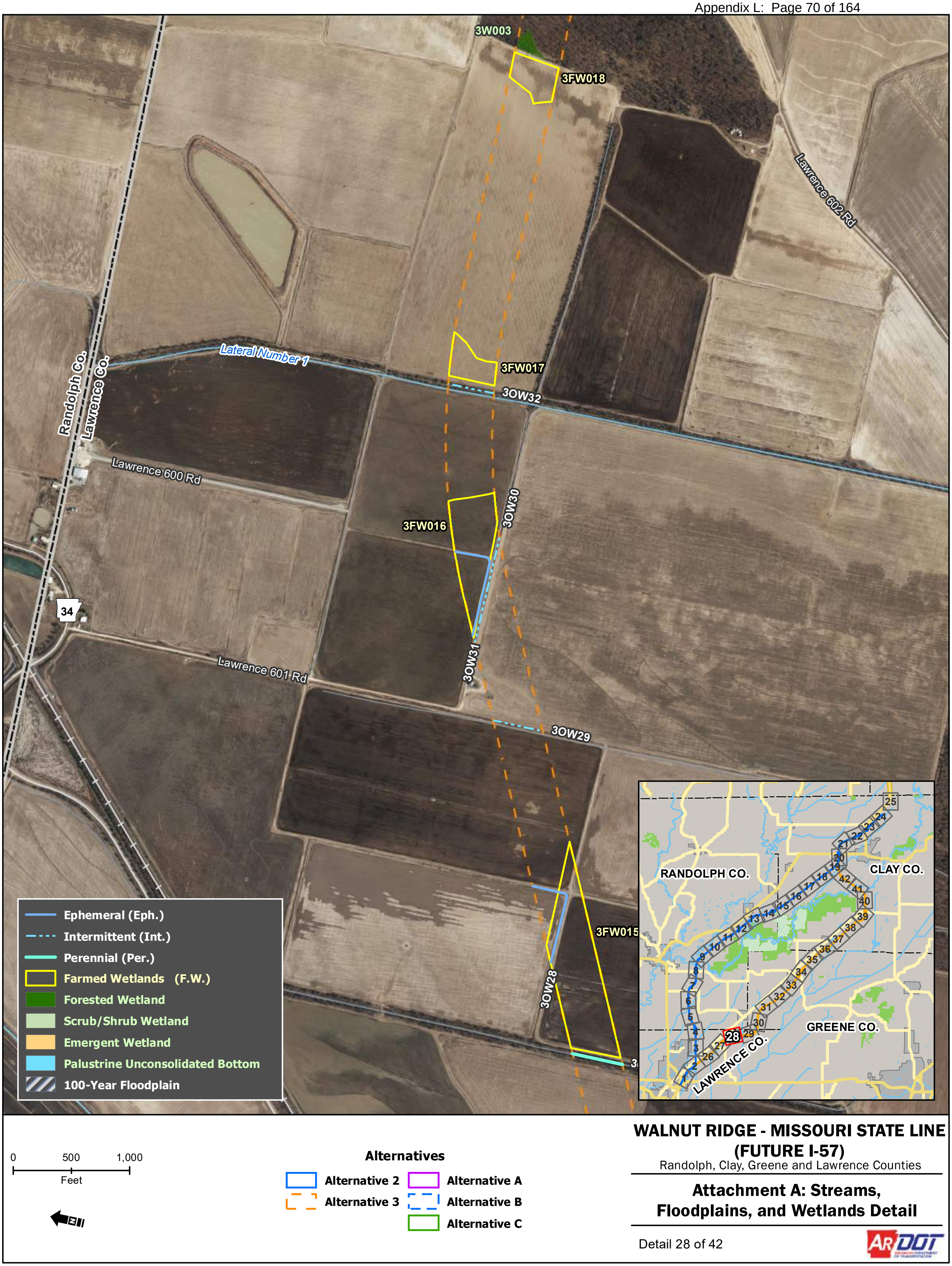
WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 27 of 42

ARDOT



WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 28 of 42

ARDOT

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Feet

Alternatives

- Alternative 2
- Alternative 3
- Alternative A
- Alternative B
- Alternative C

WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 29 of 42

Alternatives

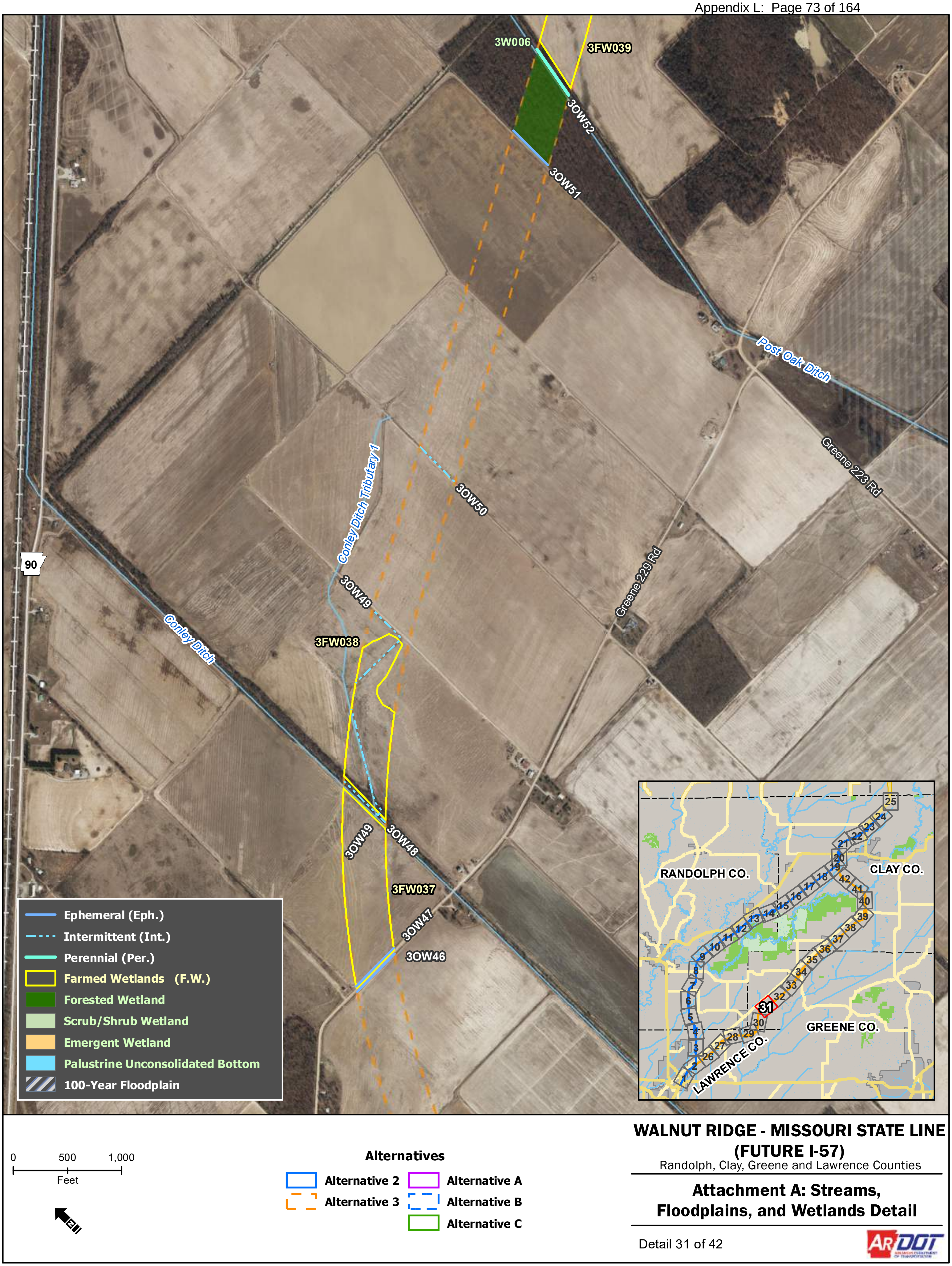
Alternative 2
Alternative 3
Alternative A
Alternative B
Alternative C

WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 30 of 42



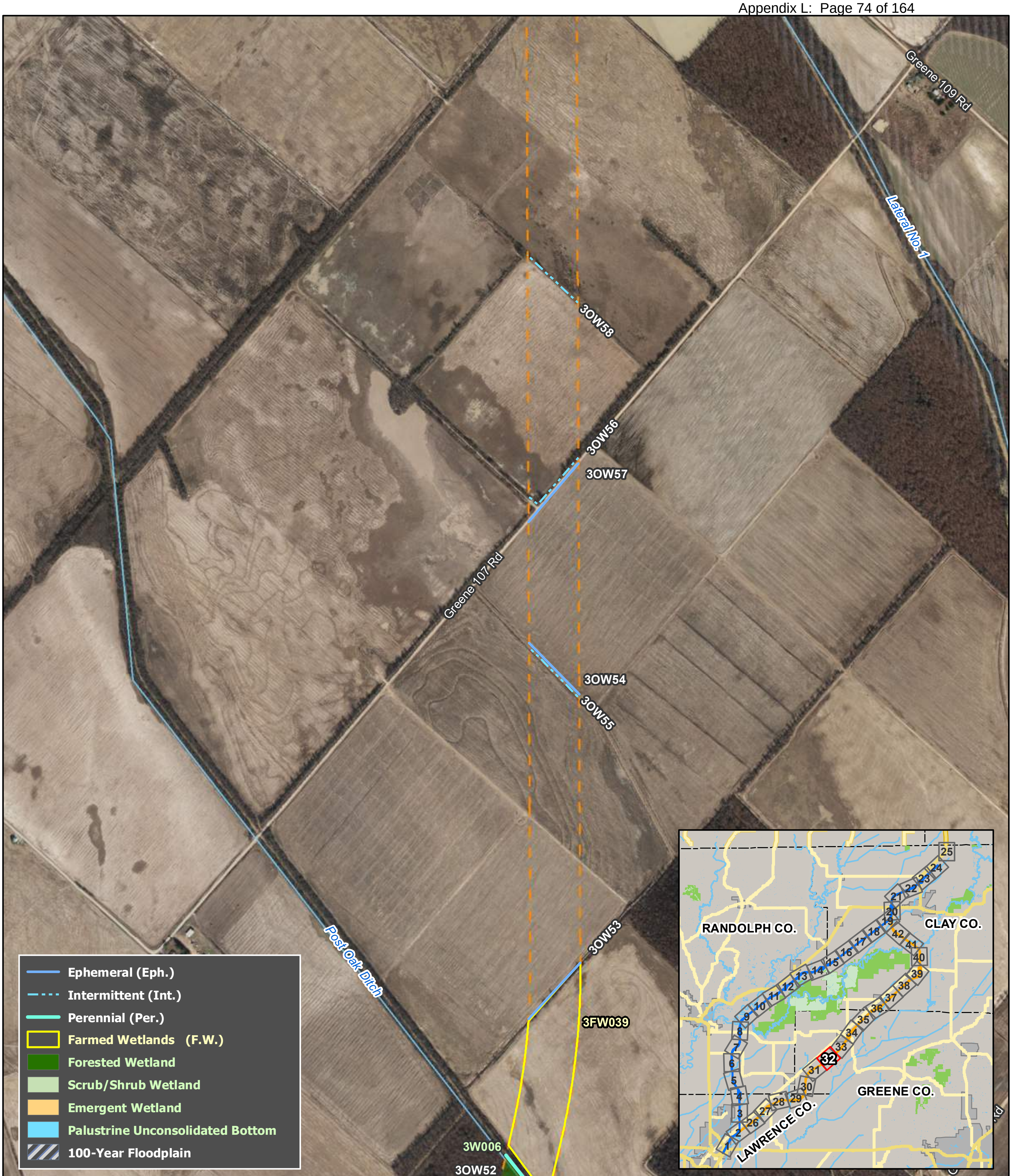
WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 31 of 42

ARDOT



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Alternatives

Alternative 2
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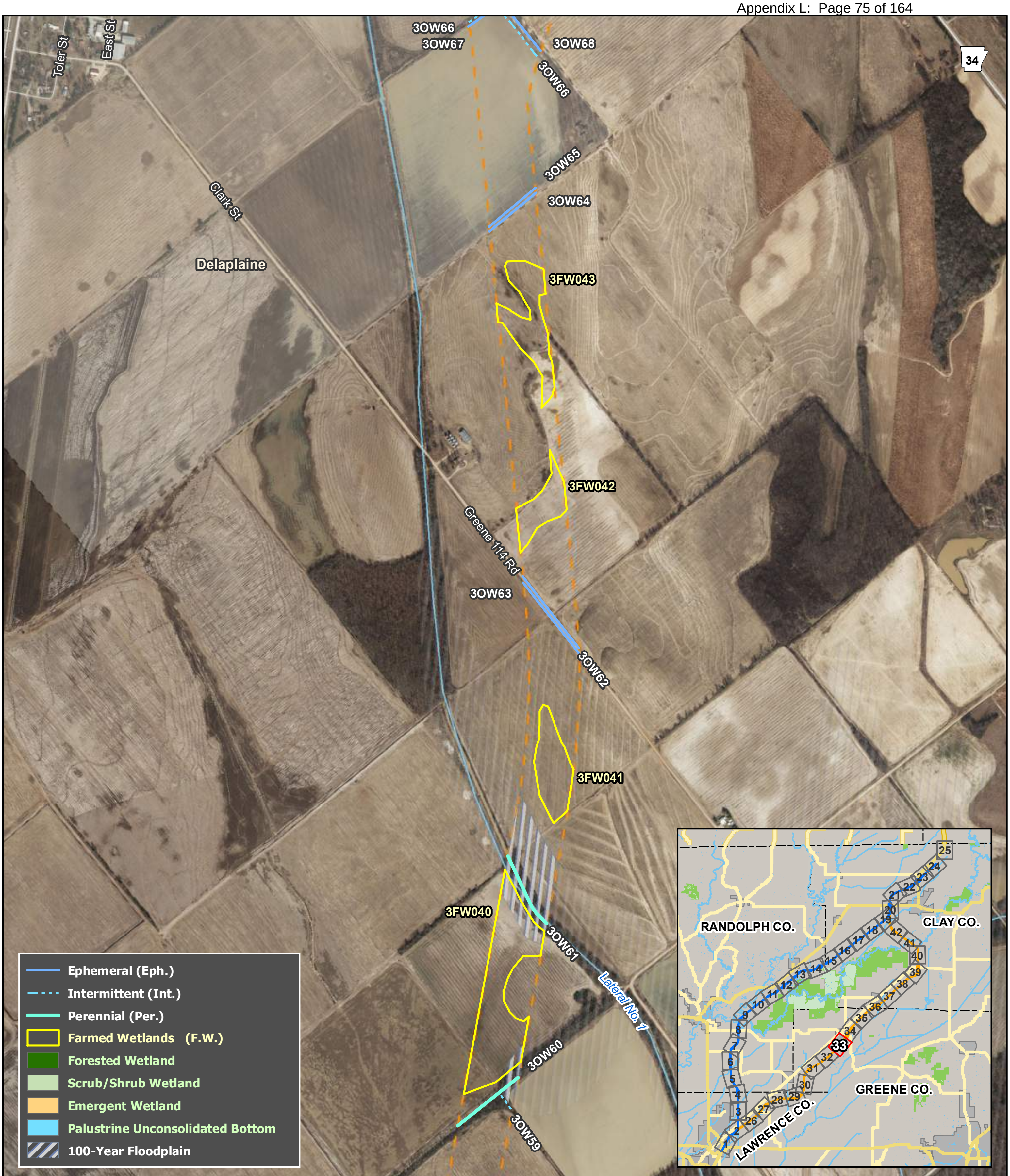
Alternative A
Alternative B
Alternative C

WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)
Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 32 of 42

ARDOT



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Feet

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Alternatives

- Alternative 2
- Alternative 3
- Alternative A
- Alternative B
- Alternative C

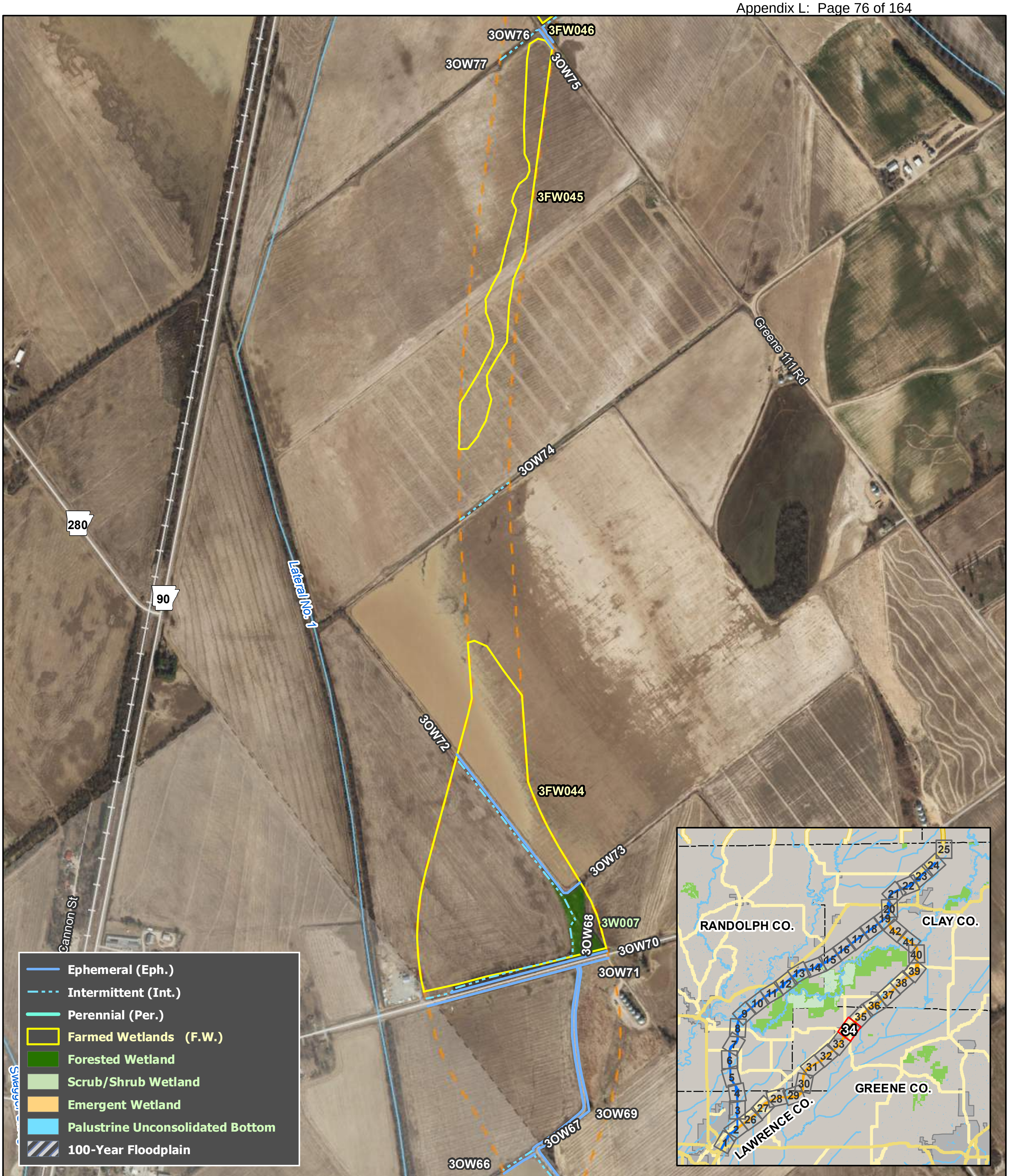
WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 33 of 42

ARDOT



Alternatives

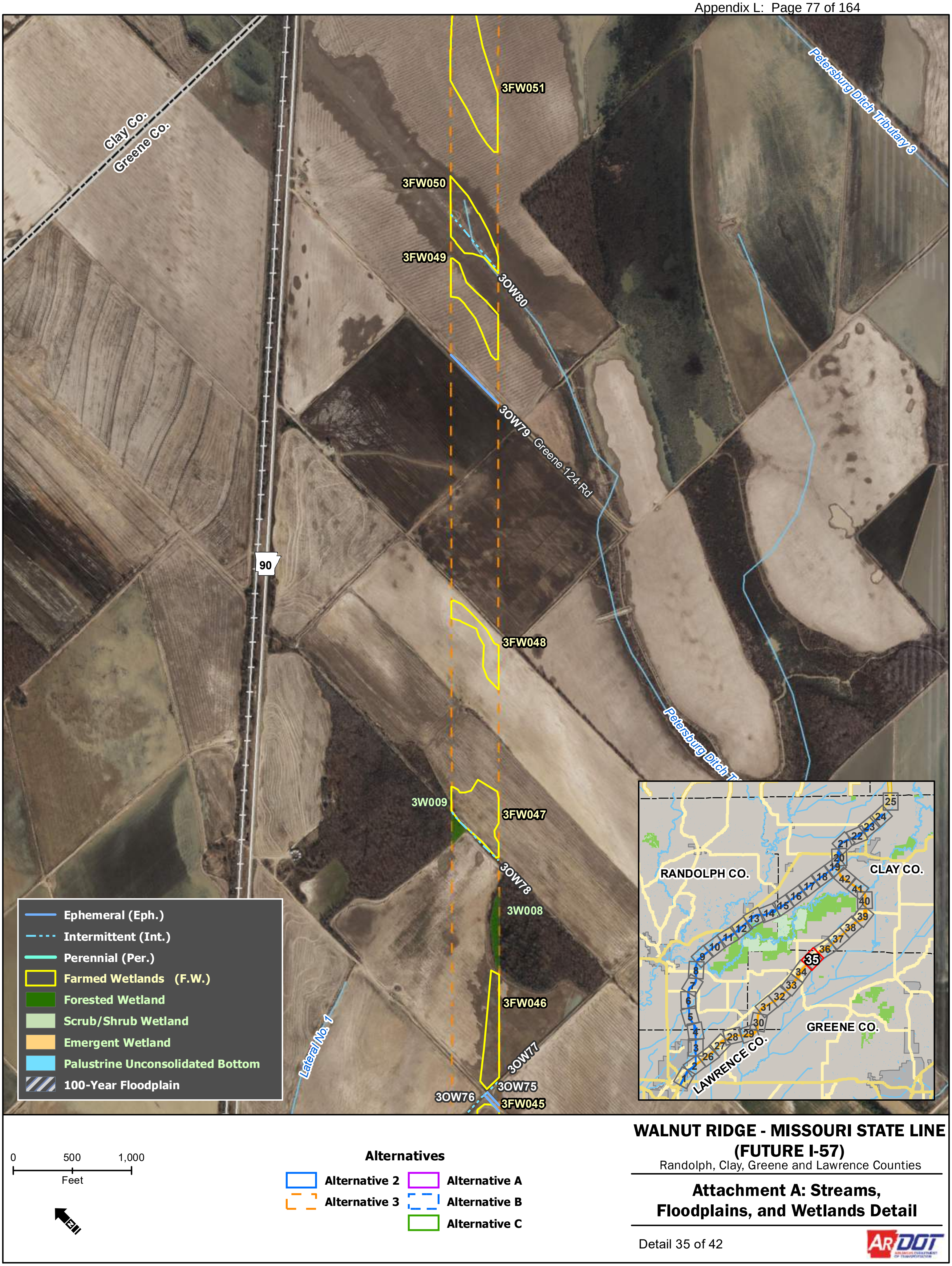
Alternative 2
Alternative 3
Alternative A
Alternative B
Alternative C

WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 34 of 42



WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 35 of 42

0 500 1,000
Feet

Alternatives

Alternative 2
Alternative 3
Alternative A
Alternative B
Alternative C

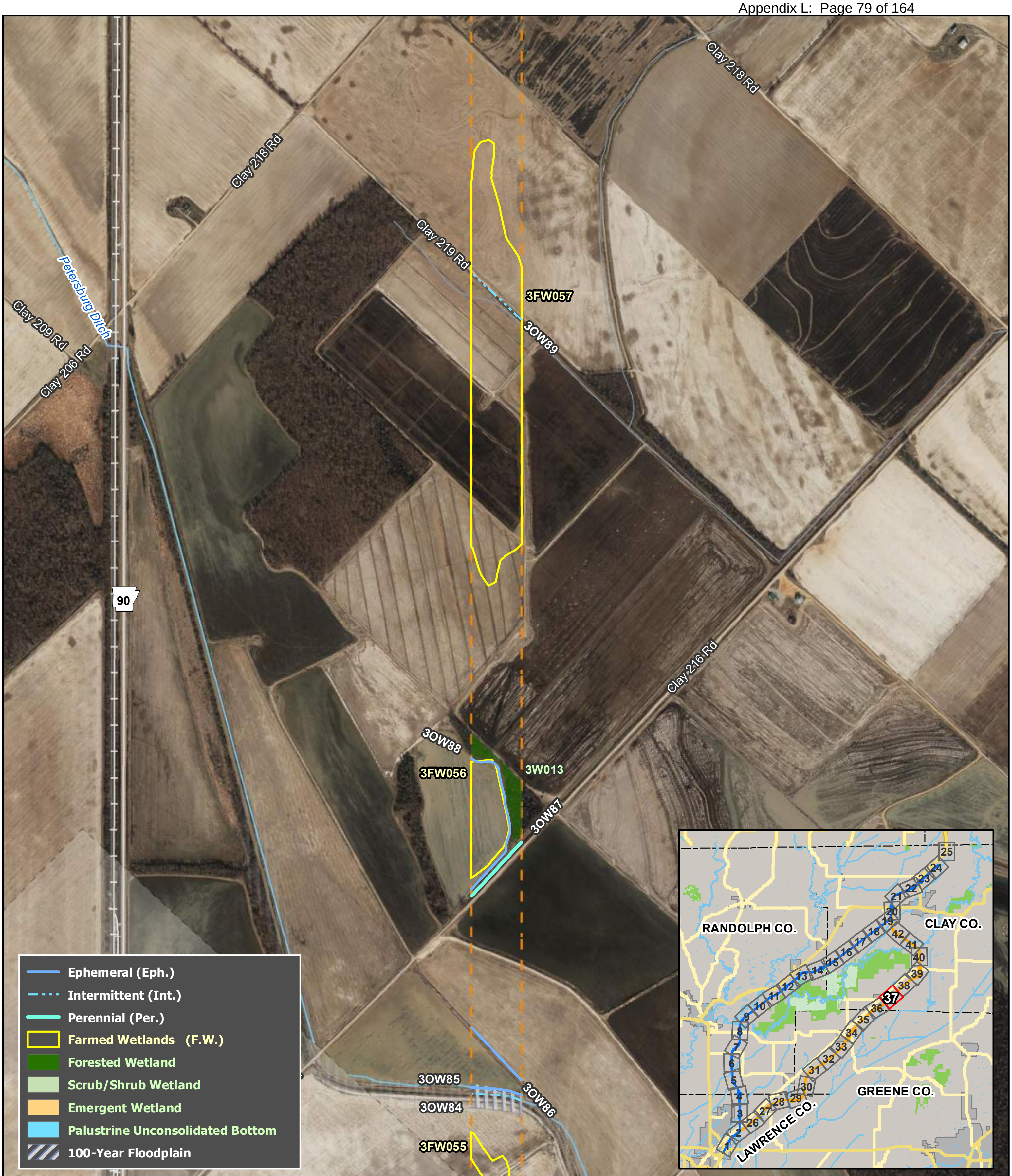
WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 36 of 42

ARDOT



Alternatives

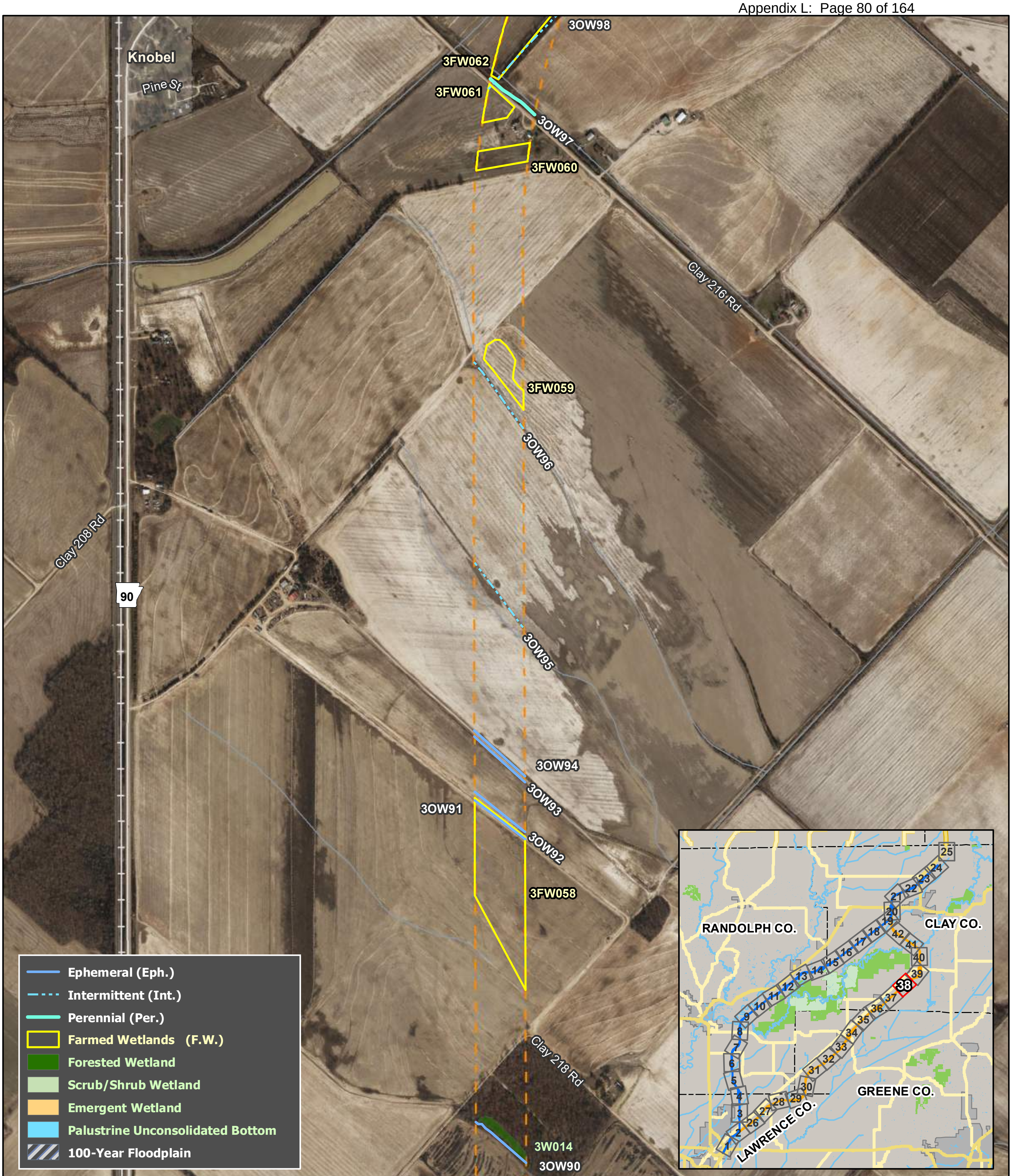
Alternative 2	Alternative A
Alternative 3	Alternative B
	Alternative C

WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 37 of 42



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Alternatives

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Alternative 3
Alternative A
Alternative B
Alternative C

WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 38 of 42

0 500 1,000
Feet

Alternatives

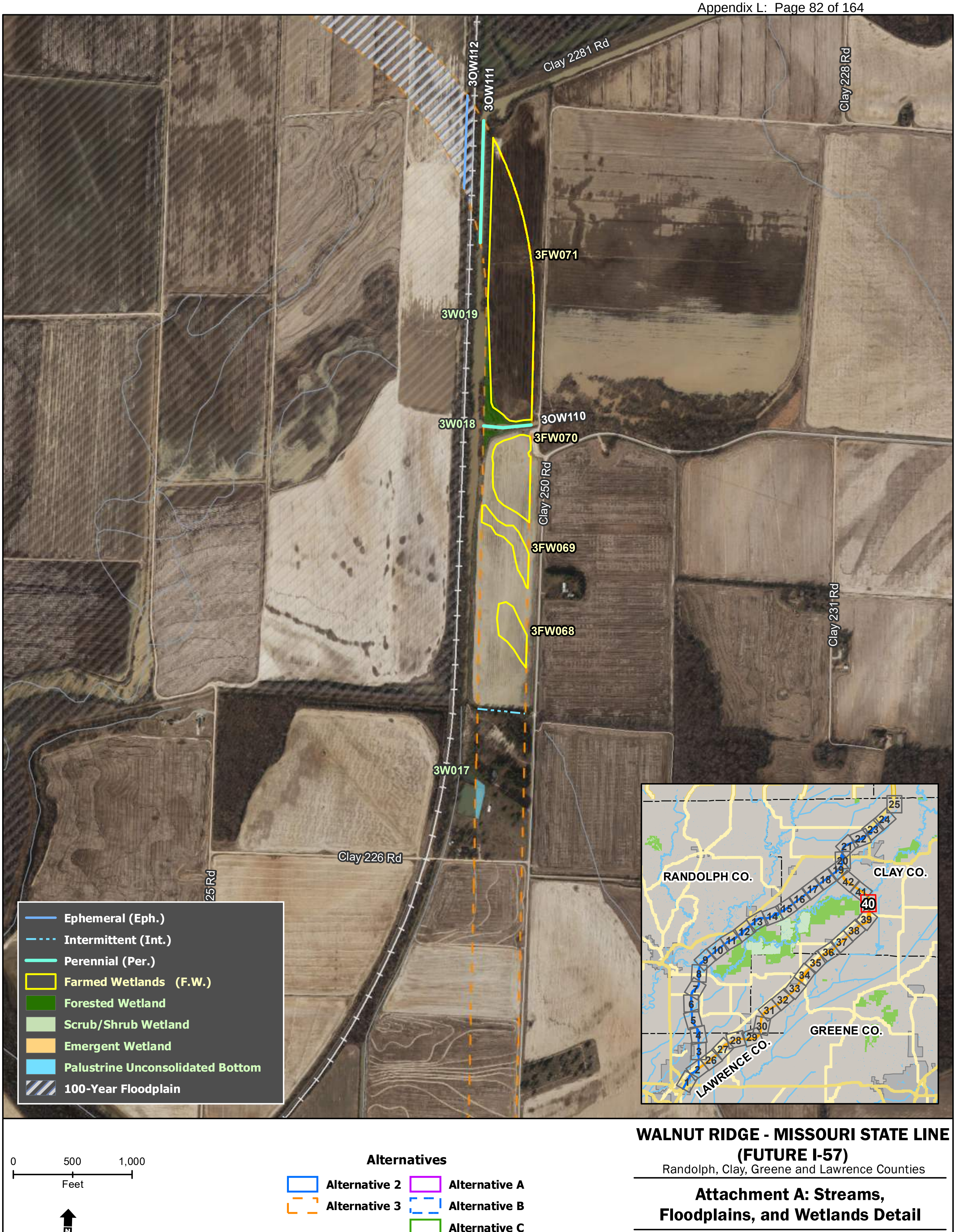
Alternative 2
Alternative 3
Alternative A
Alternative B
Alternative C

WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)
Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 39 of 42

ARDOT



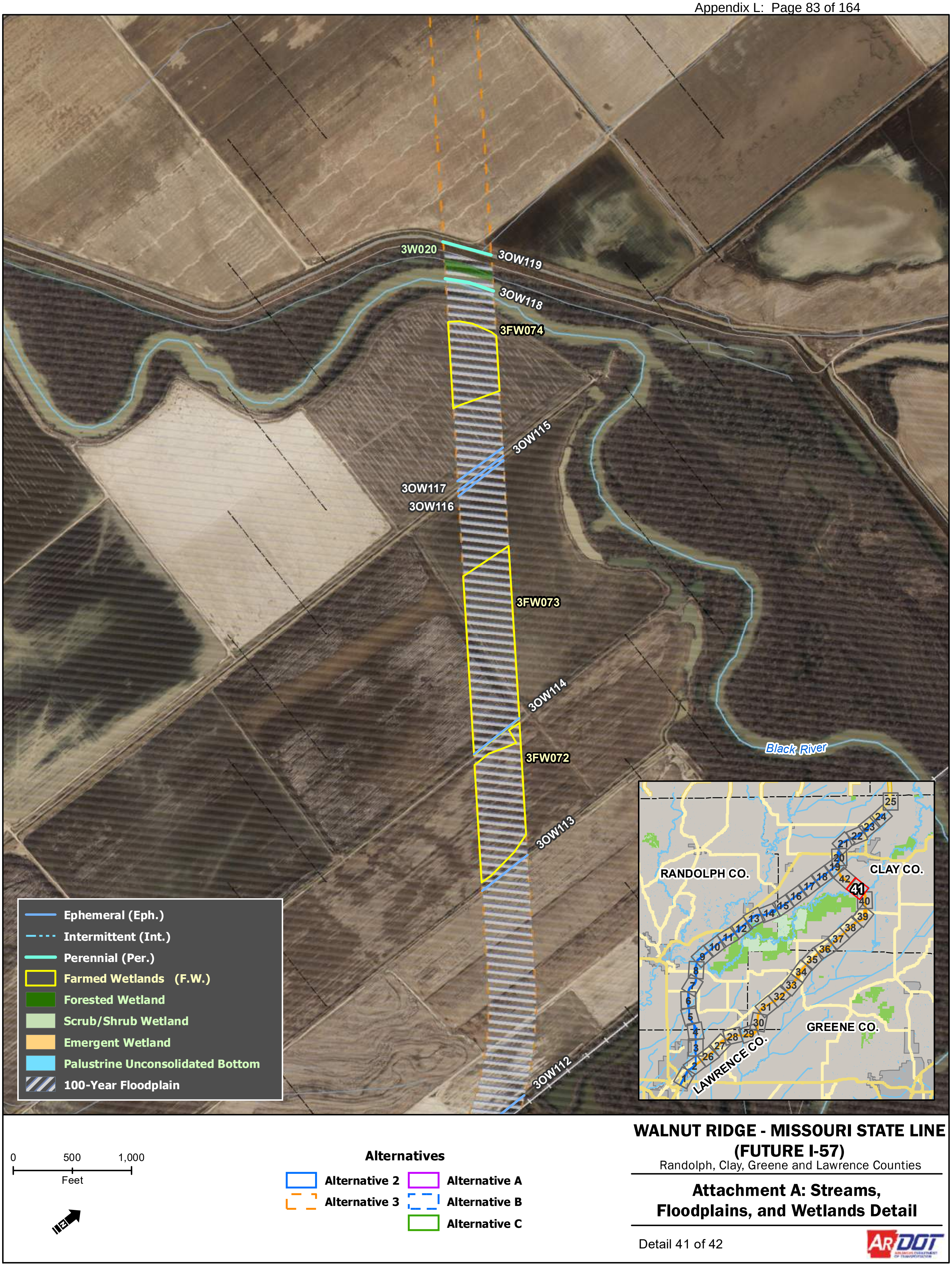
Alternatives

Alternative 2
Alternative 3
Alternative A
Alternative B
Alternative C

WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail



WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment A: Streams, Floodplains, and Wetlands Detail

Detail 41 of 42

ARDOT

Alternatives

Alternative 2
Alternative 3
Alternative A
Alternative B
Alternative C

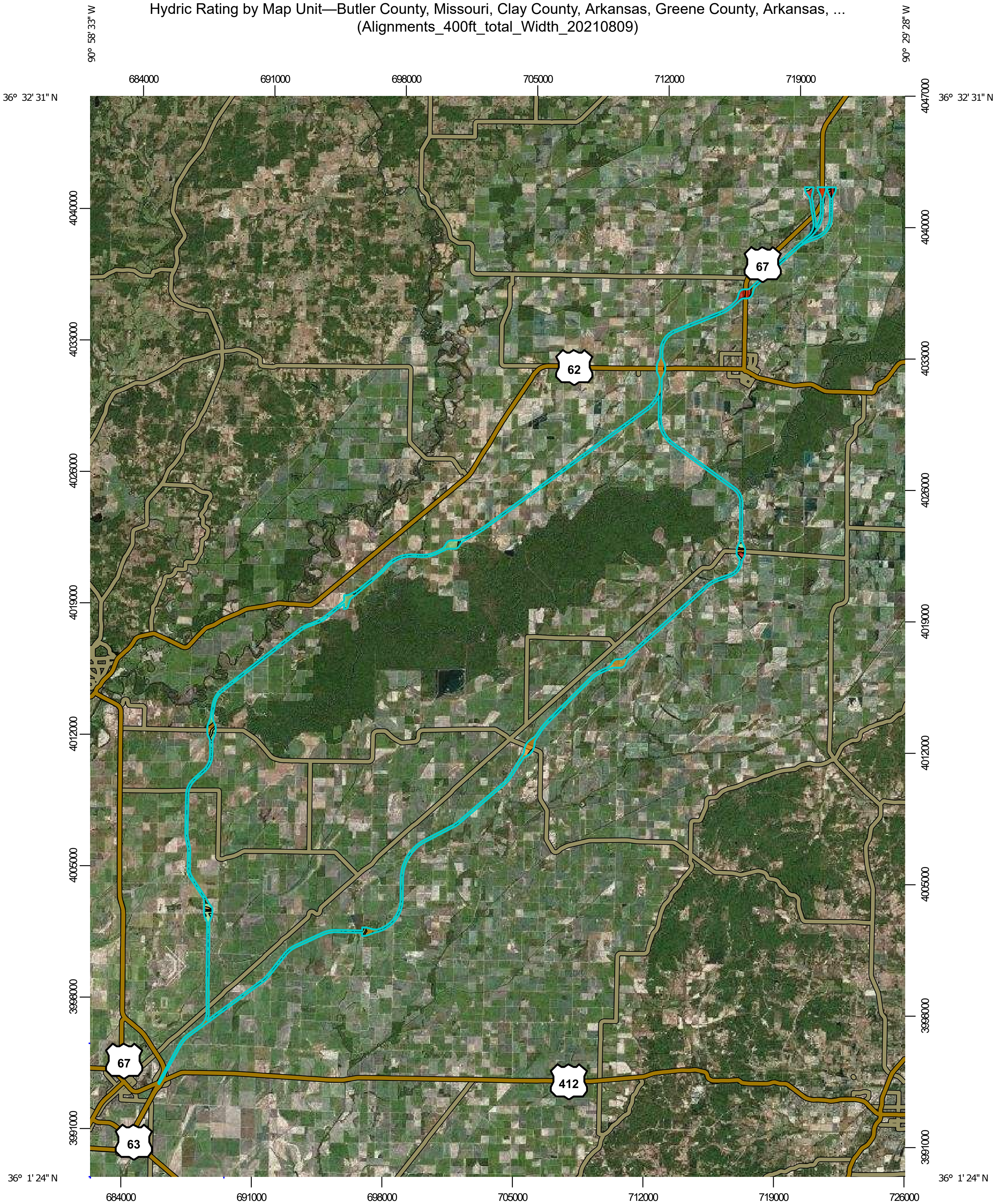
WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

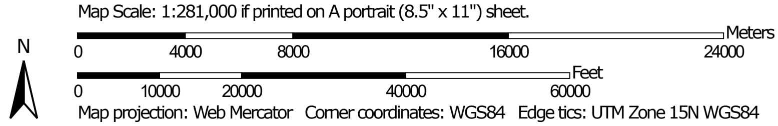
Attachment A: Streams, Floodplains, and Wetlands Detail

ATTACHMENT B — SOILS DATA

Hydric Rating by Map Unit—Butler County, Missouri, Clay County, Arkansas, Greene County, Arkansas, ...
(Alignments_400ft_total_Width_20210809)



Map Scale: 1:281,000 if printed on A portrait (8.5" x 11") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Lines
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Points
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at scales ranging from 1:20,000 to 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Butler County, Missouri
Survey Area Data: Version 24, Aug 27, 2021

Soil Survey Area: Clay County, Arkansas
Survey Area Data: Version 20, Sep 13, 2021

Soil Survey Area: Greene County, Arkansas
Survey Area Data: Version 22, Sep 13, 2021

Soil Survey Area: Lawrence County, Arkansas
Survey Area Data: Version 18, Sep 13, 2021

Soil Survey Area: Randolph County, Arkansas
Survey Area Data: Version 20, Sep 13, 2021

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 1, 1999—Dec 31, 2003

MAP LEGEND

MAP INFORMATION

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydric Rating by Map Unit

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
99037	Urban land-Udorthents complex	0	0.0	0.0%
Subtotals for Soil Survey Area			**0.0**	**0.0%**
Totals for Area of Interest			**4,368.4**	**100.0%**

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
10	Amagon silt loam, 0 to 1 percent slopes	100	35.1	0.8%
13	Beulah fine sandy loam, 0 to 8 percent slopes	0	18.8	0.4%
14	Bonn-Foley complex	100	197.2	4.5%
15	Bosket fine sandy loam, gently undulating	5	10.9	0.3%
16	Bosket fine sandy loam, undulating	5	2.2	0.1%
19	Calhoun silt loam	100	5.5	0.1%
22	Crowley silt loam	100	387.4	8.9%
23	Dexter silt loam, gently undulating	5	150.1	3.4%
25	Dundee silt loam, 0 to 1 percent slopes	6	46.7	1.1%
27	Foley silt loam, 0 to 1 percent slopes	100	398.2	9.1%
29	Jackport silty clay, 0 to 1 percent slopes	95	486.7	11.1%
30	Kobel silty clay	100	218.8	5.0%
31	Kobel soils, frequently flooded	100	3.3	0.1%
39	Water	0	5.8	0.1%
Subtotals for Soil Survey Area			**1,966.7**	**45.0%**
Totals for Area of Interest			**4,368.4**	**100.0%**

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1B	Askew silt loam, 1 to 3 percent slopes	10	10.6	0.2%
11B	Foley silt loam, 1 to 3 percent slopes	90	4.4	0.1%
12A	Foley-Bonn complex, 0 to 1 percent slopes	85	39.3	0.9%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
16A	Forestdale silty clay loam, 0 to 1 percent slopes, frequently flooded	85	2.3	0.1%
20B	Jackport silty clay loam, 0 to 2 percent slopes	85	521.4	11.9%
23A	Lafe silt loam, 0 to 1 percent slopes	15	18.9	0.4%
28B	Overcup silt loam, 1 to 3 percent slopes	85	0.1	0.0%
34	Water	0	0.0	0.0%
Subtotals for Soil Survey Area			**597.0**	**13.7%**
Totals for Area of Interest			**4,368.4**	**100.0%**

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Ao	Amagon silt loam	95	2.1	0.0%
BoB	Bosket fine sandy loam, 0 to 3 percent slopes	5	44.9	1.0%
CoA	Crowley silt loam, 0 to 1 percent slopes	95	150.2	3.4%
DeB	Dubbs silt loam, 1 to 3 percent slopes	4	8.2	0.2%
DvA	Dundee silt loam, 0 to 1 percent slopes	6	10.7	0.2%
DvB	Dundee silt loam, gently undulating	15	27.8	0.6%
FcA	Foley-Calhoun complex, 0 to 1 percent slopes	95	80.4	1.8%
Hn	Hillemann silt loam, 0 to 1 percent slopes	12	11.7	0.3%
Ja	Jackport silty clay, 0 to 1 percent slopes	95	411.1	9.4%
Pa	Patterson fine sandy loam, 0 to 1 percent slopes	5	1.6	0.0%
Tu	Tuckerman fine sandy loam	90	0.7	0.0%
Subtotals for Soil Survey Area			**749.4**	**17.2%**
Totals for Area of Interest			**4,368.4**	**100.0%**

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Amagon silt loam	90	91.5	2.1%
4	Bosket fine sandy loam, 0 to 3 percent slopes	5	432.0	9.9%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
7	Broseley loamy fine sand, undulating	10	56.7	1.3%
12	Crowley silt loam	100	18.7	0.4%
16	Dundee silt loam, 0 to 1 percent slopes	6	154.3	3.5%
24	Kobel silty clay loam	100	0.1	0.0%
27	McCrory fine sandy loam, 0 to 1 percent slopes	94	144.4	3.3%
28	Patterson fine sandy loam, 0 to 1 percent slopes	5	151.7	3.5%
34	Water	0	1.5	0.0%
Subtotals for Soil Survey Area			**1,051.0**	**24.1%**
Totals for Area of Interest			**4,368.4**	**100.0%**

Description

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Rating Options

Aggregation Method: Percent Present

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

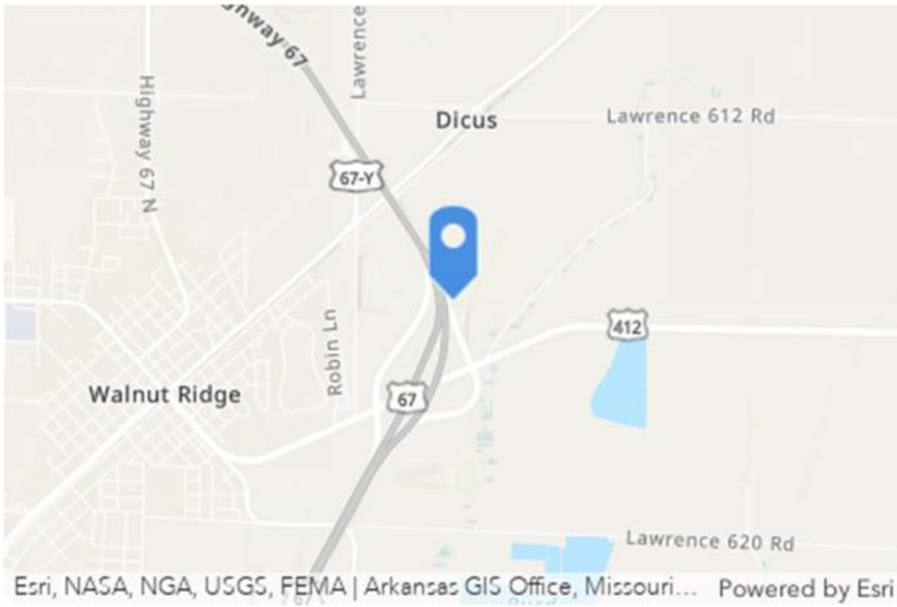
ATTACHMENT C — REPRESENTATIVE PHOTOGRAPHS OF WETLANDS AND STREAMS

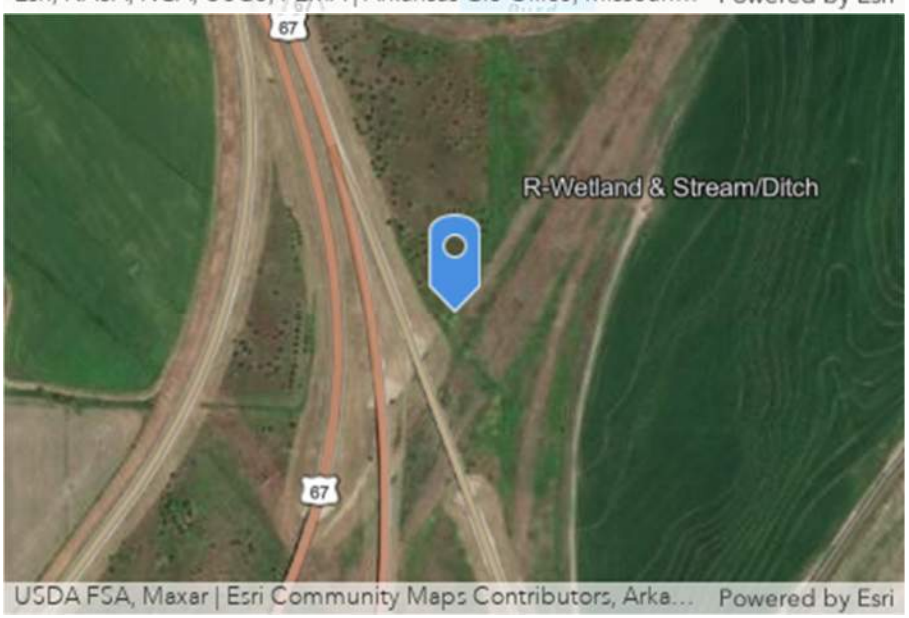
Photo Log of: Alternatives 2 and 3

PHOTO LOG OF Wetland & Stream/Ditch

See Sheet 1 of 42 in Attachment C

INSPECTED BY: **Anonymous user**
INSPECTION DATE: 03/02/2021
LOCATION: -90.93118, 36.07446





LOCATION NOTES

North side of Hwy 67 on ramp from Hwy 412

Photo Log of: Alternatives 2 and 3

Photo 1 Description: PEM / PFO facing northwest

Photo 2 Description: Stream or ditch facing northwest

Photo Log of: Alternatives 2 and 3

Photo 3 Description: Facing southwest

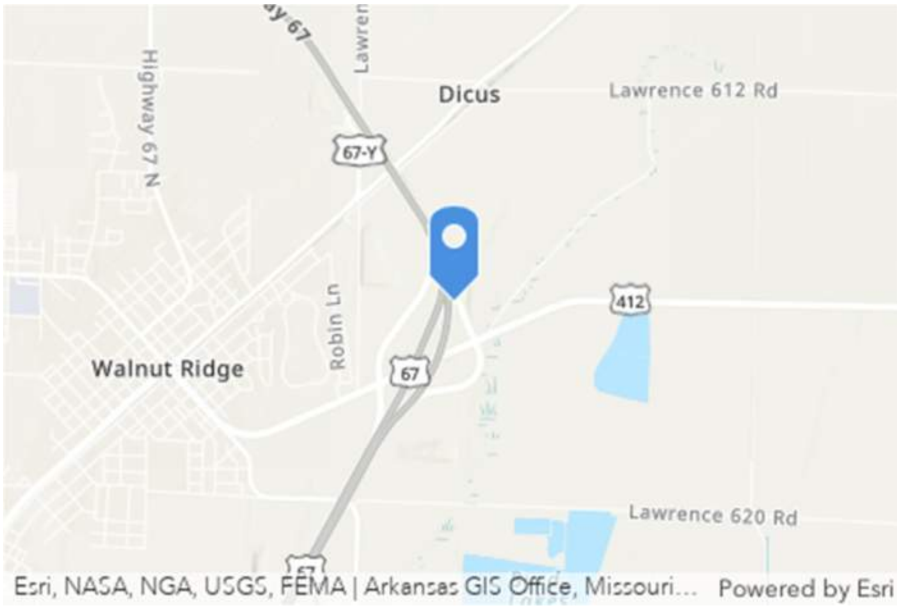
Photo Log of: Alternatives 2 and 3

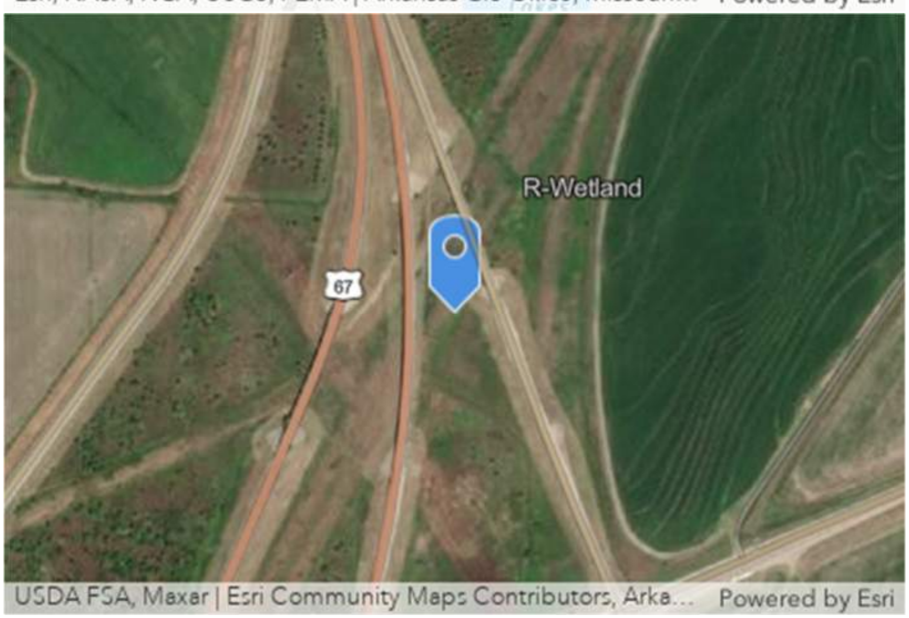
Photo 4 Description: Culvert

PHOTO LOG OF Wetland

See Sheet 1 of 42 in Attachment C

INSPECTED BY: **Anonymous user**
INSPECTION DATE: 03/02/2021
LOCATION: -90.93144, 36.07268





LOCATION NOTES

PEM within ROW at interchange

Photo Log of: Alternatives 2 and 3

Photo 1 Description: PEM-facing east. Hwy 67 on ramp from Hwy 412 in background

Photo Log of: Alternatives 2 and 3

Photo 2 Description: Common plants

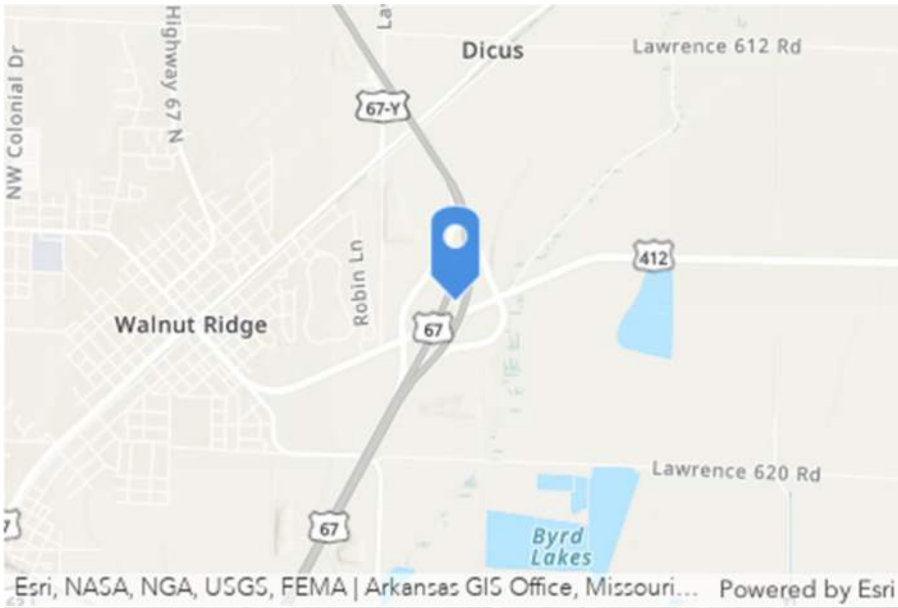
Photo Log of: Alternatives 2 and 3

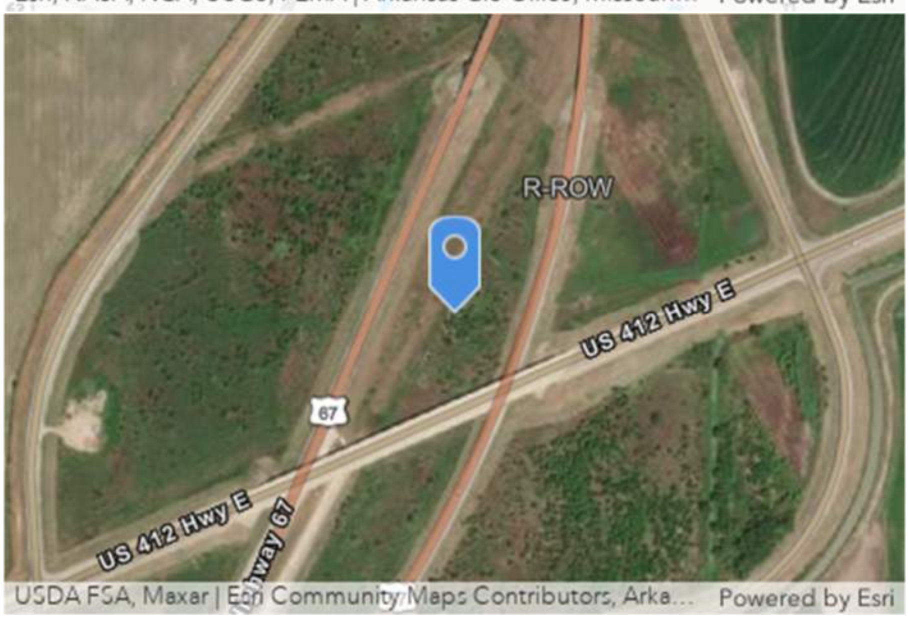
Photo 3 Description: Facing north

PHOTO LOG OF EXISTING ROW

See Sheet 1 of 42 in Attachment C

INSPECTED BY: Anonymous user
INSPECTION DATE: 03/02/2021
LOCATION: -90.93337, 36.06961





LOCATION NOTES

Sparse wooded ROW. Potential PSS/PEM.

Photo Log of: Alternatives 2 and 3

Photo 1 Description: Facing north

Photo Log of: Alternatives 2 and 3

Photo 2 Description: Common plants

Photo Log of: Alternatives 2 and 3

Photo 3 Description: Facing south

Photo Log of: Alternatives 2 and 3

Photo 4 Description: Common plants

Photo Log of: Alternatives 2 and 3

Photo 6 Description: Tree species bark

Photo Log of: Alternatives 2 and 3

Photo 7 Description: Facing east

Photo Log of: Alternatives 2 and 3

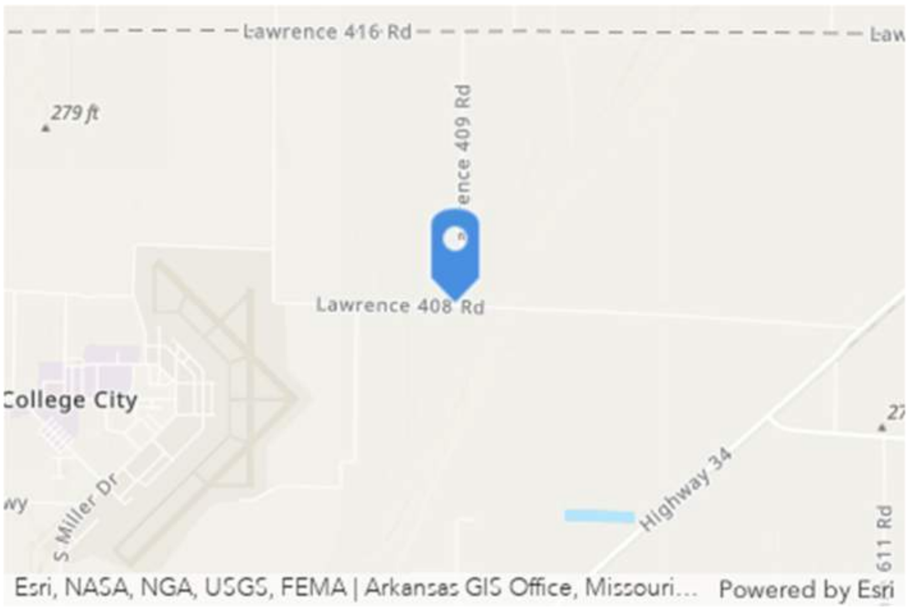
Photo 8 Description: Facing northeast

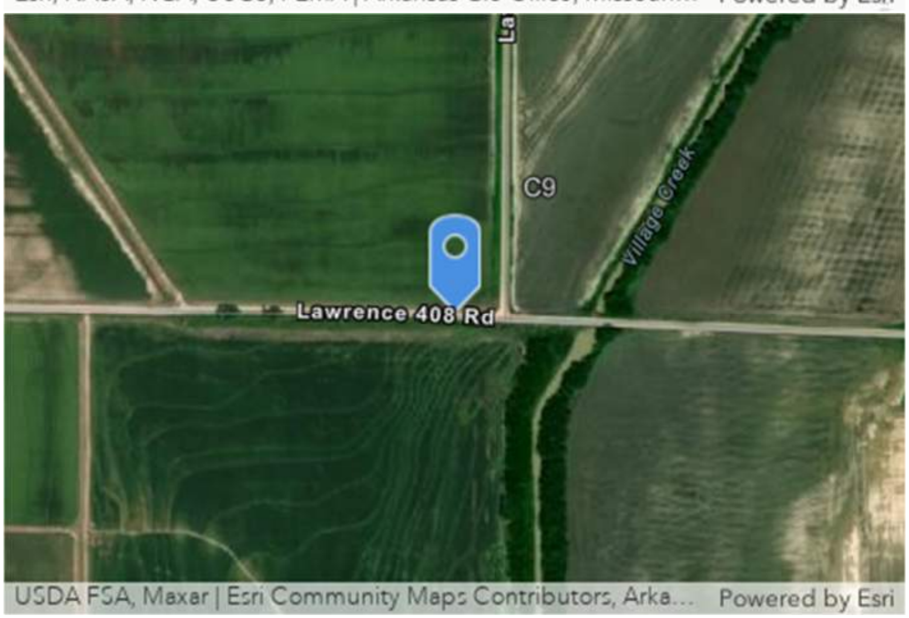
Photo Log of: Alternative 2

PHOTO LOG OF STREAM CROSSING (2OW012)

See Sheet 3 of 42 in Attachment C

INSPECTED BY: JCMarshall_Garver
INSPECTION DATE: 03/02/2021
LOCATION: -90.90573, 36.13156





LOCATION NOTES

Farm fields and drainage ditch

Photo Log of: Alternative 2

Photo 1 Description: Facing North

Photo Log of: Alternative 2

Photo 2 Description: Facing South

Photo Log of: Alternative 2

Photo 3 Description: Drainage ditch 10x2'

Photo Log of: Alternative 2

Photo 4 Description: Ditch to the east

Photo Log of: Alternative 2

Photo 5 Description: Vegetation

Photo Log of: Alternative 2

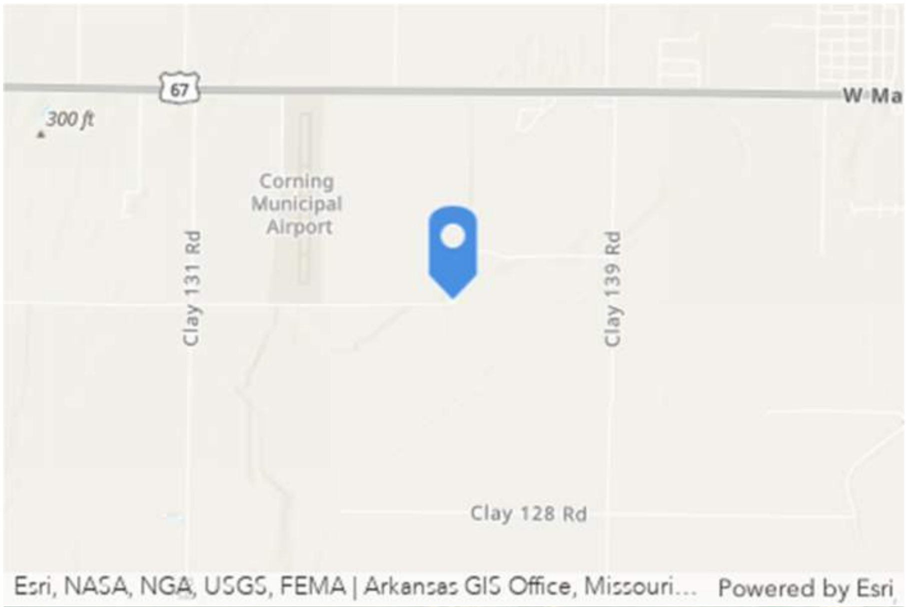
Photo 6 Description: Vegetation

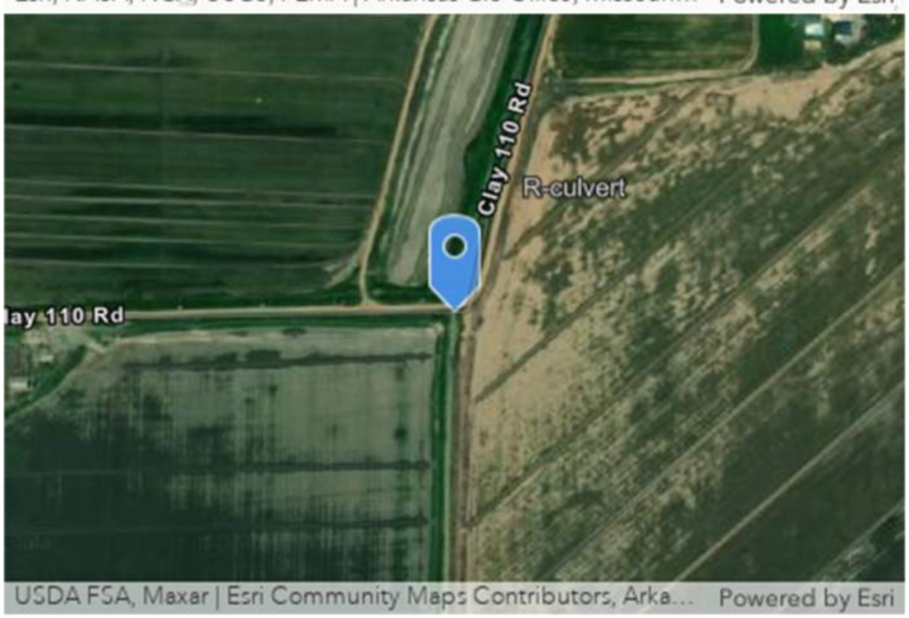
Photo Log of: Canal in Alts 2 and 3

PHOTO LOG OF: Culvert

See Sheet 19 of 42 in Attachment A

INSPECTED BY: Anonymous user
INSPECTION DATE: 03/02/2021
LOCATION: -90.63558, 36.39695





LOCATION NOTES

CR 110

Photo Log of: Canal in Alts 2 and 3

Photo 1 Description: Facing south - downstream

Photo Log of: Canal in Alts 2 and 3

Photo 2 Description: Facing west

Photo Log of: Canal in Alts 2 and 3

Photo 3 Description: Inside large 72" metal pipe

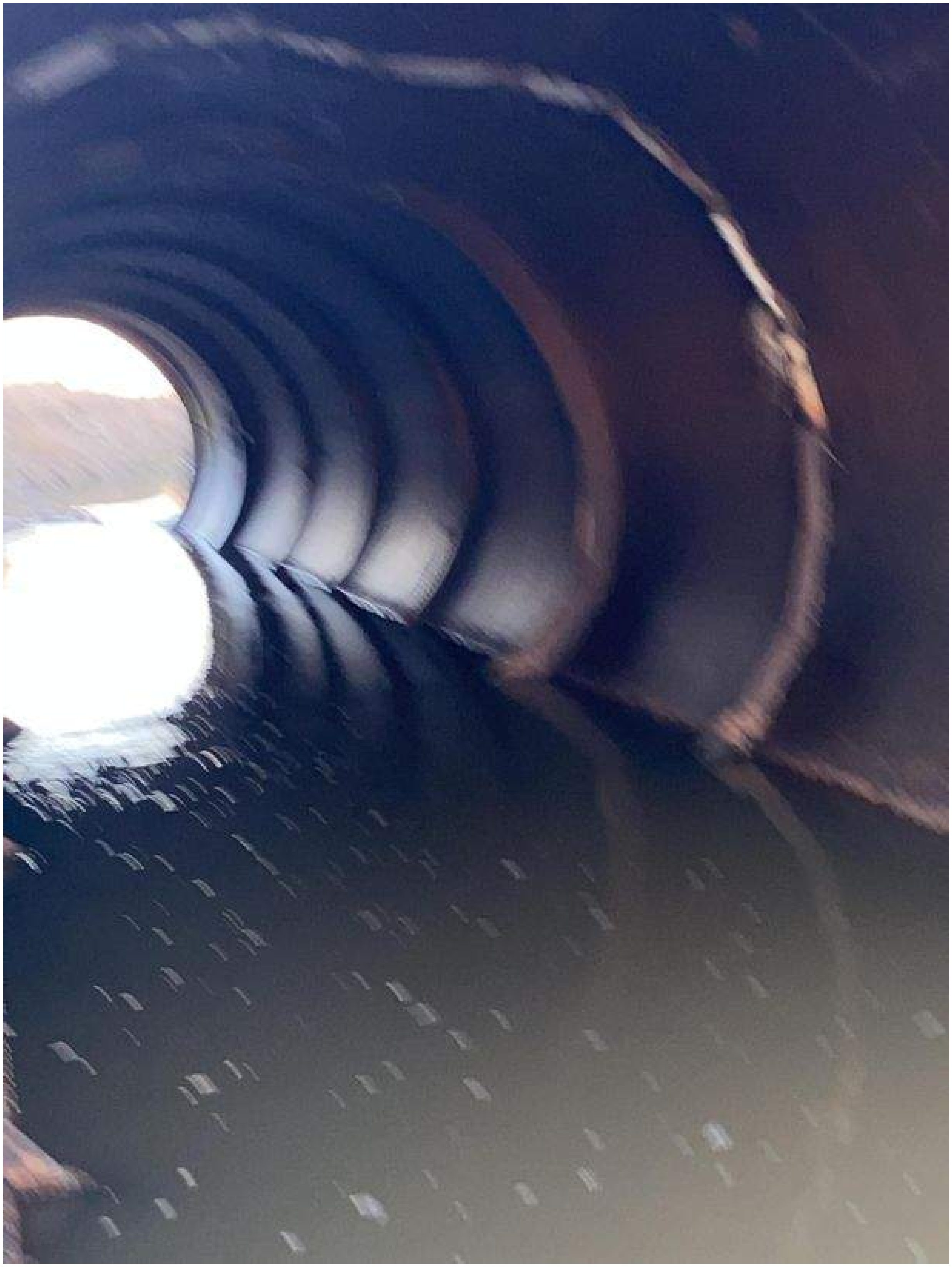
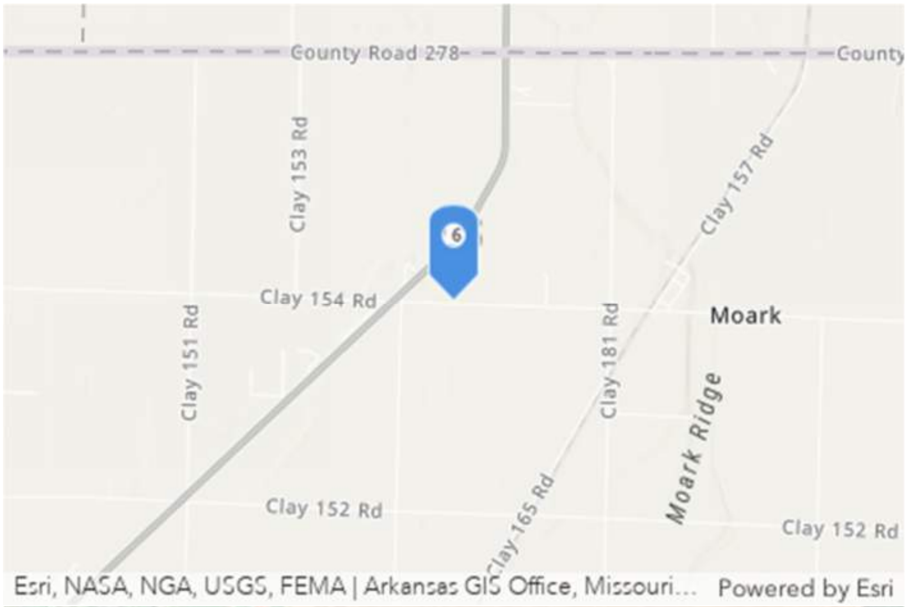


Photo Log of: Alternative A

PHOTO LOG OF ROADSIDE DITCH

See Sheet 25 of 42 in Attachment C

INSPECTED BY: JCMarshall_Garver
INSPECTION DATE: 03/03/2021
LOCATION: -90.54432, 36.48116



LOCATION NOTES

CR 154

Photo Log of: Alternative A

Photo 1 Description: South

Photo Log of: Alternative A

Photo 2 Description: North

Photo Log of: Alternative A

Photo 3 Description: House to east

Photo Log of: Alternative A

Photo 4 Description: House to west

Photo Log of: Alternative A

Photo 5 Description: AG ditch

Photo Log of: Alternative A

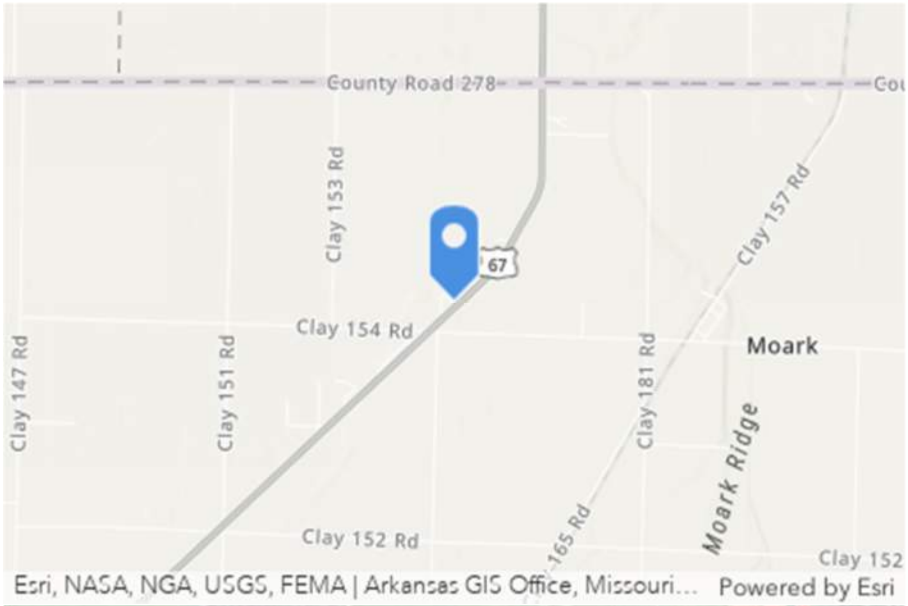
Photo 6 Description: Fish

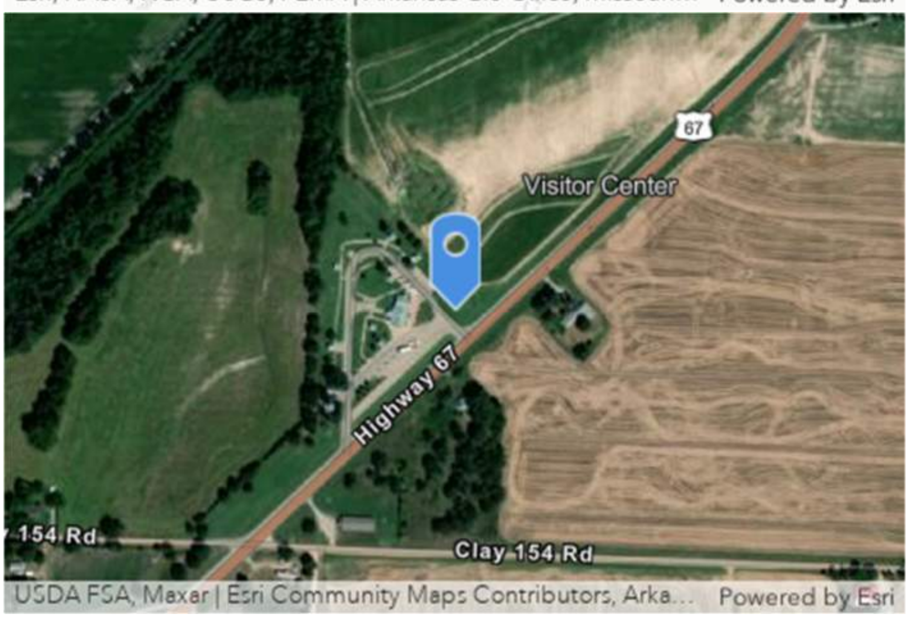
Photo Log of: Alternative B

PHOTO LOG OF Visitor Center

See Sheet 25 of 42 of Attachment C

INSPECTED BY: JCMarshall_Garver
INSPECTION DATE: 03/03/2021
LOCATION: -90.5474, 36.48332





LOCATION NOTES

Photo Log of: Alternative B

Photo 1 Description: Facing west

Photo Log of: Alternative B

Photo 2 Description: Downstream Face

Photo Log of: Alternative B

Photo 3 Description: 67 to west

Photo Log of: Alternative B

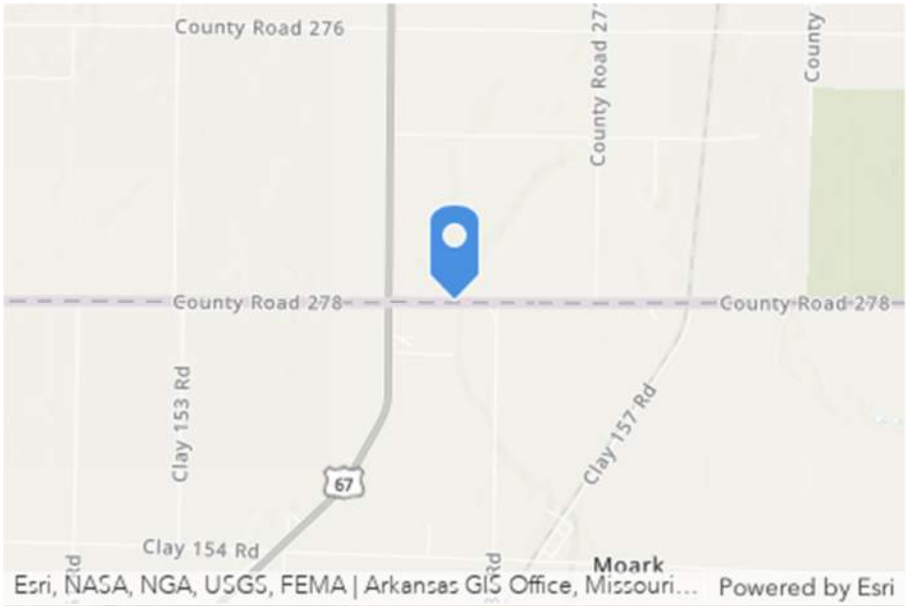
Photo 4 Description: 67 to east

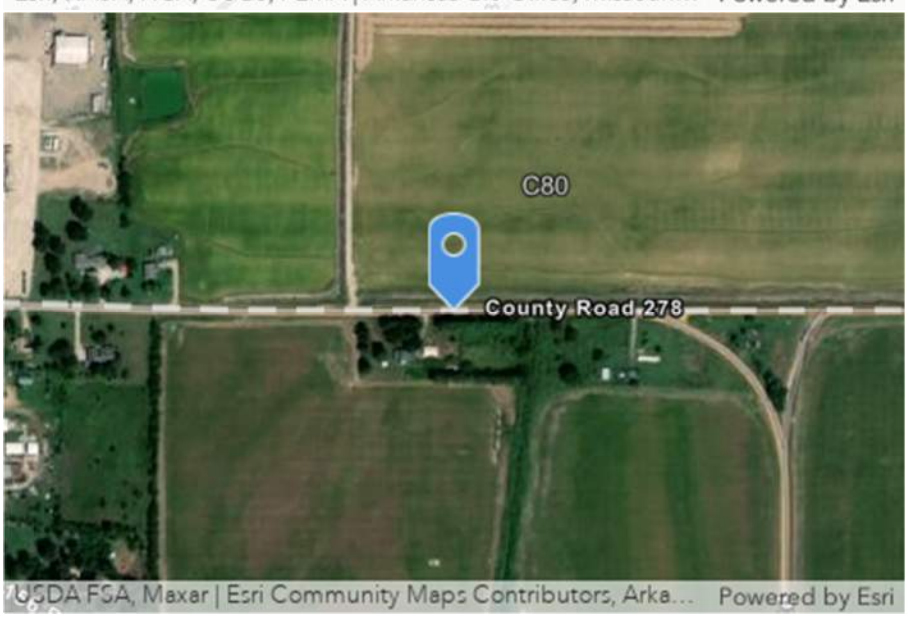
Photo Log of: Alternative C

PHOTO LOG OF COUNTY ROAD

See Sheet 25 of 42 in Attachment C

INSPECTED BY: JCMarshall_Garver
INSPECTION DATE: 03/03/2021
LOCATION: -90.53423, 36.49846





LOCATION NOTES

State line rd.

Photo Log of: Alternative C

Photo 1 Description: Buildings to south (seem unoccupied)

Photo Log of: Alternative C

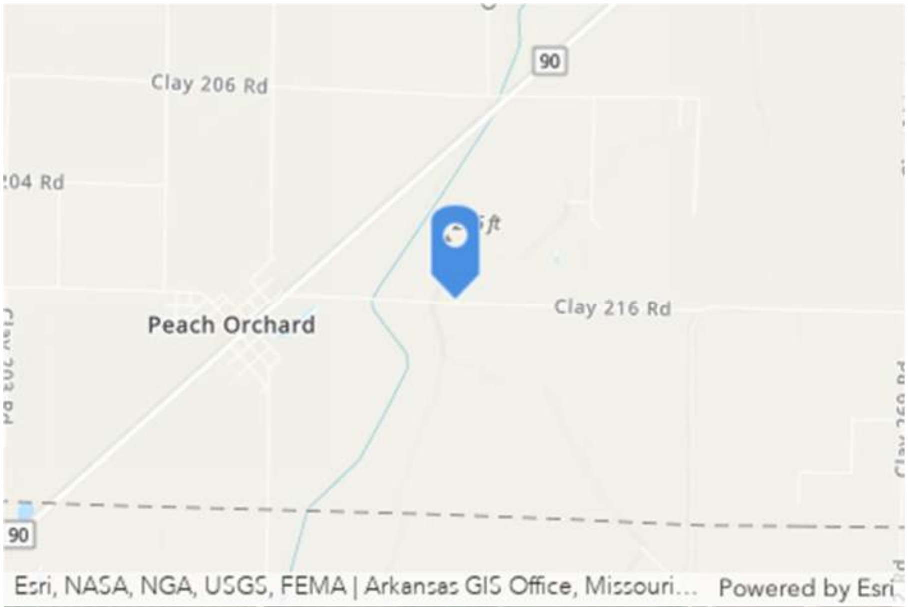
Photo 2 Description: Downstream Face

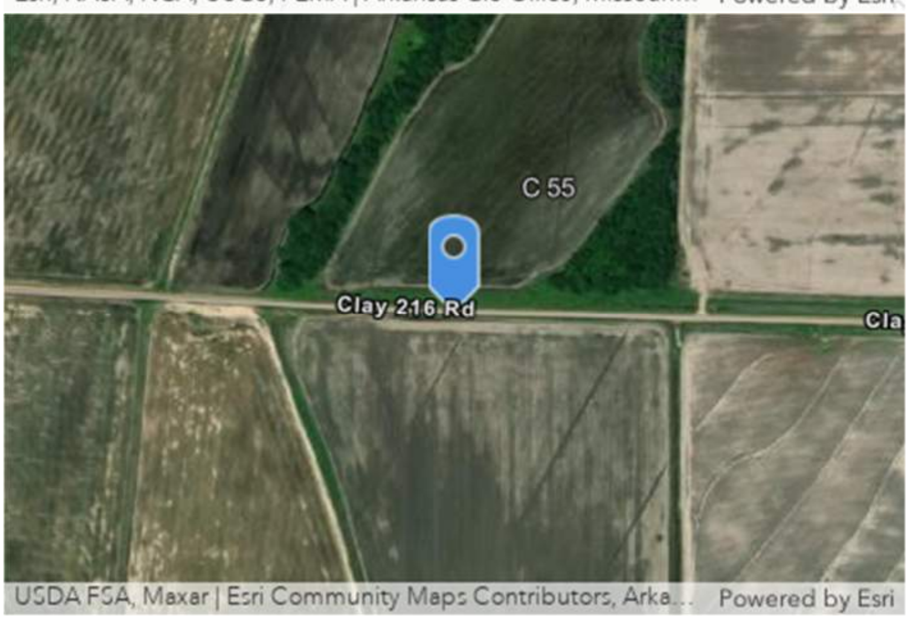
Photo Log of: Alternative 3

PHOTO LOG OF STREAM CROSSING (3OW040)

See Sheet 37 of 42 in Attachment C

INSPECTED BY: JCMarshall_Garver
INSPECTION DATE: 03/03/2021
LOCATION: -90.64501, 36.28077





LOCATION NOTES

CR 216

Photo Log of: Alternative 3

Photo 1 Description: Southwest

Photo Log of: Alternative 3

Photo 2 Description: Northeast

Photo Log of: Alternative 3

Photo 3 Description: Stream facing east

Photo Log of: Alternative 3

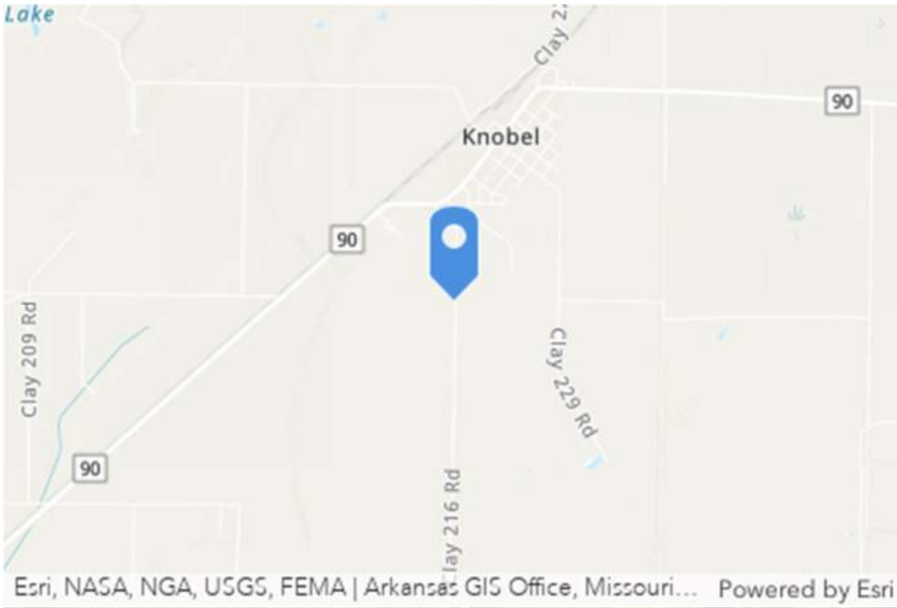
Photo 4 Description: Vegetation

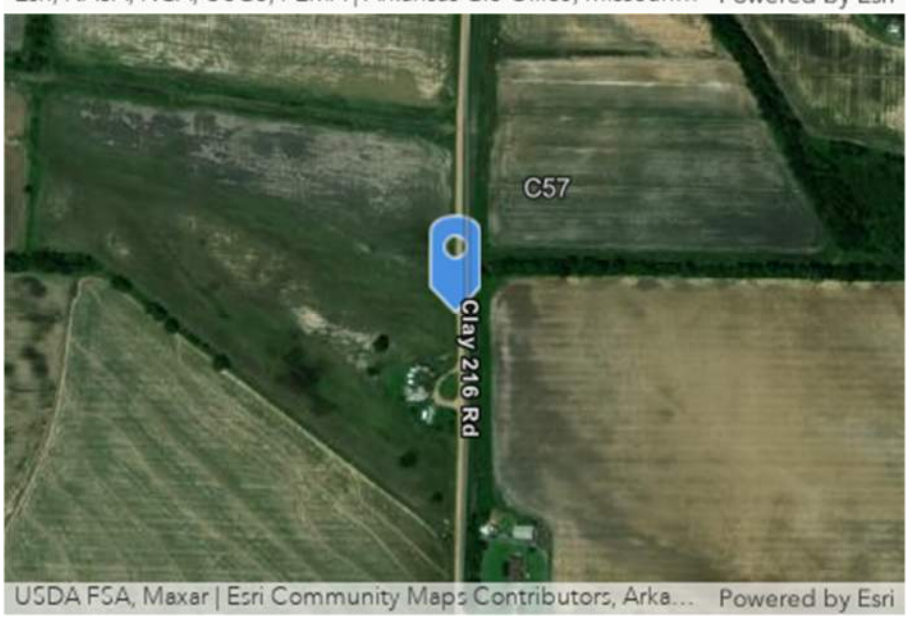
Photo Log of: Alternative 3

PHOTO LOG OF STREAM CROSSING (3OW045)

See Sheet 38 of 42 in Attachment C

INSPECTED BY: JCMarshall_Garver
INSPECTION DATE: 03/03/2021
LOCATION: -90.60561, 36.30887





LOCATION NOTES

CR 216

Photo Log of: Alternative 3

Photo 1 Description: Southwest

Photo 2 Description: Northeast

Photo Log of: Alternative 3

Photo 4 Description: Stream facing north

Photo Log of: Alternative 3

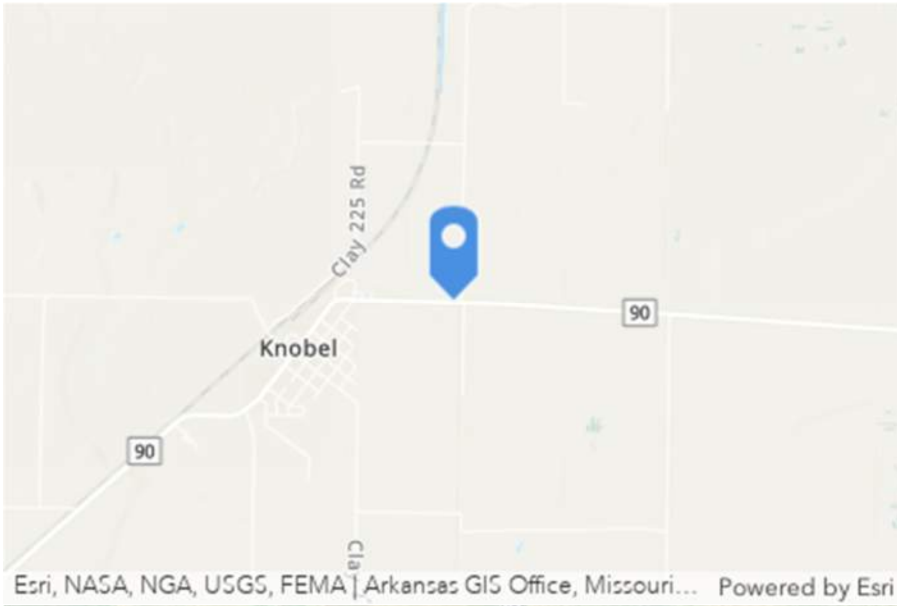
Photo 5 Description: Stream facing south

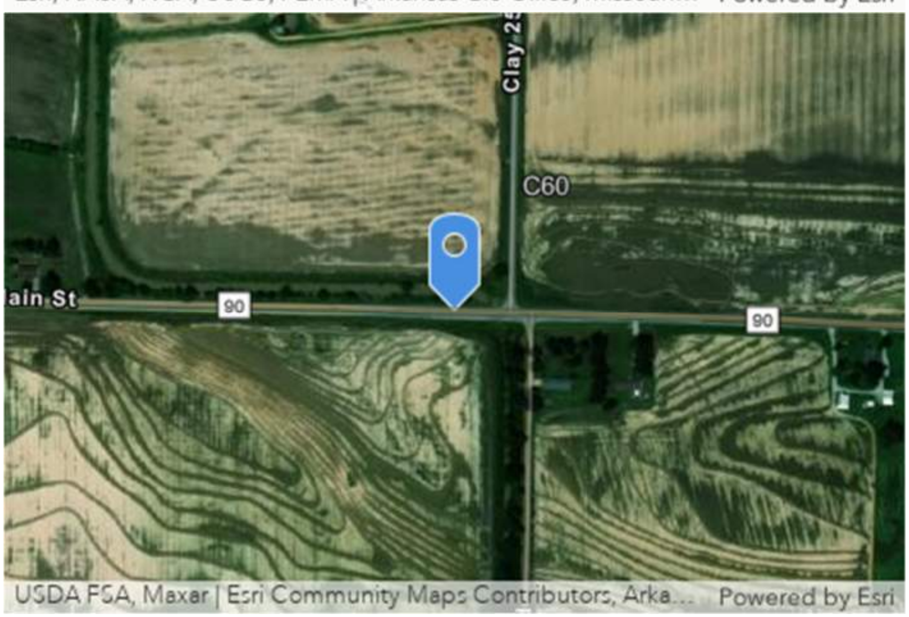
Photo Log of: Alternative 3

PHOTO LOG OF STREAM CROSSING (3OW050)

See Sheet 39 of 42 in Attachment C

INSPECTED BY: JCMarshall_Garver
INSPECTION DATE: 03/03/2021
LOCATION: -90.58824, 36.32363





LOCATION NOTES

Hwy 90

Photo Log of: Alternative 3

Photo 1 Description: South

Photo Log of: Alternative 3

Photo 2 Description: North

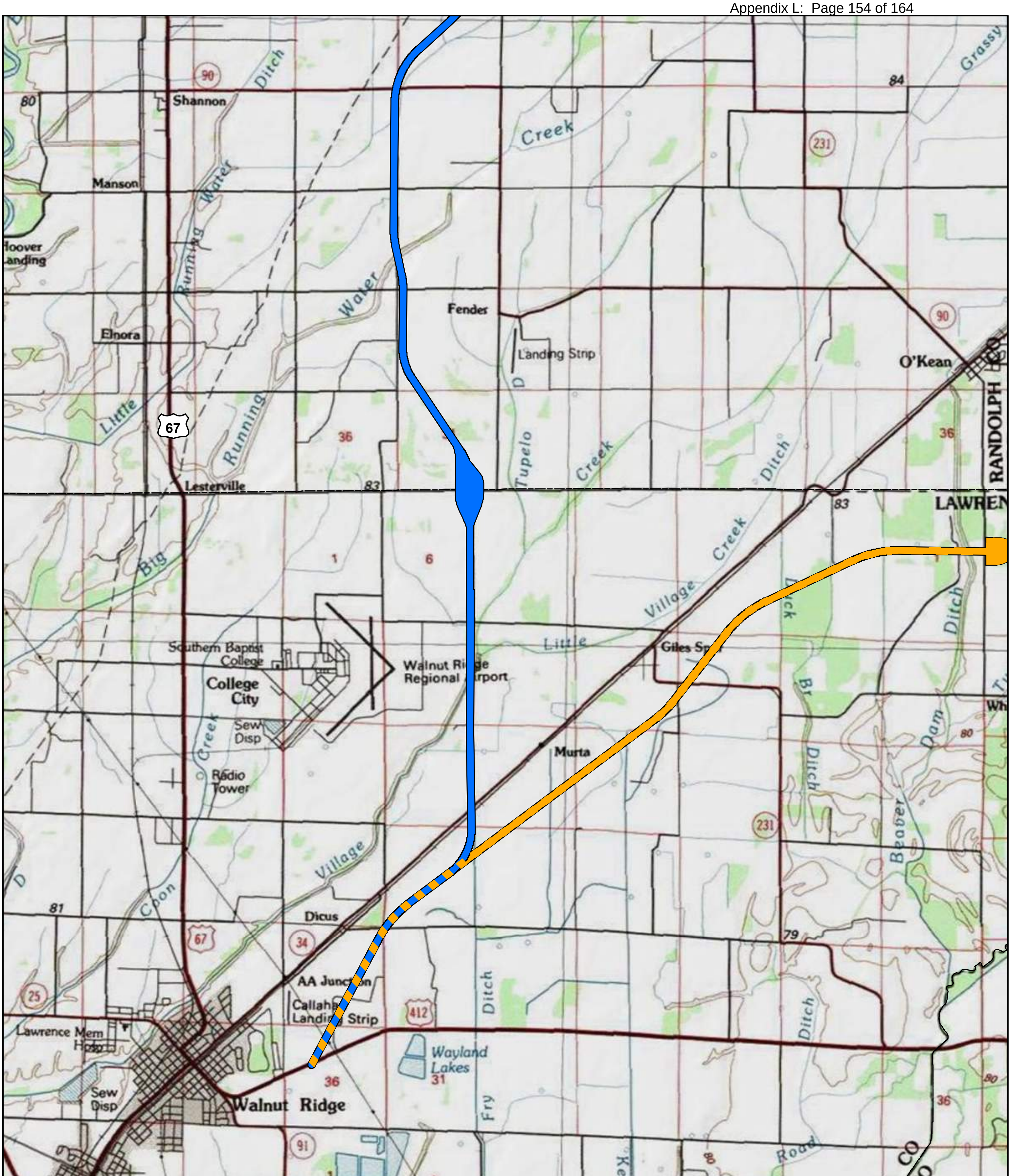
Photo Log of: Alternative 3

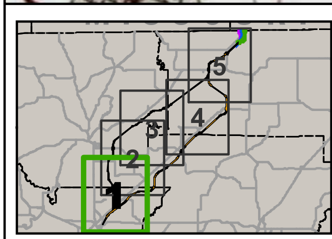
Photo 3 Description: Stream facing west upstream

Photo Log of: Alternative 3

Photo 4 Description: Looking Downstream

ATTACHMENT D — USGS 7.5-MINUTE TOPOGRAPHIC MAPS





N

0 0.625 1.25
Miles

Alternative 2		Alternative A	
Alternative 3		Alternative B	
		Alternative C	

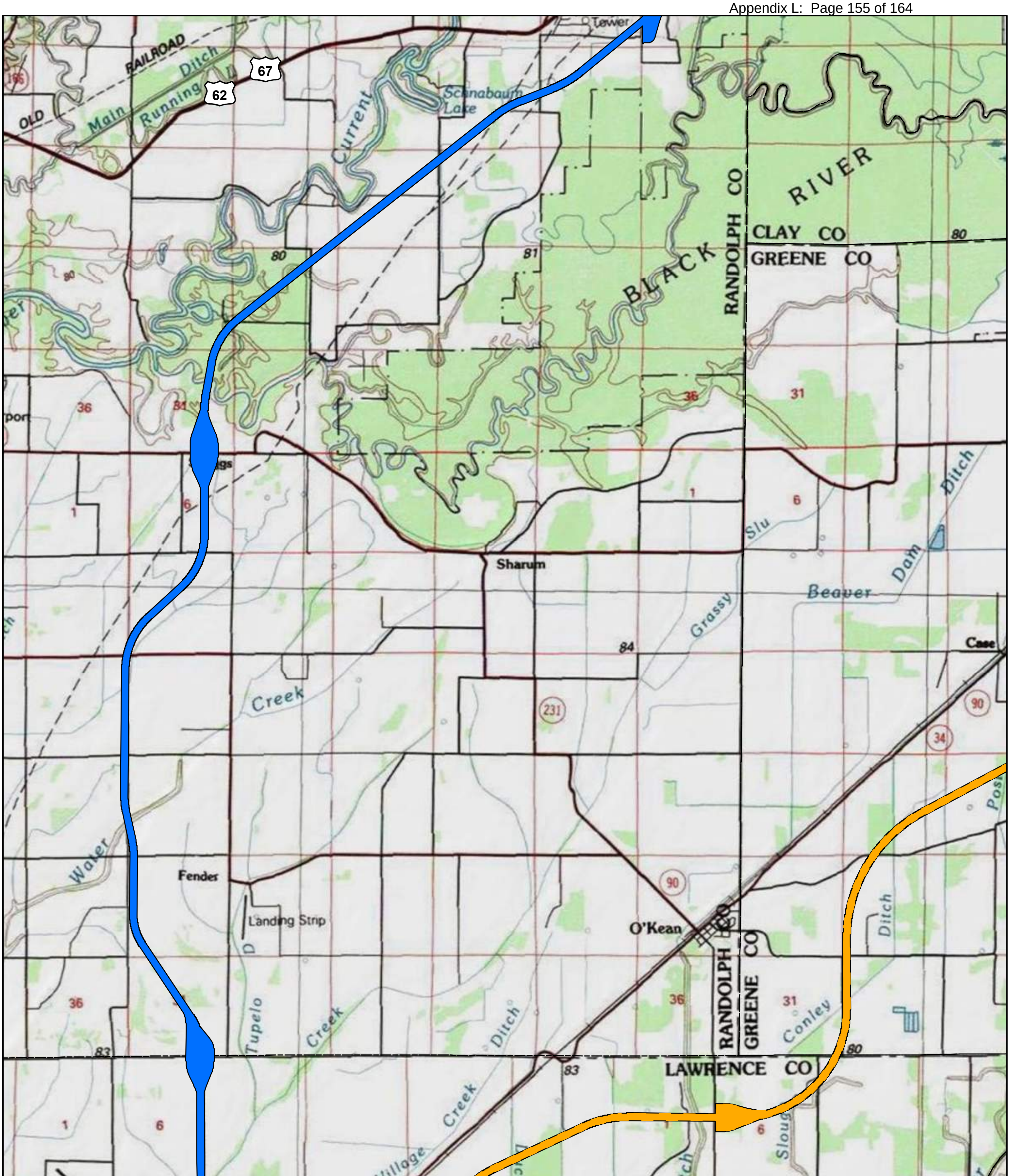
WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

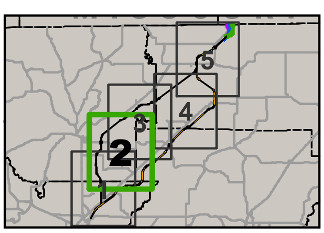
Randolph, Clay, Greene and Lawrence Counties

Attachment D: USGS Topographic Map

Detail 1 of 5

ARDOT





N

0 0.625 1.25
Miles

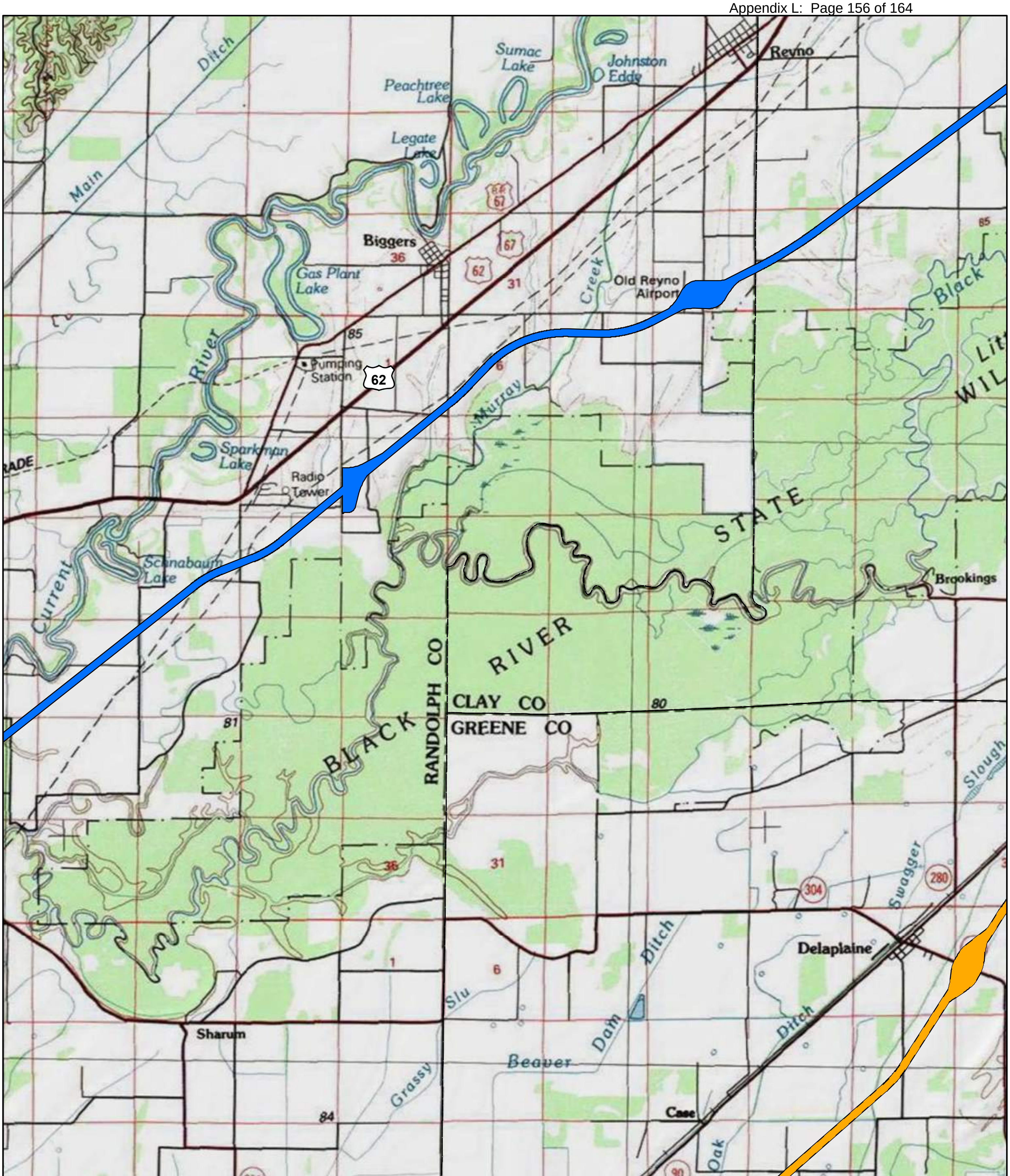
Alternative 2	Alternative A
Alternative 3	Alternative B
	Alternative C

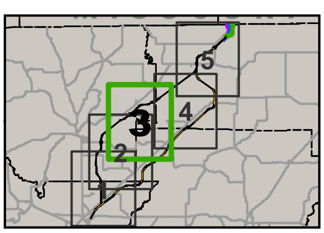
WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment D: USGS Topographic Map

Detail 2 of 5





N

0 0.625 1.25
Miles

Alternative 2
Alternative 3
Alternative A
Alternative B
Alternative C

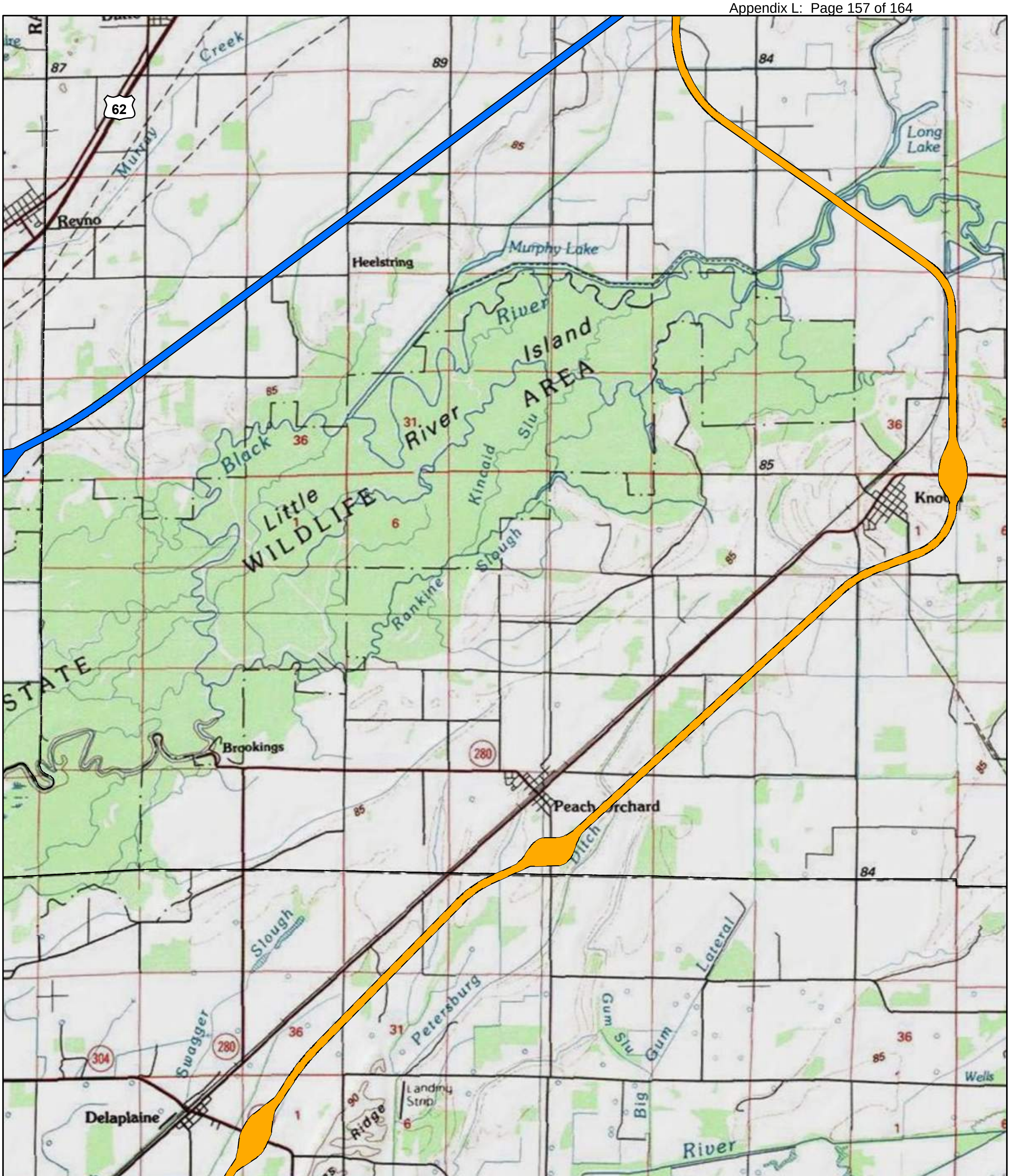
WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

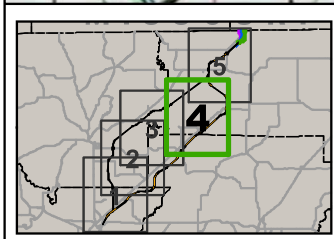
Randolph, Clay, Greene and Lawrence Counties

Attachment D: USGS Topographic Map

Detail 3 of 5

ARDOT





0 0.625 1.25
Miles

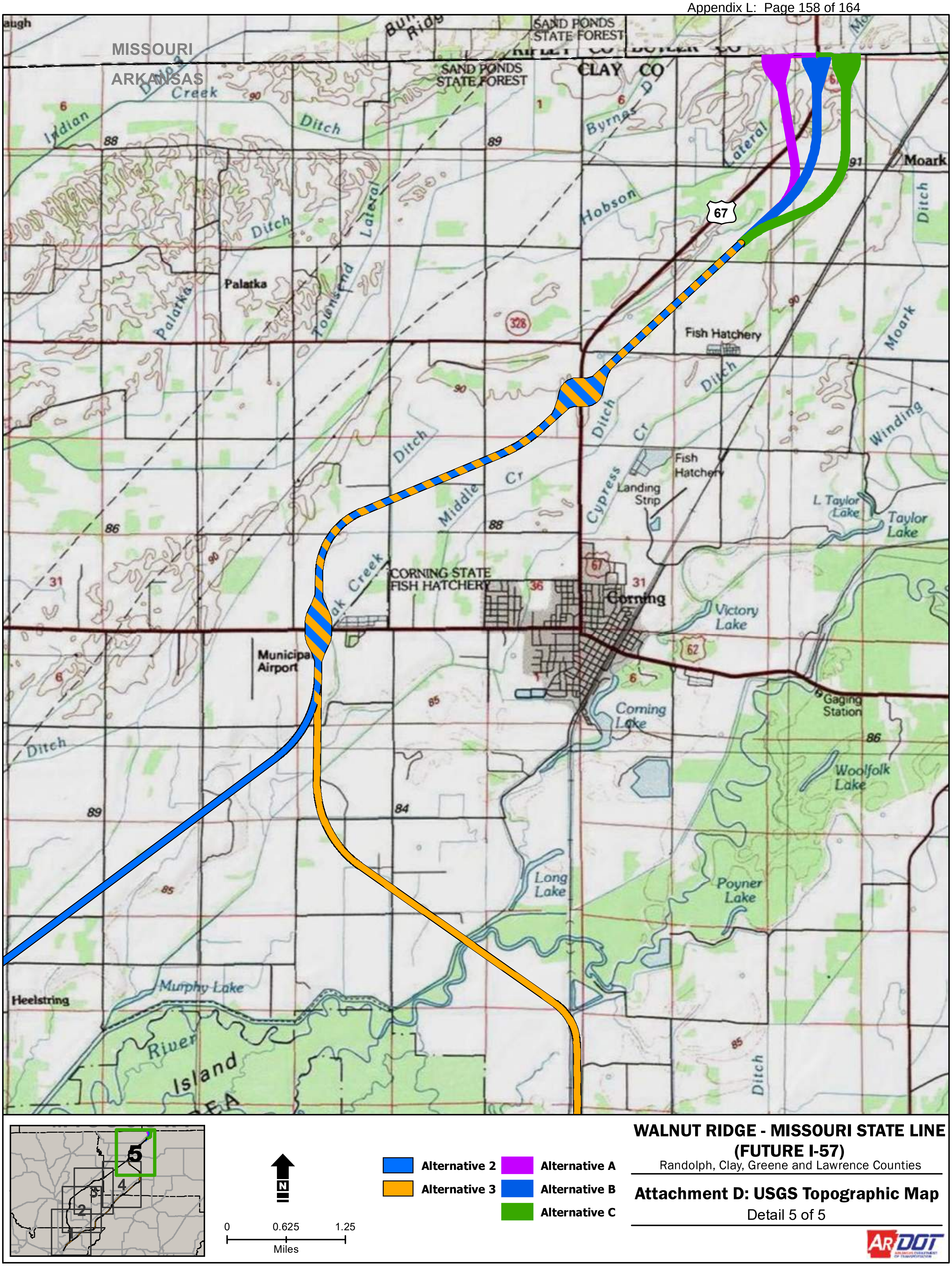
Alternative 2
Alternative 3
Alternative A
Alternative B
Alternative C

WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment D: USGS Topographic Map

Detail 4 of 5



WALNUT RIDGE - MISSOURI STATE LINE (FUTURE I-57)

Randolph, Clay, Greene and Lawrence Counties

Attachment D: USGS Topographic Map

Detail 5 of 5

ATTACHMENT E — CONCEPTUAL OTHER WATERS IMPACT TABLES

ALTERNATIVE 2 - CONCEPTUAL OTHER WATERS IMPACTS

Other Waters (OW) Identification No.	Latitude	Longitude	Stream Classification	Impacts (LF)
2OW1	36.06907486	-90.93477326	EPH	700
2OW2	36.07004602	-90.93293334	DNJ/EPH	102
2OW3	36.07203288	-90.93161727	DNJ/EPH	109
2OW4	36.08072619	-90.92632611	INT	445
2OW5	36.08749011	-90.92213112	INT	168
2OW6	36.08749272	-90.92129517	EPH	326
2OW7	36.08761161	-90.92123066	INT	354
2OW8	36.08765035	-90.92183617	EPH	346
2OW9	36.09383127	-90.91133273	DNJ/EPH	0
2OW10	36.09428048	-90.91172138	DNJ/EPH	400
2OW11	36.09473008	-90.91211037	DNJ/EPH	0
2OW12	36.09670493	-90.90796466	DNJ/EPH	285
2OW13	36.09702693	-90.90823994	DNJ/EPH	1
2OW14	36.09717798	-90.90836907	DNJ/EPH	133
2OW15	36.10130638	-90.90557125	PER	1413
2OW16	36.10226271	-90.90620378	DNJ/INT	373
2OW17	36.10379665	-90.90557153	DNJ/EPH	322
2OW18	36.10394175	-90.90634779	DNJ/EPH	269
2OW19	36.10429056	-90.9054953	DNJ/EPH	78
2OW20	36.10431583	-90.90623113	DNJ/EPH	486
2OW21	36.10440655	-90.90570644	DNJ/EPH	169
2OW22	36.10523679	-90.9056241	DNJ/EPH	344
2OW23	36.10580112	-90.90624042	DNJ/EPH	358
2OW24	36.11306329	-90.90624039	INT	370
2OW25	36.11417646	-90.9055258	DNJ/EPH	1255
2OW26	36.12336639	-90.9060656	PER	893
2OW27	36.13145299	-90.90592456	INT	399
2OW28	36.13511576	-90.90525286	DNJ/INT	2549
2OW29	36.13894823	-90.90590087	DNJ/EPH	391
2OW30	36.13960707	-90.90521383	DNJ/EPH	496
2OW31	36.14058172	-90.90520416	DNJ/EPH	115
2OW32	36.1416989	-90.90520527	DNJ/EPH	641
2OW33	36.14654034	-90.90518924	DNJ/EPH	2835
2OW34	36.17240229	-90.9174103	DNJ/EPH	398
2OW35	36.17959374	-90.91726164	DNJ/EPH	400
2OW36	36.18276718	-90.91803274	DNJ/EPH	1191
2OW37	36.18443199	-90.91816333	INT	487
2OW38	36.1942653	-90.91849122	DNJ/EPH	401
2OW39	36.20437515	-90.91825078	INT	661
2OW40	36.20867511	-90.91804988	DNJ/EPH	401
2OW41	36.20881316	-90.91800359	DNJ/EPH	406
2OW42	36.2160808	-90.91130671	EPH	565
2OW43	36.21741759	-90.90945584	DNJ/INT	467
2OW44	36.21835332	-90.90817737	DNJ/EPH	556
2OW45	36.22331771	-90.90444875	DNJ/EPH	412
2OW46	36.23768578	-90.903891	DNJ/EPH	1479

Other Waters (OW) Identification No.	Latitude	Longitude	Stream Classification	Impacts (LF)
2OW47	36.23783875	-90.90389558	DNJ/EPH	1475
2OW48	36.24835367	-90.90295626	PER	412
2OW49	36.25666544	-90.8978973	DNJ/EPH	609
2OW50	36.26115356	-90.89124079	INT	367
2OW51	36.26121122	-90.89014636	INT	321
2OW52	36.26533336	-90.88411017	DNJ/EPH	512
2OW53	36.26708418	-90.88133404	DNJ/EPH	631
2OW54	36.2683256	-90.87933532	DNJ/EPH	514
2OW55	36.26926175	-90.87798182	DNJ/EPH	571
2OW56	36.27386559	-90.87040693	INT	470
2OW57	36.27478143	-90.86903193	INT	631
2OW58	36.27957221	-90.86138483	DNJ/EPH	503
2OW59	36.27965175	-90.86125782	INT	505
2OW60	36.28577797	-90.8524609	DNJ/INT	60
2OW61	36.28584243	-90.85235801	INT	50
2OW62	36.29013035	-90.83965153	INT	463
2OW63	36.29328903	-90.83396914	DNJ/INT	496
2OW64	36.29684132	-90.82931237	DNJ/EPH	167
2OW65	36.29983896	-90.82476529	DNJ/EPH	2006
2OW66	36.30258712	-90.82010943	DNJ/EPH	728
2OW67	36.3033645	-90.81871709	DNJ/EPH	697
2OW68	36.30541215	-90.81530349	DNJ/EPH	512
2OW69	36.30513967	-90.81492066	DNJ/EPH	143
2OW70	36.30938867	-90.80875533	INT	581
2OW71	36.31364082	-90.80287976	DNJ/EPH	551
2OW72	36.31516217	-90.80101949	DNJ/EPH	580
2OW73	36.32090134	-90.79202107	DNJ/EPH	575
2OW74	36.32149805	-90.7777293	INT	405
2OW75	36.3215799	-90.78739978	DNJ/INT	401
2OW76	36.32163735	-90.78231108	PER	464
2OW77	36.3246033	-90.76573474	DNJ/EPH	876
2OW78	36.32699147	-90.760106	DNJ/EPH	1473
2OW79	36.32830685	-90.75540417	INT	705
2OW80	36.33059378	-90.75075253	DNJ/EPH	455
2OW81	36.3318461	-90.74776045	DNJ/EPH	854
2OW82	36.33193177	-90.74756421	DNJ/EPH	851
2OW83	36.33602305	-90.73953025	EPH	602
2OW84	36.33889483	-90.73460408	INT	499
2OW85	36.34294359	-90.72778133	INT	498
2OW86	36.34845772	-90.71841702	DNJ/EPH	495
2OW87	36.35361999	-90.70880906	DNJ/EPH	207
2OW88	36.35362602	-90.71010869	DNJ/EPH	394
2OW89	36.35370222	-90.70949695	DNJ/EPH	620
2OW90	36.3567642	-90.70413157	PER	588
2OW91	36.35712626	-90.70433083	EPH	183
2OW92	36.35760914	-90.7028397	DNJ/EPH	643

Other Waters (OW) Identification No.	Latitude	Longitude	Stream Classification	Impacts (LF)
2OW93	36.36728738	-90.68641886	DNJ/EPH	489
2OW94	36.36831657	-90.68466977	DNJ/EPH	645
2OW95	36.37263623	-90.67733715	DNJ/EPH	498
2OW96	36.37271355	-90.67720574	DNJ/EPH	502
2OW97	36.37540222	-90.67299234	DNJ/EPH	507
2OW98	36.38370302	-90.65852411	DNJ/EPH	499
2OW99	36.38920066	-90.64924204	INT	517
2OW100	36.38975203	-90.64806368	INT	578
2OW101	36.39689857	-90.63860953	DNJ/EPH	319
2OW102	36.39705326	-90.63874479	DNJ/EPH	467
2OW103	36.40409322	-90.63620582	INT	398
2OW104	36.40788528	-90.6352239	DNJ/INT	246
2OW105	36.41075713	-90.63378955	INT	790
2OW106	36.41155944	-90.63603031	DNJ/EPH	1446
2OW107	36.41176929	-90.63644428	DNJ/EPH	1203
2OW108	36.41388168	-90.63433251	INT	1473
2OW109	36.41744957	-90.63512057	INT	0
2OW110	36.42044848	-90.63593558	INT	2281
2OW111	36.43125876	-90.62205132	INT	431
2OW112	36.43704221	-90.60409573	DNJ/EPH	430
2OW113	36.44051855	-90.59545646	INT	603
2OW114	36.44100612	-90.59479292	INT	381
2OW115	36.44392905	-90.58973477	INT	231
2OW116	36.44401739	-90.59067493	INT	335
2OW117	36.44405697	-90.58933589	INT	512
2OW118	36.44498912	-90.59019394	INT	594
2OW119	36.4450092	-90.59011648	INT	751
2OW120	36.44779627	-90.58766178	INT	1217
2OW121	36.44735592	-90.58564819	DNJ/EPH	1580
2OW122	36.44724668	-90.58538992	DNJ/EPH	1580
2OW123	36.44647772	-90.58363858	DNJ/INT	1044
2OW124	36.44939239	-90.58485447	EPH	302
2OW125	36.44981604	-90.58106821	INT	1200
2OW126	36.45351147	-90.57718107	DNJ/INT	572
2OW127	36.46009078	-90.56741367	DNJ/EPH	168
2OW128	36.46099844	-90.56748372	DNJ/EPH	211
2OW129	36.46055173	-90.56739282	DNJ/EPH	542
2OW130	36.46716707	-90.55836677	DNJ/EPH	564
2OW131	36.46726289	-90.55822472	DNJ/EPH	567

ALTERNATIVE 3 - CONCEPTUAL OTHER WATERS IMPACTS

Other Waters (OW) Identification No.	Latitude	Longitude	Stream Classification	Impacts (LF)
3OW1	36.06907486	-90.93477326	EPH	700
3OW2	36.07004602	-90.93293334	DNJ/EPH	102
3OW3	36.07203288	-90.93161727	DNJ/EPH	109
3OW4	36.08072619	-90.92632611	INT	445
3OW5	36.08749011	-90.92213112	INT	168
3OW6	36.08749272	-90.92129517	EPH	326
3OW7	36.08761161	-90.92123066	INT	354
3OW8	36.08765035	-90.92183617	EPH	346
3OW9	36.09428048	-90.91172138	DNJ/EPH	400
3OW10	36.09473008	-90.91211037	DNJ/EPH	0
3OW11	36.09625417	-90.9075793	DNJ/EPH	115
3OW12	36.09670493	-90.90796466	DNJ/EPH	285
3OW13	36.09702693	-90.90823994	DNJ/EPH	1
3OW14	36.09792418	-90.90558108	PER	496
3OW15	36.10196447	-90.8987414	EPH	635
3OW16	36.10328827	-90.89653518	EPH	495
3OW17	36.10596753	-90.89201561	INT	493
3OW18	36.11418208	-90.87816982	PER	512
3OW19	36.11551527	-90.87591863	PER	619
3OW20	36.11713919	-90.87319451	DNJ/EPH	486
3OW21	36.12063941	-90.86897026	DNJ/EPH	614
3OW22	36.1207564	-90.86886575	DNJ/EPH	631
3OW23	36.12225911	-90.86739407	DNJ/EPH	485
3OW24	36.12242373	-90.86723285	DNJ/EPH	482
3OW25	36.12559255	-90.86415336	PER	420
3OW26	36.1293873	-90.86060739	DNJ/EPH	373
3OW27	36.13491737	-90.85055982	PER	440
3OW28	36.13638531	-90.84663065	DNJ/EPH	903
3OW29	36.13827626	-90.84147947	INT	441
3OW30	36.13962158	-90.83776601	INT	928
3OW31	36.13970237	-90.83759464	DNJ/EPH	976
3OW32	36.14091332	-90.83209565	INT	401
3OW33	36.14079218	-90.81701921	INT	427
3OW34	36.14073943	-90.81413571	DNJ/EPH	400
3OW35	36.14073702	-90.81400168	DNJ/EPH	1480
3OW36	36.14084159	-90.80930561	DNJ/EPH	1011
3OW37	36.14266194	-90.79999722	INT	505
3OW38	36.1460342	-90.79550875	DNJ/EPH	685
3OW39	36.14610925	-90.79563072	INT	812
3OW40	36.14952924	-90.79250768	DNJ/EPH	440
3OW41	36.14968005	-90.79241841	DNJ/EPH	438
3OW42	36.15166884	-90.79137434	DNJ/EPH	1066
3OW43	36.15739969	-90.79053985	INT	541
3OW44	36.17129994	-90.7895655	DNJ/EPH	411
3OW45	36.17482872	-90.78799027	DNJ/EPH	438
3OW46	36.17843522	-90.78533441	DNJ/EPH	492
3OW47	36.17855054	-90.78522802	DNJ/EPH	494
3OW48	36.18164433	-90.78170156	INT	544
3OW49	36.18349599	-90.77989866	DNJ/INT	2005
3OW50	36.18623408	-90.77247477	INT	457
3OW51	36.19007664	-90.76328074	DNJ/EPH	454
3OW52	36.1909987	-90.76107433	PER	515
3OW53	36.19320975	-90.75667504	DNJ/EPH	608
3OW54	36.19771915	-90.7501427	INT	572
3OW55	36.19777683	-90.75005961	DNJ/EPH	572
3OW56	36.20027642	-90.74645915	DNJ/EPH	613
3OW57	36.20036653	-90.74627	INT	591
3OW58	36.20331815	-90.74207736	INT	552
3OW59	36.20747782	-90.73536893	INT	173
3OW60	36.20771704	-90.73573982	PER	612
3OW61	36.21079385	-90.73139861	PER	622
3OW62	36.21519126	-90.7261019	DNJ/EPH	726
3OW63	36.21508527	-90.72619351	DNJ/EPH	716
3OW64	36.22252098	-90.72010354	DNJ/EPH	484
3OW65	36.22260484	-90.72003512	DNJ/EPH	486
3OW66	36.22604088	-90.71693636	INT	841
3OW67	36.22626112	-90.71740565	DNJ/EPH	288
3OW68	36.22623385	-90.71540673	DNJ/EPH	2177
3OW69	36.22655838	-90.71495662	DNJ/EPH	1678
3OW70	36.22942371	-90.71443719	DNJ/EPH	1491
3OW71	36.2294562	-90.71403126	DNJ/EPH	1283
3OW72	36.22965785	-90.7124347	INT	3148
3OW73	36.23201718	-90.71200272	DNJ/EPH	1554
3OW74	36.23823328	-90.70723226	INT	495
3OW75	36.2455569	-90.69829919	DNJ/EPH	185
3OW76	36.2455969	-90.69819153	DNJ/EPH	148
3OW77	36.24570841	-90.69866408	INT	571
3OW78	36.25009502	-90.69321374	INT	574
3OW79	36.25757794	-90.6838972	DNJ/EPH	572
3OW80	36.25980994	-90.6811225	DNJ/INT	623
3OW81	36.26644394	-90.6701324	INT	387
3OW82	36.26982226	-90.66103868	DNJ/EPH	1488
3OW83	36.26982137	-90.66093317	DNJ/EPH	1488
3OW84	36.27759801	-90.64940393	INT	407
3OW85	36.27768454	-90.64928613	DNJ/EPH	406
3OW86	36.27818857	-90.64858139	DNJ/EPH	579
3OW87	36.28087804	-90.64484876	PER	587
3OW88	36.28134135	-90.6436892	DNJ/EPH	1328
3OW89	36.28919863	-90.63329862	INT	546
3OW90	36.29389383	-90.62676474	EPH	520
3OW91	36.29857017	-90.62028916	DNJ/EPH	507
3OW92	36.29868239	-90.6201333	DNJ/EPH	512
3OW93	36.29944452	-90.61907481	DNJ/EPH	540
3OW94	36.29954277	-90.61893835	DNJ/EPH	540
3OW95	36.30182617	-90.61576405	DNJ/INT	672
3OW96	36.3047306	-90.61170552	INT	673
3OW97	36.30870907	-90.60540708	PER	452
3OW98	36.30932104	-90.60424242	INT	866
3OW99	36.31011213	-90.60192066	INT	404
3OW100	36.31164007	-90.59670803	INT	426
3OW101	36.31168765	-90.59654606	DNJ/EPH	428
3OW102	36.31210838	-90.59501014	DNJ/EPH	726
3OW103	36.31460095	-90.59061512	DNJ/EPH	512
3OW104	36.31567613	-90.58964496	EPH	417
3OW105	36.31845302	-90.58849043	DNJ/EPH	426
3OW106	36.32283927	-90.58767686	PER	2649
3OW107	36.32350493	-90.58834775	DNJ/EPH	300
3OW108	36.3237424	-90.58790465	DNJ/EPH	40
3OW109	36.33810664	-90.58822358	INT	401
3OW110	36.34467946	-90.58816679	PER	402
3OW111	36.35035289	-90.58900598	PER	1032
3OW112	36.35126552	-90.58948508	DNJ/EPH	784
3OW113	36.35527467	-90.59474864	DNJ/EPH	486
3OW114	36.35714432	-90.59793305	DNJ/EPH	487
3OW115	36.36066747	-90.60393159	DNJ/EPH	488
3OW116	36.36073867	-90.60405553	DNJ/EPH	485
3OW117	36.360857	-90.60425709	DNJ/EPH	476
3OW118	36.36336165	-90.6084675	PER	421
3OW119	36.36381149	-90.60929018	PER	422
3OW120	36.36802539	-90.61646961	INT	673
3OW121	36.37158643	-90.6225373	INT	489
3OW122	36.37506639	-90.62845766	DNJ/EPH	677
3OW123	36.3751777	-90.62864119	INT	654
3OW124	36.38266031	-90.63556585	INT	424
3OW125	36.38917132	-90.63665096	PER	539
3OW126	36.38973501	-90.63670006	INT	364
3OW127	36.39690738	-90.63642028	DNJ/EPH	400
3OW128	36.39711516	-90.63641436	DNJ/EPH	401
3OW129	36.40408617	-90.63552669	INT	1
3OW130	36.40409322	-90.63620582	INT	398
3OW131	36.40788528	-90.6352239	DNJ/INT	246
3OW132	36.41075713	-90.63378955	INT	790
3OW133	36.41155944	-90.63603031	DNJ/EPH	1446
3OW134	36.41176929	-90.63644428	DNJ/EPH	1203
3OW135	36.41388168	-90.63433251	INT	1473
3OW136	36.42044848	-90.63593558	INT	2281
3OW137	36.43125876	-90.62205132	INT	431
3OW138	36.43704221	-90.60409573	DNJ/EPH	430
3OW139	36.44051855	-90.59545646	INT	603
3OW140	36.44100612	-90.59479292	INT	381
3OW141	36.44392905	-90.58973477	INT	231
3OW142	36.44401739	-90.59067493	INT	335
3OW143	36.44405697	-90.58933589	INT	512
3OW144	36.44498912	-90.59019394	INT	594
3OW145	36.4450092	-90.59011648	INT	751
3OW146	36.44779627	-90.58766178	INT	1217
3OW147	36.44735592	-90.58564819	DNJ/EPH	1580
3OW148	36.44724668	-90.58538992	DNJ/EPH	1580
3OW149	36.44647772	-90.58363858	DNJ/INT	1044
3OW150	36.44939239	-90.58485447	EPH	302
3OW151	36.44981604	-90.58106821	INT	1200
3OW152	36.45351147	-90.57718107	DNJ/INT	572
3OW153	36.46009078	-90.56741367	DNJ/EPH	168
3OW154	36.46099844	-90.56748372	DNJ/EPH	211
3OW155	36.46055173	-90.56739282	DNJ/EPH	542
3OW156	36.46716707	-90.55836677	DNJ/EPH	564
3OW157	36.46726289	-90.55822472	DNJ/EPH	567

Other Waters (OW) Identification No.	Latitude	Longitude	Stream Classification	Impacts (LF)
ALTERNATIVE A				
AOW1	36.4703285	-90.55367317	DNJ/EPH	616
AOW2	36.47125249	-90.55367423	DNJ/EPH	42
AOW3	36.47409422	-90.54871942	DNJ/EPH	560
AOW4	36.47935027	-90.5443902	DNJ/EPH	1286
AOW5	36.4811262	-90.54431357	DNJ/EPH	399
AOW6	36.4812418	-90.54431903	DNJ/EPH	400
AOW7	36.48426777	-90.54545659	DNJ/EPH	60
AOW8	36.48455326	-90.54551245	DNJ/EPH	61
AOW9	36.48466559	-90.54493183	DNJ/EPH	363
AOW10	36.48494484	-90.54498647	DNJ/EPH	360
AOW11	36.48533525	-90.54446026	DNJ/EPH	60
AOW11	36.49840829	-90.54269859	DNJ/EPH	1407
AOW12	36.48539103	-90.54438508	DNJ/EPH	0
AOW12	36.49853333	-90.54323831	DNJ/EPH	1088
AOW13	36.48841063	-90.54566221	DNJ/EPH	405
AOW14	36.49498875	-90.54733519	INT	847
AOW15	36.49842541	-90.5473797	DNJ/EPH	1345
ALTERNATIVE B				
BOW1	36.47756829	-90.54443902	DNJ/EPH	582
BOW2	36.48105191	-90.54177167	DNJ/EPH	429
BOW3	36.48115788	-90.54171144	DNJ/EPH	429
BOW4	36.48421168	-90.54553171	DNJ/EPH	0
BOW5	36.48426777	-90.54545659	DNJ/EPH	60
BOW6	36.48449631	-90.5455874	DNJ/EPH	0
BOW7	36.48455326	-90.54551245	DNJ/EPH	61
BOW8	36.48466559	-90.54493183	DNJ/EPH	363
BOW9	36.48494484	-90.54498647	DNJ/EPH	360
BOW10	36.48533525	-90.54446026	DNJ/EPH	60
BOW11	36.48539103	-90.54438508	DNJ/EPH	0
BOW12	36.49055691	-90.54051631	DNJ/EPH	281
BOW13	36.49226333	-90.53974942	DNJ/EPH	2008
BOW14	36.49306869	-90.54002404	DNJ/EPH	1462
BOW15	36.49507405	-90.53960926	DNJ/EPH	379
BOW16	36.49550488	-90.53970386	DNJ/EPH	322
BOW17	36.49661352	-90.5413996	INT	1340
BOW18	36.49841021	-90.54197902	DNJ/EPH	347
BOW19	36.49841165	-90.54084698	DNJ/EPH	319
ALTERNATIVE C				
COW1	36.46958303	-90.55401309	DNJ/EPH	7
COW2	36.46959073	-90.55400672	DNJ/EPH	0
COW3	36.4703285	-90.55367317	DNJ/EPH	616
COW4	36.47398757	-90.54471075	DNJ/EPH	1023
COW5	36.47699864	-90.53837953	INT	2515
COW6	36.48087074	-90.5354225	DNJ/EPH	417
COW7	36.48096315	-90.53538226	DNJ/EPH	415
COW8	36.49171138	-90.5345046	DNJ/EPH	398
COW9	36.49635807	-90.53363532	INT	1488
COW9	36.49841157	-90.5371675	DNJ/INT	184
COW10	36.49840811	-90.53336315	DNJ/EPH	604

ATTACHMENT F — CONCEPTUAL WETLAND IMPACT TABLES

ALTERNATIVE 2 - CONCEPTUAL WETLAND IMPACTS

Wetland (W) Identification No.	Latitude	Longitude	Cowardin Classification	Impacts (Acres)
2W001	36.07045492	-90.9327089	PEM	0.98
2W002	36.07242321	-90.9313682	PEM	0.54
2W003	36.10298155	-90.9063236	PFO	2.65
2W004	36.18742839	-90.9184905	PEM	1.22
2W005	36.20769111	-90.9176493	PEM	0.76
2W006	36.21606639	-90.9113463	PFO	0.63
2W007	36.23055453	-90.9045269	PEM	0.06
2W008	36.24067058	-90.9038223	PFO	4.61
2W009	36.24744837	-90.9031277	PFO	4.42
2W010	36.2858755	-90.8514463	PFO	5.36
2W011	36.2858311	-90.8507648	PEM	0.35
2W012	36.28686776	-90.8505961	PEM	0.16
2W013	36.29025488	-90.8395701	PFO	2.38
2W014	36.29327694	-90.8345334	PFO	0.99
2W015	36.32163746	-90.782049	PFO	4.56
2W016	36.32156009	-90.7776964	PEM	0.40
2W017	36.33631896	-90.7389821	PFO	4.30
2W018	36.35667271	-90.704537	PFO	2.37
2W019	36.35682938	-90.703714	PFO	0.75
2W020	36.37185409	-90.6796554	PFO	0.11
2W021	36.42822368	-90.6313858	PFO	0.06
2W022	36.44866887	-90.5847112	PUB	0.25

ALTERNATIVE 3 - CONCEPTUAL WETLAND IMPACTS

Wetland (W) Identification No.	Latitude	Longitude	Cowardin Classification	Impacts (Acres)
3W001	36.070455	-90.932709	PEM	0.98
3W002	36.072423	-90.931368	PEM	0.54
3W003	36.141147	-90.821926	PFO	0.61
3W004	36.140775	-90.816995	PFO	1.35
3W005	36.152705	-90.790788	PFO	1.09
3W006	36.190547	-90.762188	PFO	6.65
3W007	36.229666	-90.712165	PFO	2.50
3W008	36.24823	-90.694694	PFO	0.77
3W009	36.250519	-90.693429	PFO	0.40
3W010	36.266107	-90.670845	PSS	2.89
3W011	36.266866	-90.670504	PUB	0.20
3W012	36.266658	-90.670106	PEM	0.43
3W013	36.281955	-90.643031	PFO	1.86
3W014	36.293918	-90.626604	PFO	0.69
3W015	36.310026	-90.601742	PFO	0.32
3W016	36.310058	-90.601048	PFO	1.11
3W017	36.336109	-90.588821	PUB	0.40
3W018	36.34447	-90.588637	PFO	0.28
3W019	36.345406	-90.588584	PFO	1.28
3W020	36.363506	-90.608825	PFO	0.77
3W021	36.428224	-90.631386	PFO	0.06
3W022	36.448669	-90.584711	PUB	0.25

ALTERNATIVE A - CONCEPTUAL WETLAND IMPACTS

Wetland (W) Identification No.	Latitude	Longitude	Cowardin Classification	Impacts (Acres)
AW001	36.47076628	-90.553046	PFO	2.78
AW002	36.4748499	-90.547246	PEM	0.31
AW003	791332.5609	-90.542018	PEM	0.26
AW004	791347.1164	-90.542054	PUB	0.08

ALTERNATIVE B - CONCEPTUAL WETLAND IMPACTS

BW001	36.47076628	-90.553046	PFO	2.78
BW002	36.4748499	-90.547246	PEM	0.31
BW003	36.48727456	-90.540194	PFO	7.22

ALTERNATIVE C - CONCEPTUAL WETLAND IMPACTS

CW001	36.47073311	-90.553032	PFO	3.03
CW002	36.47791053	-90.536802	PFO	1.51