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WFI-B UMBRELLA MITIGATION BANKING PROSPECTUS VARIOUS COUNTIES, ILLINOIS

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1.0 INTRODUCTION

On behalf of WFI Holdings-B LLC (WFI-B), SCI Engineering, Inc. (SCI) has prepared the following sections of the WFI-B Umbrella Mitigation Banking Instrument (UMBI) Prospectus for various watersheds/service areas within the St. Louis District of the U.S. Army Corps of Engineers (USACE). SCI understands that WFI-B (hereafter, Sponsor) is proposing to develop an UMBI in accordance with 33 CFR 332, *Compensatory Mitigation for Losses of Aquatic Resources* ("2008 Mitigation Rule"). The UMBI will describe the standard provisions for the establishment, use, operation, and maintenance of one or more mitigation bank sites and provides the operating framework for the Instrument made and entered into by and among the Sponsor and the Mitigation Banking Review Team (MBRT) chaired by the USACE, and including the U.S. Environmental Protection Agency (EPA), the U.S. Fish and Wildlife Service (USFWS), and the Illinois Department of Natural Resources (IDNR). The WFI-B UMBI is anticipated to be utilized primarily for compensatory mitigation for unavoidable impacts to waters of the U.S., including wetlands and waterbodies, located at project sites within the USACE St. Louis District, specifically, those sections of the District located in Illinois.

The WFI-B UMBI Sponsor proposes to create, maintain, and protect diverse wetland, stream and aquatic systems that provide habitat for wildlife, and perform many of the functions of naturally occurring aquatic systems found in this region. Some of the primary functions and qualities that mitigation banks within the WFI-B UMBI are intended to provide are improved water quality, flood control, aesthetics, species habitat, and a source of groundwater recharge and discharge, among other benefits. In addition, the banks will hopefully serve as recreational and educational areas for the communities in which they are developed.

In addition to the many natural function's mitigation banks within the WFI-B UMBI will provide, they can be used to provide a reliable source of compensatory mitigation for anticipated adverse impacts to jurisdictional waters and wetlands located within the WFI-B UMBI's geographic service areas. This will benefit both developers and the USACE by streamlining much of the Section 404/401 permitting process. Significant time can be lost during the permitting process by negotiating mitigation requirements and locations. Still, more time is consumed after permit issuance by compliance checks and review of monitoring reports for multiple sites. The proposed WFI-B UMBI will allow monitoring and maintenance on a broad scale unlike anywhere else in the St. Louis District. The compliance of mitigation requirements for many projects can all be inspected at the same time and in the same location. Furthermore, the likelihood

for mitigation success will improve since many of the proposed WFI-B UMBI Banks will be constructed and functioning in advance of project impacts. The permitting process would likely be expedited, and the workload of the USACE lessened with the establishment of the WFI-B UMBI.

The Sponsor proposes to manage the development, release, and use of mitigation credits under the proposed WFI-B UMBI upon the approval by the MBRT. Mitigation credits generated and approved by the MBRT, on a site-specific basis, may be used for future USACE Section 404 permits that require compensatory mitigation within the WFI-B UMBI service areas. Mitigation site-specific details including service area, mitigation type, release schedule, etc. for each site under the proposed WFI-B UMBI will be provided in Site-Specific Mitigation Plans included as addenda to the Final WFI-B UMBI. The WFI-B UMBI is anticipated to set the framework by which future individual mitigation sites will be added as addenda to the WFI-B UMBI as they are identified. The roles and responsibilities of the MBRT will be outlined, including responsibilities related to review of future site-specific mitigation plans within the WFI-B UMBI.

Additional details on the establishment, use, operation, maintenance and closure of the WFI-B UMBI is provided in the following sections.

2.0 BACKGROUND

The WFI-B UMBI is proposed to encompass 40 counties located throughout Southern and Central Illinois, including densely inhabited regions such as St. Clair, Madison, and Champaign counties. These areas have experienced considerable growth and developmental pressure over the past ten years and continue to grow today. The proposed WFI-B UMBI lies within the floodplain of several larger waterbodies, including the Mississippi River, Illinois River, Kaskaskia River, and the Big Muddy River, all of which are designated as Section 10 Waters at least partially located in the St. Louis District.

There is much history related with floodplains and wetland habitats in Illinois. The 100-year floodplain can be accurately defined as the area adjoining a river, stream, or watercourse covered by water in the event of a 100-year flood. Floodplain areas form a complex physical and biological system that not only support a variety of natural resources but also provide natural flood and erosion control. Floodplains also represent a natural filtering system, with water percolating back into the ground and replenishing groundwater. Throughout Illinois, a significant amount of floodplain habitat has been lost due to expansive development and agriculture. The decline of viable floodplain land has also resulted in a decline of natural wetlands associated with floodplains. The Illinois Natural History Survey (INHS) estimates that more than

90 percent of Illinois' wetlands have been drained since European settlement. Activities that contribute to the loss and degradation of Illinois' wetlands include urban development, agricultural activities, channelization, pollution, and sedimentation.

Additionally, development of these areas has led to severe degradation of the very streams and rivers that have formed the historic floodplains. Typically, land around these waterways is nutrient enhanced and provides very suitable soil for agricultural purposes. Unfortunately, many of the natural forested corridors that lined these waterways have been cleared to provide land for agricultural, industrial, commercial, and other types of human activities. Although the land is fertile, the loss of riparian corridors accelerates the erosion of land and overtime has diminished the quality of these waterways. Riparian corridors can and do provide streambank protection, increased water quality, and habitat for flora and fauna, including threatened and endangered species.

Through the development and implementation of the WFI-B UMBI, the primary ecological goal is to restore, enhance and/or preserve wetlands, streams, and riparian corridor systems and their functions and values to aid in compensating for unavoidable wetland and stream impacts from future Section 404 projects that require compensatory mitigation.

3.0 WATERSHED APPROACH/BASELINE DATA

The WFI-B UMBI is being developed with the intent of consolidating 12 existing watersheds within the USACE St. Louis District - Illinois Section, down into 6 larger Service Areas. A map depicting the 12 watersheds is provided as Figure 1, while a map depicting the proposed services areas is provided as Figure 2. The ultimate goal of this combined watershed approach is to improve the quality and quantity of aquatic resources through strategic selection of compensatory mitigation sites. This watershed approach considers the importance of landscape position and aquatic resource type for the sustainability of aquatic resource functions within the watershed. As part of the development of the WFI-B UMBI, the Sponsor carefully examined and considered watershed needs and how location and types of compensatory mitigation projects address those needs. A landscape perspective helps to identify the types and locations of compensatory mitigation projects that will benefit the watershed in a changing landscape and offset losses of aquatic resource functions authorized by future USACE permits.

Prior to being paired, the proposed watershed was evaluated and based on characteristics including, but not limited to, geographic location, land use, ecoregions, soil types, historic and existing plant communities,

topographic data and the hydrologic connectivity of existing streams, rivers and wetlands within proposed services areas. A watershed-based analysis of these characteristics and justification of the service areas based on numerous factors is provided below.

3.1 Watersheds

The proposed service areas along with their respective watersheds (State of Illinois only) proposed to be included within the WFI-B UMBI, along with their existing United States Geologic Survey (USGS) Hydrologic Unit Code (HUC), are as follows:

- **Service Area A** - Lower Illinois (HUC code 07130011) & Macoupin (07130012)
- **Service Area B** - The Sny (07110004), Peruque-Piasa (07110009) & Cahokia-Joachim (07140101)
- **Service Area C** - Shoal (07140203) & Lower Kaskaskia (7140204)
- **Service Area D** - Upper Kaskaskia (07140201) & Middle Kaskaskia (07140202)
- **Service Area E** - Big Muddy (07140106)
- **Service Area F** - Upper Mississippi-Cape Girardeau (07140105) & Cache (071401408)

For ease of identification, the following acronyms have been created for the six service areas:

- **Service Area A = LIM**
- **Service Area B = ABPP**
- **Service Area C = LKS**
- **Service Area D = KMU**
- **Service Area E = BM**
- **Service Area F = UMCC**

3.2 Ecoregions

The areas to be serviced by the WFI-B UMBI are located in *Ecoregion 54 - Central Corn Belt Plains* and *Ecoregion 72- Interior River Lowland*. A detailed description of each ecoregion is provided below. Additionally, a map depicting each Ecoregion within the proposed services areas are included as Figures 3A through 3F.

The **Central Corn Belt Ecoregion** is primarily comprised of glaciated plains with native prairie communities intermixed with oak-hickory forests. They were a stark contrast to the hardwood forests that grew on the drift plains of ecoregions to the east. Historically, the natural vegetation has gradually been replaced by agriculture. Farms are now extensive on the dark, fertile soils typical of this Ecoregion and mainly produce corn and soybeans; cattle, hogs, sheep and poultry. Agriculture has affected stream chemistry, turbidity, and habitat.

The **Interior River Lowland Ecoregion** is mainly comprised of many wide, flat-bottomed terraced valleys, forested valley walls, and dissected glacial till plains. In contrast to the rolling to slightly irregular plains in adjacent ecological regions to the north, east and west, where most of the land is cultivated for corn and soybeans, a little less than half of this area is in cropland, and the remainder is in pasture.

3.3 Historic/Existing Plant Communities

Prior to European settlement, dominant vegetative communities within the areas to be serviced by the WFI-B UMBI were primarily native prairie habitat and Oak-Hickory forests. As you move closer to the Illinois and Mississippi River valleys, the landscape transitioned to more broad floodplains with river terraces and levees and bottomland deciduous forests. Following European settlement in North America, much of the State of Illinois was converted from its natural land use to agricultural practices. Today, much of southern and central Illinois is comprised of cropland (corn, soybeans, hay, wheat, rye, oats and sorghum) and land utilized by livestock such as cattle (fed and dairy), hogs and poultry.

The Lower Illinois & Macoupin watersheds were paired together to form **LIM** as historically, they both were dominated by native prairie and oak-hickory forests prior to being converted to agricultural uses. Currently the vegetation communities within these watersheds are dominated by agriculture (corn, soybeans, winter wheat, etc.), forested corridors mainly found along topographic drainages and tributaries within the watershed, including the Illinois River Valley.

Plant communities within **ABPPS** (The Sny, Peruque-Piasa, and Cahokia-Joachim watersheds) were historically found within broad floodplains with river terraces and levees, with bottomland deciduous forest vegetation covering the region before much of it was converted to agricultural uses. Currently the vegetation communities within these watersheds are dominated by agriculture (corn, soybeans, winter wheat, etc.) and forested corridors primarily found along topographic drainages and tributaries within the watershed.

The Shoal and Lower Kaskaskia watersheds were paired to form **LKS**, as historically they both were dominated by native prairie and oak-hickory forests prior to being converted to agricultural use. Currently the vegetation communities within these watersheds are dominated by agriculture (corn, soybeans, winter wheat, etc.), forested corridors primary found along topographic drainages and tributaries within watershed, including the Kaskaskia River Valley.

The Upper Kaskaskia & Middle Kaskaskia watersheds were merged into **KMU** as historically they both were dominated by native prairie and oak-hickory forests prior to being converted to agricultural uses. Currently the vegetation communities within these watersheds are dominated by agriculture (corn, soybeans, winter wheat, etc.), forested corridors primary found along topographic drainages and tributaries within watershed, including the Kaskaskia River Valley.

Historically, **BM** (Big Muddy watershed**)** was mostly comprised of broad floodplain with river terraces and levees and bottomland deciduous forest vegetation covering the region before much of it was converted to agricultural use. Currently the vegetation communities within the watershed are dominated by agricultural (corn, soybeans, winter wheat, etc.), deciduous forested blocks associated with the Shawnee National Forest, forested corridors primarily found along topographic drainages and tributaries within watershed, including the Big Muddy River Valley.

The Upper Mississippi-Cape Girardeau and Cache watersheds **(UMCC)** were mostly broad floodplain with river terraces and levees, with bottomland deciduous forest vegetation covering the region before much of it was converted to agricultural uses. Currently the vegetation communities within this watershed are comprised of agricultural (corn, soybeans, winter wheat, etc.), deciduous forested blocks associated with the Shawnee National Forest, forested corridors primary found along topographic drainages and tributaries within watershed, including the Mississippi River Valley.

3.4 Land Use/Land Cover

Land use and land cover across all the representative watersheds and service areas is fairly similar (Figures 4A through 4F). The majority of the current land use includes agricultural uses with pockets of residential, commercial developments and industrial uses. Forested areas typically are associated with the riparian corridors of the tributaries or major river systems located within each service area. The primary, large metropolitan area located within the WFI-B UMBI service area is the St. Louis City – Metro East, which is generally located along the Mississippi River.

Additionally, several conservation areas or state parks are located within the watersheds. These include, but are not limited to: **LIM**- Bear Dam State Park and Pere Marquette State Park, **ABPPS** - the Upper Mississippi Conservation Area, Horseshoe Lake Recreation Area and Cahokia Mounds State Historic Site, **LKS**- Shoal Creek Nature Conservation Area, **KMU**- Coffeen State Park, Ramsey State Park, and Carlyle Lake State Fish & Wildlife Area, **BM**- Washington County State Recreation Area and **UMCC**- the Randolph County State Conservation Area, Lake Murphysboro State Park and the Cypress Creek National Wildlife Refuge. The Shawnee National Forest is located in the southern tip of Illinois and is encompassed by both **BM and UMCC**.

3.5 Jurisdictions and Demographics

The areas to be serviced by the proposed WFI-B UMBI are comprised of 40 counties spread throughout central and southern Illinois. In general, many of these areas are comprised of smaller, rural farming communities, with larger urban areas existing as you approach the St. Louis Metro area. Based on United States Census Bureau - *Annual Estimates of the Resident Population: 2010- 2018*, Counties within the UMBI support anywhere from approximately 5,000 (Calhoun County) to 265,000 residents (Madison County).

It's important to note that only three of these counties contain greater than 100,000 residents. The remaining 31 counties, many of which are comprised of rural farming communities, contain less than 68,000 residents. Noteworthy municipalities within the WFI-B UMBI service areas include Alton, East St. Louis, Jacksonville, Edwardsville, Belleville, Sparta, Shelbyville, Mattoon, Mount Vernon, and Anna-Jonesboro.

3.6 Climate

All six service areas proposed within the WFI-B UMBI are contained within the State of Illinois, which lies midway between the Continental Divide and the Atlantic Ocean, while the State's southern tip is approximately 500 miles north of the Gulf of Mexico. Illinois' climate is typically continental with cold winters, warm summers, and frequent short fluctuations in temperature, humidity, cloudiness, and wind direction. Overall, the climate within each watershed is not drastically different.

Per the State Climatologist Office, the climate of Illinois is known to have five unique features:

- Four distinct seasons, each with different conditions;

- Major north-south temperature contrasts;
- An extremely wide variety of types and amounts of precipitation with moderate variations between monthly and seasonal average values;
- Extreme variability of weather conditions in different parts of the state and, certainly, between years; and
- A large number of storms during all seasons.

3.7 Topography

Topographically, much of Central and Southern Illinois is flat with very little elevation change. However, as you migrate west and south through the State, the topography begins to gently slope toward the larger river valleys, ultimately ending with bluffs, steep slopes and depressional floodplain areas as you reach the Mississippi River Valley.

More specifically, within **LIM**, the majority of the land east of the Illinois River consists of land with little elevation change. Tributaries shown on the USGS topographic maps are at a lower elevation than the surrounding areas and generally drain southwest towards the Illinois River. The area west of the Illinois River shows greater elevation change in the area along McKee Creek. Tributaries generally drain southeast towards the Illinois River.

The northern section of **ABPPS** consists of numerous tributary valleys that drain southwest towards the Mississippi River. The southern section of the watershed contains fewer valleys with more areas of little elevation change. There is a large change in elevation at the edge of the Mississippi River Valley that runs along the western boundary of the watershed.

The majority of **LKS** consists of relatively flat land with little elevation change. Tributaries shown on the USGS topographic maps are at a lower elevation than the surrounding areas and generally drain towards the Kaskaskia River.

Similarly, **KMU** consists of land with little elevation change. There are several valleys containing tributaries that drain southwest towards the Kaskaskia River. Two large lakes exist within this watershed; Lake Carlyle in the southern section and Lake Shelbyville in the northern section.

The majority of **BM** consists of valleys containing tributaries and various sizes of lakes. The watershed generally drains towards the southwest. The southern end of the watershed contains the Mississippi River Valley and more significant changes in elevation.

Similarly, the northern section of **UMCC** contains numerous valleys with tributaries that drain southwest towards the Mississippi River. The Mississippi River Valley is located along the western edge of the watershed, while the southern section of the watershed contains an area of sudden elevation changes to the west and an area of gradual elevation change to the east.

3.8 Soils

Within the service area of the WFI-B UMBI, soil types tend to show little variation from watershed to watershed. Illinois is generally known for having deep, dark, and well drained soils in the uplands which support agriculture and deep, poorly drained soils in the bottomlands and floodplains. Within **LIM**, the dominant soils are comprised of Lawson-Beaucoup and Tama-Sable-Ipava. Respectively, these soils are found primarily in poorly drained bottomlands/floodplains and in well drained silty loam soils typically utilized for row cropping.

Within **ABPPS** soils are dominated by Stoy-Hosmer-Hickory, Wynoose-Hickory-Bluford-Ava and Bonnie-Belknap**.** Similar to **LIM,** these soils vary from poorly drained to well drained and consists mainly of silt loams, silty clays and silty clay loams. In the uplands of these soil series, row cropping is the main land use, while the poorly drained soils are seen primarily in the upland to stream valley transition zones and within forested bottomlands.

LKS is dominated by three primary soil types. These consist of *Wakeland-Birds-Belknap*, which are nearly level, poorly drained soils found in primarily in floodplains, *Virden-Herrick,* which are generally deep and dark silty clay loams suited for farmland but are heavily restricted to non-farm uses because of seasonal high-water table, and the *Stoy-Hosmer-Hickory soils,* which are somewhat poorly drained to well drained soils formed in loesses in glacial till; on uplands.

Within **KMU,** soils are generally associated with well drained, agricultural land and somewhat poorly drained soils found in the upland to stream valley transition zones. Dominant soil types within this watershed include Flanagan-Drummer-Catlin, Hoyleton-Darmstadt-Cisne and Wynoose-Hickory-Bluford-Ava.

BM is dominated by the Wynoose-Hickory-Bluford-Ava, Bonnie-Belknap, and the Stoy-Hosmer-Hickory soil units. Soils of the Stoy-Hosmer-Hickory unit are found mainly in well drained uplands that have formed in loess in glacial till. Much of the land found in this series is used for row cropping. Wynoose-Hickory-Bluford-Ava soils are found in the topographical transition zones from upland to stream corridors and are primarily loamy soils seen on side slopes, convex ridgetops and edges of broad flats on Illinois till plains. Lastly, The Bonnie-Belknap soils are poorly drained soils formed in silty alluvium on floodplains. This association generally consists of soils in long, narrow areas along perennial and intermittent streams.

Within **UMCC**, soils are generally dominated by Goss-Baxter-Alford, which are well drained, moderately permeable soils (silt loams and silty clay loams) formed in loess. These soils are mainly found on ridgetops and hillsides in upland habitats. The second dominant soil type found in this watershed is the Bonnie-Belknap unit, which as described above, is comprised of mainly silt loams and silty clays in stream and river valleys. Lastly, the Stoy-Hosmer-Hickory is comprised of somewhat poorly drained to well drained soils formed in loesses in glacial till on uplands. Soils in this unit are primarily silt loams and silty clay loams found in agricultural landscapes.

3.9 Historic & Existing Hydrology/Major Waterbodies (NWI/NHD)

Historically, watersheds within the WFI-B UMBI service area were supported by larger river systems and their active floodplains. This includes major river systems such as the Mississippi River, Illinois River, Kaskaskia River and the Big Muddy River. Over time, human expansion has brought along an increased number of habitat modifications and the inclusion of impervious surfaces, which has led to increased runoff volumes and rates. The increased volumes and flow rates have caused smaller headwater drainages to scour, which overtime has given us the named rivers and creeks that we see today. A figure showing the primary waterbodies within each proposed service area are included as Figures 5A through 5F.

Currently, **LIM** is comprised of the Lower Illinois and Macoupin watersheds, both of which share common waterbodies such as: The Illinois River, Little Indian Creek, Indian Creek, Coon Run, Mauvaise Terre Creek, Little/Big Sandy Creek, Prairie Creek, Apple Creek, Macoupin Creek, Otter Creek, Meredosia Lake, Smith Lake and Lake Jacksonville. While no large, intact wetland complexes are found within this watershed, NWI mapped emergent (PEM), scrub shrub (PSS) and forested (PFO) wetlands can be found along waterbodies such as the Illinois River and Apple Creek.

Within **ABPPS**, the primary waterbodies include rivers such as the Kaskaskia and Illinois, as well as manmade drainage systems such as the Cahokia Diversion Channel and the Chain of Rocks Canal. In addition, the hydrology within this watershed is supported by tributaries such as Otter Creek, Piasa Creek, East Fork Wood River/Wood River Creek, Cahokia Creek, Prairie DuPont Creek, and Carr Creek. In addition to waterbodies, there are several large wetland complexes mapped along the Missouri River Valley, Cahokia Creek, around Horseshoe Lake and a large complex just south of East St. Louis.

Existing primary waterbodies within **LKS** include the Kaskaskia River with supporting drainage systems such as Shoal Creek, Silver Creek, Little Silver Creek, Ogles Creek, Sugar Creek, Beaver Creek, Richland Creek, Elkhorn Creek, and Mud Creek. In addition, a large NWI wetland complex is mapped south of Taylor Springs, along East Fork Creek, Shoal Creek, Beaver Creek, as well as additional wetland complexes along Southern Shoal Creek and Silver Creek.

KMU is comprised of the Upper Kaskaskia and Middle Kaskaskia watersheds. It contains the Kaskaskia River, with contributing tributaries such as Hurricane Creek, Ramsey Creek, Robinson Creek, Richland Creek, Wolf Creek, Big Creek, Hickory Creek, and Beaver Creek. Waterbodies such as Carlyle Lake, Lake Shelbyville, and Lake Lou Yaeger also support the hydrology of this watershed. In addition, NWI mapped PEM-PSS-PFO wetland complexes are found near Lake Shelbyville, along the Upper and Middle Kaskaskia River, Carlyle Lake, and along Crooked Creek.

As the name Big Muddy implies, the primary hydrologic sources within **BM** are the Little and Big Muddy Rivers. These river systems are supported by a network of tributaries and waterbodies such as Mary's River, Rayse Creek, Galum Creek, Beaucoup Creek, Crab Orchard Lake and Rend Lake. In NWI wetland areas mapped within this watershed include PEM-PSS-PFO complexes around Crab Orchard Lake, along the Little and Big Muddy Rivers, and along Beaucoup Creek.

UMCC, which is comprised of the Upper Mississippi-Cape Girardeau and Cache watersheds, contains numerous waterbodies including the Cache River. Supporting tributaries, such as Drury Creek, Wolf Creek, Grassy Creek, Dutchman Creek, Cypress Creek, Post Creek Cutoff, Mill Creek, Big Creek, and Kincaid Creek drain through the watershed. This service area is also home to several impoundments, including Kincaid Lake, Lake of Egypt, Horseshoe Lake, and Cedar Lake. Lastly, the service area contains sensitive natural areas associated with the Cypress Creek National Wildlife Refuge. This refuge contains thousands

of acres of wetland habitat and represents approximately 91 percent of the state's high-quality swamp and wetland communities, plus a wide array of waterfowl, wading birds and Neotropical songbirds.

3.10 Hydrology & System Connectivity

Aquatic ecosystems such as streams, rivers, lakes, and wetlands interact because of their ability to transfer material and energy, and through their ability to adjust the inputs and outputs of these materials. A key element of these interactions is connectivity, which describes the degree to which components of a river system are joined, by various transport mechanisms (U.S. EPA, 2015). Connectivity of river systems - hydrological, chemical, and biological - is determined by characteristics of the physical landscape, climate, and the biota, as well as human impacts. To design the WFI-B UMBI in a manner in which it maximizes connectivity throughout its footprint, existing watersheds were further analyzed and paired accordingly.

Within **LIM**, a series of smaller stream systems generally drain southwest and west toward several main tributaries (Macoupin Creek, Apple Creek, Big Sandy Creek and Mauvaise Terre Creek), before ultimately joining the Illinois River, which is a direct tributary to the Mississippi River.

Within the northern portions of **ABPPS**, the smaller tributary systems drain primarily southwest and west toward several main tributaries (Cahokia Creek, Piasa Creek, Wood River (including Forks), Prairie DuPont Creek, and Canteen Creek), before directly joining the Mississippi River. In the southern portions of the service area, the smaller tributary systems drain primarily west toward several main tributaries (Carr Creek, Fountain Creek, Monroe City Creek, and the Kaskaskia River) before directly joining with the Mississippi River. It's important to note that Service Area B contains segments of the Illinois River and the Kaskaskia River, both of which drain directly into the Mississippi River.

Smaller headwater tributary systems within **LKS**, such as Dry Fork, Lake Fork, Bearcat Creek, and West and Middle Forks of Shoal Creek, generally drain south and west toward several main tributaries (Shoal Creek, Silver Creek, Beaver Creek, Sugar Creek) before ultimate joining the Kaskaskia River, a direct tributary to the Mississippi River.

KMU is paired as its primary hydrologic source is the Kaskaskia River. Several main tributaries join the Kaskaskia River throughout the watersheds, including Ramsey Creek and Robinson Creek. Within the watershed, the Kaskaskia River is impounded near Shelbyville, Illinois to create Lake Shelbyville. Downstream, the Kaskaskia River continues to drain southwest until it reaches Carlyle, Illinois, where the

waterbody is again impounded to form Carlyle Lake. Below Carlyle's outfall point, the Kaskaskia River continues to drain southwest, while receiving hydrologic inputs from smaller ephemeral and intermittent waterbodies prior to reaching the Mississippi River near Chester, Illinois.

Smaller headwater tributary systems within **BM**, such as Gun Creek, Casey Fork, Atchison Creek and Collier Creek, generally drain south and west toward several main tributaries (Little Muddy River, Big Muddy River and Beaucoup Creek) before ultimately joining the Kaskaskia River, which is a direct tributary to the Mississippi River.

UMCC is comprised of the *Upper Mississippi-Cape Girardeau and Cache* watersheds, both of which share a western border with the Mississippi River. The primary hydrologic source of this watershed is the Mississippi River and its floodplain and smaller headwater systems that drain into waters such as the Cache River. Several of the smaller tributaries within the watershed have been historically impounded to form waterbodies such as Kincaid Lake and Crab Orchard Lake.

3.11 Cultural Resources

3.11.1 Prehistoric Overview

Archaeologists have developed a broad cultural and historical classification scheme with which to organize and describe the prehistory of the project service area. In their seminal volume, Bareis and Porter (eds. 1984) presented the culture history and chronology for this region based upon the extensive archaeological work for the FAI-270 Project as well as investigations of previous area researchers.

Over the last 36 years, the work has continued, and the expansive amount of new data has resulted in a need to revise this chronology. The following prehistoric overview is a compilation of much of this research. Recently a calibrated sequence based on radiocarbon dates, approximately 280, from more than 100 archaeological sites was presented in order to aid in this revision of much of the regional chronology (specifically Late Archaic, Early, Middle and Late Woodland). The authors, Fortier, Emerson, and McElrath, "present a new perspective on… cultural historical development that stresses cultural discontinuities, historical contingencies, local abandonment, population movement, and social and political continuities and disruptions" (2006). These cultural periods include the following: Paleoindian (10,000?-8,000 BC), Archaic (8,000-900 BC), Woodland (900 BC-AD 1050), Mississippian (AD 1050-1350), and Oneota/Late Prehistoric (1350-1500) (Fortier et al. 2006; Koldehoff and Walthall 2000; McElrath et al. 2009; Wiant and Berkson 2000).

3.11.1.1 Paleoindian Period

When humans first arrived in the Americas is an ongoing question among archaeologists. Some early sites have produced dates from around 14,000 years ago. However, much research over the decades has focused on sites from 12,000 years ago and sooner. Regardless, the Paleoindian Period is that of the earliest inhabitants of the Americas. These early groups lived in small, highly mobile families of gatherers and hunters. Especially known for hunting late Pleistocene megafauna, the tool kit of this period is most often characterized by fluted projectile points (such as Clovis and Folsom), end scrapers, side scrapers, burins, drills, and beveled flake tools associated with bone and hide working. Clovis sites are ordinarily found on well-drained landforms like high terraces and bluff tops. Such prominent locations on the landscape would allow these early groups to watch not only the movements of herds but also other groups of people (Koldehoff and Walthall 2000).

Just across the Mississippi River from the current study area are two Paleoindian sites of note. A rare but important Paleoindian kill site, Mastodon State Park (Kimmswick site) in Jefferson County, Missouri, has provided a great deal of information on these early hunters in the region. At Kimmswick, in situ deposits containing late Pleistocene megafauna have been found in direct association with cultural material dating to the Paleoindian Period (Adams 1953; Graham 1982). Not only has Kimmswick provided us with important information on the inhabitants of the Midwest at the end of the Pleistocene, but also much needed data on the vegetation and faunal species present and has allowed refinements of the environmental reconstruction for the late Pleistocene (Koldehoff and Walthall 2000). Another important Paleoindian site is Martens site in Chesterfield, Missouri. A focus study of two acres of this large camp site produced approximately 5,000 stone artifacts from surface as well as subsurface archaeological investigations. Use-wear analysis of some of the artifacts indicates that blades and flakes were used to scrape, cut, incise/engrave, plane, perforate and wedge. Likely activities include not only cutting and butchering meat and working fresh hides but also working medium to hard materials such as wood, ivory, antler, and bone (Morrow 2000; Morrow and Morrow 1999).

In Illinois, the Paleoindian Period is mostly represented by the earlier portion of this time period with Clovis populations (Fortier et al. 2006). Archaeologically, these sites are often expressed as isolated stone tools or fluted points and small lithic scatters (debris from making stone tools). Additionally, these stone tools were typically made from a wide assortment of non-local cherts. In particular, a preference for Attica chert from the Wabash Valley in Indiana is evident in the artifact assemblages of this period. This procurement of raw materials from distances often greater than 100 km usually from northern and northeastern sources

has emerged as a pattern at Paleoindian sites. This strongly supports the pattern of great mobility of the Paleoindian groups (Fortier et al. 2006; Koldehoff and Walthall 2000, 2004).

Very rarely workshop sites and large campsites have been discovered dating to this time (Koldehoff and Walthall 2000). However, a few interior upland Paleoindian sites have been recorded and to varying degrees investigated within the study area. To the west of Alton, in Jersey County, Illinois, flaked stone artifacts were collected from the surface of the Ready/Lincoln Hills site which demonstrated the full range of Clovis fluted biface production (Morrow 1995; Tankersley and Morrow 1993; Wiant and Winters 1991). In St. Clair County, the excavation of large assemblages from the Mueller-Keck and Bostrom sites represent a campsite visited repeatedly over time and a well-used hunting camp, respectively (Amick and Koldehoff 2005; Koldehoff and Walthall 2000; Tankersley 1995; Tankersley et al. 1993). Additionally, the Compensatory Basin North site, located on the Wood River Terrace in Madison County, contained buried features which yielded cultural material attributed to this period (Evans et al. 1997). Such sites indicate a strong Paleoindian presence in this portion of Illinois.

3.11.1.2 Archaic Period

The Archaic Period, which is broken into Early, Middle and Late, represents humans' adaptation to changing plant and animal resources due to the dramatic climate shifts at the end of the Ice Age. The changing climate resulted in an increase in large and small mammals (most notably white-tailed deer) as well as a variety of aquatic resources such as fish, mussels, waterfowl, amphibians and reptiles. Archaic groups also relied heavily on the harvesting and processing of wild plants (e.g., marsh roots and tubers, nuts and seeds). During this period, human groups shift to a more sedentary lifestyle and increased in population. This is exhibited in the archaeological record in the form of small, temporary campsites as well as larger villages that were the locations of long-term or repeated occupations. Exploitation of the more diverse resource base focused on aquatic environments is reflected in a more diverse tool kit which included: ground-stone and bone tools, large side notched points, scrapers, and drills. Toward the end of the Archaic Period there is evidence of ceremonial behavior, long-distance trade and the use of horticulture to supplement gathering and hunting (Wiant and Berkson 2000). In the region, population fluctuations are illustrated in site density patterns. In the uplands, sites during the Early Archaic are well represented and then a reduction in site density occurs during the Middle Archaic. The Late Archaic then follows with an increase in site density in the region (Fortier et al. 2006).

3.11.1.3 Early Archaic

For many decades, Dalton was regarded as a technological shift from Paleoindian to Early Archaic and often included at the end of the Paleoindian Period by most researchers (Chapman 1975; Goodyear 1982; Morse and Morse 1983; Smith 1986). However current regional scholars have presented that "Dalton culture is distinct from paleo-indian, and rather than representing a 'transitional' episode of occupation in the Central Mississippi Valley as viewed by some…instead represents the first true Early Archaic cultural expression" (Fortier et al. 2006:180). Koldehoff and Walthall agree as they "do not see 'adaptive continuity'...[r]ather, in the central Mississippi Valley, there is evidence of a clear disjuncture between Clovis and Dalton lifeways" (2004:64). The Bostrom, Mueller-Keck and Dugan Airfield sites exemplify this break from the previous Paleo-pattern of non-local chert procurement to a shift in exploiting mostly local chert sources (Koldehoff and Walthall 2004; Tankersley et al. 1993). Notably, Dalton groups well adapted to the woodland landscape, who can be viewed "as the first groups to have settled into the central Mississippi Valley" (Koldehoff and Walthall 2004:63), were less mobile than previous Clovis populations. They also existed in larger numbers and used the land more intensively as demonstrated by the density of sites in the region. Dalton populations also established formal cemeteries, exchange networks and used rock shelters and caves, unlike Clovis populations (Byers 2004; Koldehoff and Walthall 2004; Morse 1997; Walthall 1999).

Connected to the westward and northward migration of the deciduous forests and other temperate habitats and resources indicative of developing Holocene environments, Dalton populations responded to these shifts through regional specializations and variations designed to exploit new resource concentrations thus establishing foraging practices for these rich woodland-riverine biomes (Koldehoff and Walthall 2009). Artifacts that are diagnostic of these Dalton groups and are commonly associated with Dalton assemblages include chipped-stone adzes with plano-convex or triangular cross-sections and heavily ground lateral edges. These adzes mark the beginning of a strong woodworking industry that would continue for millennia in the region. Additionally, the tool kit often included long projectile points with ground concave bases and lateral haft elements, points with unifacial and alternate beveling from repeated resharpening, snub-end scrapers, side scrapers, engravers, and points reworked into drills/awls and end scrapers (Ahler 1984; Chapman 1975; Koldehoff and Walthall 2009).

In the region, Early Archaic sites are well represented (Fortier et al. 2006). Just south in Randolph County, Illinois, archaeologists have recovered Dalton points, along with other Early Archaic tool types, from the lowest levels of Modoc Rock Shelter in strata. Interestingly and as evidenced from Modoc, Dalton

projectile points were commonly recovered and reused by subsequent people throughout the Archaic Period (Ahler and Koldehoff 2009; Fortier et al. 2006). On the southern end of the Savanna Terrace at the base of the bluffs the Nochta site, in Madison County, has produced the most important Early Archaic data in the region. At least 156 subsurface features from the Early Archaic component alone were excavated and the site likely served as a base camp for at least some part of its occupation (Higgins 1990; McElrath et al. 2009). In addition to the Nochta site, a number of upland sites have produced Dalton and other Early Archaic period material from both surface and subsurface contexts. These data have assisted local researchers in identifying the importance of woodworking and the use of the rivers for transportation for these populations. Unfortunately, radiocarbon dates are not available for this portion of the Archaic (Fortier et al. 2006; Koldehoff and Walthall 2004, 2009; McElrath et al. 2009).

In addition to Dalton projectile points, diagnostic points of the Early Archaic period in the region include; Thebes, St. Charles, Hardin, Kirk Corner Notched, Cache River Side Notched, Graham Cave Side Notched, Bifurcates, Kirk Stemmed, Hidden Valley Stemmed, and Searcy. Many of these points are characterized by serrated blades and left-hand beveling from repeated resharpening. Ground-stone tools from this time include: manos, metates, grooved axes, and pitted cobbles. Additionally, cores, bifaces, bifacial performs, wedges, adzes, and drills are among the chert artifacts and indicate not only production and maintenance but also recycling of material (McElrath et al. 2009).

3.11.1.4 Middle Archaic

During this time, the climate shifts to a drier and warmer pattern known as the Hypsithermal Interval. Populations in the region responded by focusing on the major river valleys which maintained diverse and rich resources (Wiant and Berkson 2000). Groups of the Middle Archaic period can be described as continuing a trend toward broad-spectrum resource utilization and more efficient adaptation to both floodplain and forested environments. In the region, this trend is shown by the diversification of tool kits and the appearance of more groundstone artifacts used in heavy woodworking and plant-food processing (McElrath et al. 2009).

In addition to Early Archaic, substantial Middle Archaic components have been identified at Modoc Rock Shelter and the Nochta site (Ahler and Koldehoff 2009; Higgins 1990). The Nochta site, critical in expanding local knowledge of this time period, contained rock clusters (caches of cobble tools and tool-quality raw material) and approximately 220 mostly pit features associated with a sealed living surface. Of great importance in the region, the earliest identified open-air burials and perhaps the earliest local

domestic structure were excavated (Fortier et al. 2006; Higgins 1990; McElrath et al. 2009). Additionally, the Strong site, an open-air upland site, produced 66 basin-shaped features dating to the Middle Archaic. Within these features, a large assemblage representing both ground and chipped-stone tool production, maintenance, and recycling was encountered. Floral remains were also excavated which included black walnut and acorn, but mostly hickory shells were present. This site also produced small amounts of goosefoot, rush, American lotus, and grape seeds. Of note, very little faunal remains were encountered (Adams et al. 1997; Fortier et al. 2006; McElrath et al. 2009; Walz et al. 1998).

Middle Archaic diagnostic projectile points include: Valmeyer Expanding Stemmed and Corner Notched, Brannon Side Notched, Matanzas, Godar Side Notched, and Karnak Straight Stemmed. Additional lithic artifacts common to Middle Archaic assemblages include crescent-shaped bannerstones, cobble tools associated with plant-food processing, sandstone abraders, grooved axes, bifaces, wedges, scrapers (often from reworked side-notched points), and perforators. Small, bipolar-produced flake tools made of local chert such as Burlington which have been heat-treated are typical (Fortier et al. 2006; McElrath et al. 2009).

3.11.1.5 Late Archaic

The Late Archaic period coincides with the end of the Hypsithermal and is characterized by a period of climate amelioration relative to the drying maximum of the late Hypsithermal. Considerable growth in population, increased sedentism, distinct regional adaptations, and interregional exchange occur during this period in the Southeast and Midwest. Intensive adaptation to ecological niches not previously exploited by earlier inhabitants distinguishes this period from previous ones. The region witnessed a continuation and elaboration of the settlement and subsistence trends of the Middle Archaic period. Archaeological data from the Late Archaic point to a marked increase in the exploitation of plant and aquatic resources (Chapman 1975; Wiant and Berkson 2000).

A number of important sites used in understanding the Late Archaic in the study area were excavated and analyzed to varying degrees in the 1980s. These include: Go-Kart North (Fortier 1984), Missouri Pacific No. 2 (McElrath and Fortier 1983), Dyroff-Levin (Emerson 1984), Labras Lake (Phillips and Hall 1981), McLean (McElrath 1986), Range (Fortier 1987; Kelly et al. 1987), and George Reeves (McElrath 1993; McElrath and Finney 1987). Reexamination of assemblages from some of these sites as well as more recent work at new sites has expanded our understanding of the period. Some of these projects include: the Marge site (Fortier 1996), the Ringering site (Evans and Evans 2000), and Modoc Rock Shelter (Ahler and Koldehoff 2009; Fortier et al. 2006).

Intrusive groups into the region have been identified a number of times during this period. The earliest of these groups -Titterington- is represented by the Etley and Wadlow point types and appear to come from the west, specifically out of southeastern Kansas and northwestern Missouri. Sites occupied by these groups focused on chert quarries near the confluence of the Illinois and Mississippi rivers. A later, but short lived, intrusion from the south is represented by Mule Road (Ledbetter) point styles. Another intrusion has been identified from a still later portion of the Late Archaic. This incursion is represented by Riverton (Merom) points and appears to have connections with groups from southeastern Illinois, specifically the Wabash and Ohio River region. While these first two intrusions are likely a result of actual population shifts, this last more likely illustrates interaction between regions rather than movement of peoples (Fortier et al. 2006; McElrath 1993).

As the Archaic Period reaches its end, a shift in settlement pattern is observed. Few interior upland sites have been encountered. Site density focuses on the Mississippi floodplain along backwater sloughs and occupations are expressed in the form of large year-round base camp (Fortier et al. 2006; McElrath et al. 2009). While nutshell, dominated by hickory but also including acorn and black walnut, and fleshy fruit species continue to be observed, site assemblages for the first time produce native cultigens in quantity and diversity which expresses a shift in subsistence. Evidence "suggests that populations continued to rely on wild plant resources, but may have begun to use them in slightly different ways, and also increasingly supplemented them with garden products" and "intentional human activities that included proactive sowing, harvesting, and storing of seeds as well as passive policies of noninterference" (Simon and Parker 2006:219).

Late Archaic diagnostic projectile points include: Ferry/McLean/Helton, Etley, Wadlow, Ledbetter, Merom, Dyroff, Springly, and Missouri-Pacific (Fortier et al. 2006). Additional lithic artifacts diagnostic, yet infrequent, to the Late Archaic include Snyders and Gilcrease grooved hematite plummets. These have often been recovered from burial contexts (Farnsworth and Asch 1986). Artifact assemblages also include cobble tools associated with plant-food processing, small, rectangular ground-stone celts and ground-stone grooved axes (Fortier et al. 2006; McElrath et al. 2009).

3.11.1.6 Woodland Period

The Woodland Period is a time of continued increase in population, technological and cultural complexity, as well as long-distance trade and social interaction. The introduction and development of ceramic technology, corn agriculture and complex burial practices mark this period. The Havana-Hopewell culture

participated in complex mortuary ritual often involving mound groups and earthworks. Elaborate social and political systems as well as extensive interaction and trade networks are part of this tradition. Typical settlement patterns involve a single ritual/mortuary location on the river-edge, surrounded by a number of single-households to small-hamlet sized villages. In time, this pattern gave way to floodplain mounds and ritual centers established at regular intervals along the river. Each of these ritual precincts was associated with a larger bluff-based village and adjacent bluff-top mounded cemeteries. Large numbers of deer, abundant aquatic resources, and various wild plants were exploited. Also, early horticultural developments continued. As the Woodland Period comes to a close, rapid regional culture changes have occurred. Ceramic traditions and tool kits become less complex and the elaborate Hopewellian trade and ritual system appears to unravel and disappears. Large villages along the bluffs are common. Territorial claims, the use of the bow and arrow and an increased dependence on corn agriculture are evident. By convention, the onset of the Woodland Period is marked by the introduction of grit-tempered pottery; however, Woodland potters also used grog (clay) or limestone temper (Farnsworth 2000; Fortier 2006; Fortier et al. 2006).

3.11.1.7 Early Woodland

Similar to the Late Archaic, the Early Woodland period in the region was a time of intrusion by outside, particularly southern, populations. For the earliest of these intrusive groups – Carr Creek (Marion), camps are typical with assemblages containing light ceramic and lithic debris. These camp sites appear in both the uplands and floodplain and suggest that the region "was 'utilized' rather than 'occupied' by small, fairly mobile groups of hunters and gatherers who were part of broader social groupings with origins outside the valley" (Fortier et al. 2006:185). These people were followed by those who established more permanent and larger camps along the rivers and regularly exploited riverine resources. Represented by grog-tempered ceramics, this intrusion (Florence) also appears to be from a southern origin. Some local researchers have interpreted the site assemblages of the Early Woodland to represent discrete ethnic groups (Emerson and McElrath 2001; Fortier et al. 2006).

During the 1970s and 1980s, the Jean Rita (Linder 1974), Carbon Monoxide (Fortier 1985), and Florence Street (Emerson et al. 1983) sites were the basis for knowledge of Early Woodland in the region. However, the Ringering site, located on the Wood River Terrace, was essential to expanding these initial interpretations. Although preservation of floral remains is quite poor, plant subsistence focused mainly on tubers, aquatic plants and nuts with some evidence of starchy native cultigens (Evans and Evans 2000; Fortier et al. 2006).

Diagnostic artifacts for the Early Woodland include Black Sand, Marion Thick, and Columbia ceramics as well as Kramer projectile points. Flaked lithic assemblages include contracting stem points, hafted and unhafted bifaces, drills, humpback scrapers, and disc scrapers. Cobble and groundstone tools such as manos, metates, and abraders are also typical (Emerson and Fortier 1986; Evans and Evans 2000).

3.11.1.8 Middle Woodland

The Middle Woodland period in the region is characterized by widespread acceptance of pottery, mound building, and the appearance of more permanent villages. This period is also associated with Havana/Hopewell cultures, which is marked by specific design motifs on pottery vessels, community mounds, blade technology, the appearance of tobacco and maize and the presence of Hopewell Interaction Sphere exotic materials. Floodplain villages were typically associated with a nearby single mound. After time, these life ways begin to decline and the Middle Woodland ends with a short occupational hiatus (Fortier 2006; Fortier et al. 2006).

During the beginning of the Middle Woodland, sites are located across the entire region particularly in the middle of the floodplain on low-lying sandy landforms with almost no indication of upland occupation. These site types include both small extraction camps and large residential campsites. Plant remains indicate an almost identical signature to that of the Early Woodland focusing on nuts and wild plants (Fortier 2006). "Products of gardening/farming supplemented wild plant resources…but clearly were not replacements" (Simon and Parker 2006:223). The Petite Michele site in St. Clair County, which produced 86 pit features as well as burial remains, represents a fairly large habitation site from this early part of the Middle Woodland (Fortier 2004). Ceramics from this site include Havana-type vessels. The most common were large jars with thick walls demonstrating zoning, linear, curvilinear, and dentate stamping. Also present were Naples and Neteler Stamped, Schafner Pinched, Naples Ovoid, Havana Plain and Cordmarked, and Fettie Incised ceramics. The lithic assemblage from Petite Michele consisted of lamellar blades, unifacial, bifacial, large disc and Snyders scrapers as well as Waubesa-like contracting-stemmed bifaces and Snyders points. This represents a dramatic break from Early Woodland assemblages. An appreciably greater percentage of Cobden/Dongola chert, coming from southern Illinois, is present in the lithic tools and debitage from this site. This is noteworthy due to the ceramics being derived from a northern tradition and suggests interaction of people on a broad scale and/or long-distance movement of raw materials. The presence of copper tool fragments, ground schist and galena, fluorite and mica fragments, and a chert bird effigy all point to possible activities associated with Hopewell interaction. These exotic materials and

their indication of extra-regional contact are unique to the Petite Michele site and have not been recovered to date in archaeological contexts from the early portion of the Middle Woodland (Fortier 2004, 2006).

The core of Middle Woodland is expressed by remarkable changes in most aspects of life for the people not only of the subject region, but throughout the entire Southeast and Midwest. Among the Middle Woodland sites excavated, the Holding site, a large village which contained evidence of Havana/Hopewell culture, is of great importance in understanding this time of revolutionary change in much of the region (Fortier et al. 1989). These considerable changes are expressed through new lithic tool kits and technologies (ex. lamellar blades from prismatic cores, small tools, and chert hoes), acquisition of not only exotic cherts but an increase in chert type diversity, procurement of other extra-regional materials (ex. mica, fluorite, cooper, and obsidian), and new ceramic styles and technologies (ex. presence of bowls and miniature thin-walled jars; use of grog and limestone tempers; decorative motifs such as multiple-paneled design fields, cross-hatching, small punctuates, and interior rim channeling; appearance of clay ear spools and animal and human figurines). Settlement (ex. large villages) as well as subsistence practices (ex. focus on horticulture, with the earliest evidence of tobacco, sunflower, cucurbits and maize and a significant increase in starchy seeds; increased use of hazelnuts rather than hickory and black walnut; and dramatic increase in plant-use diversity) also demonstrate the marked shifts throughout the region (Fortier 2006; Fortier et al. 2006). "In fact, based in part on the sheer abundance and frequency of seeds from native crop plants, researchers have argued that…Middle Woodland peoples were true farmers, growing native crop plants in monocrop stands (Johannessen 2003, Smith 1992)" (Simon and Parker 2006:223).

As seen throughout the Midwest, the end of the Middle Woodland is marked by the disappearance of the traits and practices of Havana/Hopewell cultures. This decline is still not well understood. However, there appears to be a breakdown and even abandonment in unrelated practices and technologies. Researchers are unsure if these changes happened quickly or slowly over a few hundred years. Evidence does point to a short hiatus which sets the boundary for the end of the Middle Woodland. Among other practices, blade technology stops, hazelnuts are no longer part of their subsistence, motifs and designs on ceramic pots inexplicably and dramatically change, and the use of Hopewell Interaction Sphere exotic artifacts become reduced in the archaeological record (Fortier 2006; Fortier et al. 2006).

3.11.1.9 Late Woodland

As discussed above, the end of the Middle Woodland period is marked by a reduction in interregional trade, a decrease in complexity, and less elaborate ceramic decoration. Site locations were established in the

upland bluffs rather than in the floodplain. This noteworthy shift in settlement pattern may stem from changes, even instability, in the activity of the Mississippi River which made some parts of the floodplain undesirable for residential locations (McElrath and Fortier 2000). These early Late Woodland groups subsisted on both wild (especially nuts and fruit) and cultivated plants, as did those who inhabited the area during the Middle Woodland. However, field rotation in combination with slash-and-burn agriculture greatly assisted in adaptation to their upland locations. The full range of crops in the Eastern Agricultural Complex as well as tobacco and squash were grown by these populations (Simon and Parker 2006).

Following reoccupation of the region, population growth during this time is reflected in an increase in the number, size, and complexity of sites (Fortier and Jackson 2000). In addition to marked differences from the earlier portion of the Late Woodland, the middle portion is quite unique compared to other times in the region as "it is one of the most stable and most homogenous" (Fortier et al. 2006:191). As populations flourished in the uplands, groups moved out onto the floodplain as they had in the past. More complex settlements developed with a greater diversity of forms (ex. isolated house clusters, dispersed linear arrangements of structures and pits, multi-structure clustered settlements, and extractive camps) and innovative house types, such as small rectangular huts, keyholes, and large public structures (Fortier et al. 2006; Fortier et al. 1984; Kelly et al. 1987). Reassessing sites like Range (Kelly et al. 1987; Hanenberger 2003), Sponemann (Jackson et al. 1992) and the Faust South locality (Holley 2000) has led researchers to a clearer picture of site use and settlement patterns for this portion of the Late Woodland. Evidence suggests that sites were reoccupied multiple times as a result of seasonal or annual abandonment and short-term reoccupation rather than being occupied for long continuous periods (Koldehoff and Galloy 2006). Smaller projectile points indicate the common use of the bow and arrow over use of the atlatl or spear during the earlier part of the Late Woodland. Ceramic assemblages also changed with the addition of storage vessels and large bowls. These ceramic traditions can be identified as homegrown rather than brought in from outside. Archaeological evidence even suggests an expansion of American Bottom populations east into the Kaskaskia River area as well as west across the Mississippi River (Fortier et al. 2006; Harl 2000; Kuttruff 1991). Reliance on cultivated crops continued, especially those associated with slash-and-burn agriculture. "Regardless of site size or location, native crop plant seeds comprise 50 percent or better of all identified seeds from" 26 archaeological components dating to this portion of the Late Woodland (Simon and Parker 2006). This type of subsistence led to informal "use and reuse of village space" as well as "the unsettled and rather egalitarian character of… [these] societies" (Koldehoff and Galloy 2006:294).

Toward the end of the Late Woodland, evidence presents the region as a place of great diversity with interaction on a regional level, a fair degree of sociopolitical organization, moderately large populations, and a subsistence base which included maize as well as native crop agriculture. The archaeological record appears to embody a "true variety and diversity of local social and technological traditions…[during] a time of extreme heterogeneity, especially in terms of ceramic assemblages" (Fortier et al. 2006:193). Researchers have long focused on differences in pottery tempers to help interpret and define this time period. However, while some found meaning and guidance toward an interpretation of an orderly and linear transition (Kelly 1990, 1993, 2000, 2002a, 2002b) others saw a "virtual cornucopia of local pottery-making traditions" and interpreted these 'microstylistic modes' as the norm rather than the exception (Emerson 1991; Emerson and Jackson 1984; Fortier et al. 2006:193; Pauketat 2001). Occupations at most sites appear to have been relatively permanent. Crossing this threshold to sedentary, nucleated villages came in concert with large-scale cultivation of maize (Koldehoff and Galloy 2006). Plant remains from this time point to a balanced agricultural strategy based on maize and starchy and oily seed crops of the Eastern Complex. Although the data are not as obvious as would be preferred, "it is clear that maize achieved paramount importance rapidly, within a period of about 75 years…[and] by the end of [the Late Woodland], it was ensconced, and would remain so throughout the remainder of the prehistoric sequence" (Simon and Parker 2006:232). Although maize was incorporated into the diet, it is critical to note that it in no way took the place of native cultigens but was a supplement to them (Johannessen 1988; Lopinot 1994; Simon and Parker 2006). This relatively rapid addition of maize to the lifeways of Late Woodland groups brought with it "significant demographic changes; transformations in the way society was organized, especially the appearance of social ranking…[as well as] the use of symbols that embraced the traditional concepts of fertility, renewal, and purification" (Kelly 2000:165).

3.11.1.10 Mississippian Period

This was a time of tremendous political and social transformations in the region. "The Mississippian period was probably the only time when the American Bottom can be regarded as a regional nexus and a source of internally generated innovation. During most of prehistory, the American Bottom was a frontier" (Fortier et al. 2006:201). Very large population centers, at times reaching the size of cities, monumental architecture, extensive agricultural systems, complex social hierarchies, evident ethnic diversity, long-distance trade, warfare, and rich political and religious symbols define the Mississippian Period. These large population centers were surrounded by clusters of smaller villages which, in turn, would be surrounded by outlying farmsteads (Emerson 2000; Pauketat 2004). Mississippian culture is characterized by an increased dependency upon maize-agriculture as a subsistence base and increased social stratification

and complexity. Mississippian societies were organized into ranked societies or chiefdoms. Large population centers of the time are thought to have functioned as central places with respect to economic as well as ceremonial activities. Plaza and mound construction as well as formal cemeteries appear during this time (Emerson et al. 2003; Koldehoff and Galloy 2006; Pauketat 2004). Burials are often found in direct association with Mississippian mounds. The most impressive and influential of these population centers is known today as Cahokia, located near East St. Louis, Illinois. Cahokia was the massive political and cultural center that served as the driving force for change across much of the midcontinent for over 300 years (Emerson 2000).

Tool kits including stone hoes and wood digging sticks reflect their increased dependence on agriculture. Diagnostic Mississippian artifacts include shell-tempered pottery, finely made Madison and Cahokia arrow points, and farming implements including bifacial chipped-stone hoes commonly made of chert from the Mill Creek quarries in southern Illinois. These chert hoes often became heavily polished through use, and small flakes with polished surfaces (hoe flakes) which were struck from the hoes as a result of reworking or sharpening, are commonly found at Mississippian habitation sites. The presence of hoe flakes is often interpreted as evidence of agricultural activity. Small artifact scatters containing shell-tempered pottery and hoe flakes are frequently characterized as farmsteads or homesteads (Pauketat 2004). However, these homesteads were but the threads making up "complex rural networks of farmers, temples and priests, and local hamlet leaders, all woven into the greater Cahokia polity" (Fortier et al. 2006:195).

3.11.1.11 Oneota/Late Prehistoric Period

The Late Prehistoric Period was one of great change. While some populations in southern Illinois continued the Mississippian tradition to a diminished extent, this way of life vanished from the rest of the region. The local political vacuum which resulted destabilized the area and led to increased violence. In addition, the climate became cooler which shortened growing seasons and caused harsher winters. This instability in their agricultural base also triggered social instability as well as an escalation in violence. There are dramatic declines in the larger population centers, the overall regional depopulation left those remaining crowded in a few large towns. Much of the countryside was virtually uninhabited. Cultural complexity as a whole diminishes which is demonstrated in the ceramics, tool kits and trade items which are less elaborate (Esarey 2000).

Researchers have identified an Oneota intrusion into the region from their core area to the north and west. Diagnostic artifacts include shell-tempered jars with distinctive shoulder decorations, endscrapers, and

large oval structures constructed of posts set in individually dug postholes (Milner et al. 1984). More recently excavated Oneota sites in the region include the Range site (Hanenberger 2003; Kelly et al. 1987), Sponemann (Jackson et al. 1992), and the 78th Street site in East St. Louis (Wells and Holley 1993).

3.12 Historic Overview

Gums and Kelly (1994) have provided an overview of the history of the region. This area has a rich historical heritage beginning with the seventeenth century French exploration and French settlement that followed.

The local history can be divided into general periods (Mueller et al. 1996). The Explorer period from A.D. 1541-1700 marks the time of the first European visitors to the Mississippi Valley to the establishment of the first permanent European settlement at Cahokia, to the south of the current project area. The Colonial Frontier period from A.D. 1700-1800 represents the era when the region was under European colonial rule. The Pioneer period from A.D. 1800-1830 denotes the era of initial American settlement which is soon followed (A.D. 1830-1850) by the Early Agricultural period. The span from A.D. 1850-1884 is known as the Early Industrial period with the late Industrial period spanning from A.D. 1884-present.

3.12.1 Explorer Period (A.D. 1541-1700)

The vast territory east of the Mississippi River was known as the Illinois Country for the Native American Illinois Confederacy. The first European exploration of the area was that of the Jesuit Father Jacques Marquette and the French explorer, Louis Jolliet in 1672-73. Marquette and Jolliet's explorations were followed by Robert Cavalier LaSalle and Henri Tonti between 1679 and 1683.

3.12.2 Colonial Frontier Period (A.D. 1700-1800)

The earliest local European settlement was the French village of Cahokia. This early settlement was established by the Jesuits to serve as a mission to the Tamoroa and Cahokia groups of the Illini Tribe but soon grew as French settlers arrived at the fledgling frontier community. After Cahokia, a series of small communities began to appear across the region; Kaskaskia (1703), Fort de Chartres (1719), Prairie du Rocher (ca, 1721), and Ste. Phillippe (ca. 1723). The French expanded across the Mississippi establishing the communities of St. Louis (1764) and Ste. Genevieve (ca. 1750).

The defeat of the French by the British in 1763 resulted in a general depopulation of the French settlements on the east side of the Mississippi. Not wanting to be the subjects of British rule, many of the French

settlers relocated across the river to the French settlements of St. Louis and Ste. Genevieve in the then Spanish territory.

3.12.3 Pioneer Period (A.D. 1800-1830)

Several decades following the Revolutionary War and American independence, occurred a growth of the region's population as pioneers expanded into the area. The area next to the river was no longer the preferred area and movement began into the uplands surrounding the river's floodplain.

3.12.4 Early Agricultural Period (A.D. 1830-50)

As the population grew in the first half of the 19th century, so did the need for roads and other infrastructure. The majority of the population at this time was farmers and the ability to move their crops to large markets was essential to their success. At the same time there was a need to be able to move manufactured necessities into the rural areas. Thus, this period is marked by the development of roads, railroads, river transport, and canals. With these means of transportation came the development of communities centered on this infrastructural growth.

3.12.5 Early Industrial Period (A.D. 1850-1884)

As populations increased and the local economy flourished, new industries developed in the area to supply locals, as well as those further to the west with the goods needed in everyday life. Because of the advantage of cheap transportation afforded by the Mississippi and Missouri Rivers, manufactures and commodity dealers saw this area as an ideal place for commercial operations. In addition, at this time, East St. Louis became the rail hub of the nation, connecting the east to the west via rail.

3.12.6 Late Industrial period (A.D. 1884-present)

Following the aftermath of the Civil War, the area begins to take on a more industrial/commercial role with the individual family farm slowly disappearing. The first half of the 20th century saw two mechanized wars in World Wars I and II. This fully cemented the region as an industrial center until the second half of the century when industry began re-locating to regions or countries which afforded a better profit margin in terms of labor, transportation and/or overall operating costs.

3.13 Service Areas and Cultural Resources

The overall service area represents major drainage basins that empty into the Mississippi River. These basins and their confluences represent some of the richest archaeological areas in the United States.

Nearly all of the sites mentioned in the above discussion are to be found in one of the subject drainage basins. This, coupled with the fact that only a small portion of each of these basins have been subjected to archaeological investigations, would indicate that there is a high potential for significant prehistoric and historic archaeological resources within each of these drainages that are yet to be discovered. This potential exists from the mouth of these waterways to their headwaters and covers the entire drainage basin. Therefore, based on what has been found in the past and given the high potential for the presence of numerous significant archaeological sites, it should be anticipated that any proposed actions within these drainage basins would need to be proceeded by cultural resource investigations as per the National Historic Preservation Act of 1966, as amended, via compliance with the Section 106 process.

4.0 MITIGATION PLAN

4.1 Goals and Objectives

Development, implementation and operation of the WFI-B UMBI and its associated Bank Sites (BS) are intended to accomplish the following goals and objectives:

1. Support the national goal of "no net loss" of wetlands by providing wetland mitigation Bank Sites and credit options in Southern and Central Illinois;

2. To consolidate resources in order to increase the potential for the establishment, permanent protection and long-term management of successful mitigation that maximizes opportunities for contributing to biodiversity and/or watershed function;

3. To contribute to watershed function through appropriate determination of the Bank Site geographic service area (generally hydrologically based on watershed basin);

4. To reduce permit processing times and provide more cost-effective compensatory mitigation opportunities for those projects which qualify;

5. To increase review and compliance monitoring efficiency and, thus, improve the reliability of efforts to restore, create, or enhance wetland areas for mitigation purposes;

6. To identify sites with an aquatic resource base, some significant portion of which is degraded and restorable to a properly functioning condition;

7. To select and prioritize sites based on review of hydrologic function, water rights, position within the landscape and watershed, and ownership structure;

8. To establish permanent protection for the created, restored and enhanced aquatic resources of the Bank Sites; and

9. To establish an appropriate coverage area for the WFI-B UMBI, as well as appropriate geographic boundaries within which each Bank Site may operate in terms of crediting and debiting.

4.2 Site Selection

This section will provide a description of the factors that were considered during the site selection process. WFI-B compensatory mitigation projects will utilize a watershed approach in order to be appropriately sited and designed in an effort to provide a site with natural hydrology and landscape position that will support long-term sustainability and function as a self-sustaining system.

The BS will be ecologically suitable for providing the desired aquatic resource functions by describing their specific attributes including:

1. The size and the location of the BS relative to hydrologic sources and other ecological features.
2. The watershed-scale features such as aquatic habitat diversity, habitat connectivity, the existence of threatened or endangered species related to prior habitat loss, and other landscape scale functions.
3. The hydrological conditions, soil properties, native seed source, and other physical and chemical characteristics.
4. The compatibility with adjacent land uses and any existing watershed management plans.
5. The reasonably foreseeable effects the compensatory mitigation project will have on ecologically important aquatic or terrestrial resources, cultural resources, or habitat for federally or state listed threatened and endangered species.
6. Other information as available including potential chemical contamination, impacts from land use changes including residential and/or commercial development within the watershed, and the proximity to the location of other mitigation banks, in-lieu fee mitigation project sites, or protected conservation areas within the watershed.
7. A table outlining Existing Conditions and Proposed Conditions.

4.3 Site Protection Instrument

The following sections summarize the ownership and legal arrangements that will be used to provide long-term protection of the proposed BS.

1. For long-term protection of non-government property other than transfer of title, the use of conservation easements and/or deed restrictions are deemed sufficient site protection measures. WFI-B will strive to utilize the standard District conservation easement and establish an appropriate third party (government or non-profit resource management agency) the right to enforce site protections and provide the third party the resources necessary to monitor and enforce the site protections.
2. The long-term protection mechanism must contain a provision requiring 60-day advance notification to the district engineer before any action is taken to void or modify the instrument,

management plan, or long-term protection mechanism, including transfer of title to, or establishment of any other legal claims over, the compensatory mitigation bank site.

3. For government property, long-term protection may be provided through federal facility management plans or integrated natural resources management plans as long as those plans are compatible with restrictive covenants specified on nongovernment property.

4. Each site will generate a Title Report and overview of all ownership rights, and easements.

4.4 Baseline Information

This section of the WFI-B UMBI will describe the current conditions of the proposed BS and the characteristics that the design team deems this area as highly qualified for wetland restoration.

1. **Bank Site (BS):** This section discusses the existing conditions of the BS's (hydrology, soil characteristics, and hydric vegetation). This section will also include a delineation of the proposed BS, using the 1987 USACE Wetland Delineation Manual and Midwest Supplement.

   The BS will describe the existing conditions, the bank sponsor will provide the following analysis, information and maps/figures as required:

   - Hydrologic conditions of the site;
   - Soil Classifications and soil maps of the site;
   - Analysis of vegetation within the mitigation site;
   - Boundary of proposed mitigation bank;
   - Historic aerial photos;
   - Bank Site (BS) location to include county, township and range and latitude and longitude points;
   - Wetland Determination of the site to identify soils, hydrology and vegetation and any wetlands existing within its boundaries; and
   - Describe the existing hydro-system connectivity between wetlands and other waters including tributaries connection to receiving waters.

2. **Reference Site:** This section is needed to identify an area in close proximity to the proposed mitigation site that is similar in wetland characteristics to predict the future conditions of the site. This reference site needs to have similar hydrology, soil characteristics, and hydric vegetation. The idea of the reference site is to determine the future potential of the proposed wetland mitigation bank.

3. **Rapid Impact Assessment Method (RIAM):** This assessment method will be utilized on all BS locations and as a standard tool in the evaluation of the BS. The RIAM is used to determine how well the wetland is functioning before and after the mitigation bank is built and provide an ecological lift rating.

4. **Archaeological Phase 1 Survey:** The BS will receive an overview by the Bank Sponsor in coordination with the MBRT as to requirements for an Archaeological Phase 1 Survey, however, at this time unless unusual circumstances arise, all BS will receive a Phase 1 Survey. The survey

will provide an overview of cultural resources within the BS project area and serve as a coordination point for the project permit with the State Historic Preservation Office.

5. **Environmental Site Assessment:** Every BS will receive an Environmental Site Assessment report. This report will identify at a macro level any expected environmental issues that might be identified with the Bank Site.

4.5 Determination of Credits

This section provides an overview of the types of credits that are to be provided at the Bank Site's with a brief description for the determination of the wetland type. Wetland credit types need to be identified to the Cowardin class and, in the absence of a functional assessment method, determined based on a combination of land area and method of compensation. Wetland types include:

Establishment- the manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area and functions.

- Established wetlands-1:1 (1 acre of restored wetland=1 Bank credit)

Restoration- the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource.

- Restored wetlands-1:1 (1 acre of restored wetland=1 Bank credit)

Enhancement- the manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area.

- Enhanced wetlands- Range of 1.3: 1 to 2:1 (1.3 to 2 acres of enhanced wetland=1 Bank credit)

Buffer- an upland, wetland, and/or riparian area that protects and/or enhances aquatic resource functions associated with wetlands, rivers, streams, lakes, marine, and estuarine systems from disturbances associated with adjacent land uses.

- Buffer- 4:1 (4 acres of buffer=1 Bank credit)

Preservation- the removal of a threat to/or preventing the decline of aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions.

- Preservation- 10:1 (10 acres of preservation=1 Bank credit)

Stream credits will be determined by using the current version of the ***Illinois Stream Mitigation Method Version***.

4.5.1 Credit Release Schedule

The Credit Release Schedule will reflect the approved UMBI plans for the WFI-B UMBI.

Table 4.2 – Credit Release Schedule

Description	Total Credits=72.0	Credits Released
Bank Approval	15%	10.8
Construction Complete	25%	18.0
Hydrology Confirmation	15%	10.8

Table 4.2 – Credit Release Schedule (continued)

Description	Total Credits=72.0	Credits Released
Year 3 Performance Standards	15%	10.8
Year 4 Performance Standards	15%	10.8
Year 5-7 Performance Standards	15%	10.8
Total	**100%**	**72.0**

4.5.2 Credit Tracking Accounting Logs

The Sponsor shall submit a statement to the Corps St. Louis District each time credits are debited or additional credits are approved. If requested, the Corps will distribute the statement to other members of the MBRT. At a minimum, the Sponsor shall submit an annual ledger to the Corps for distribution to all members of the MBRT, showing all transactions at the bank for the previous year.

4.6 Mitigation Work Plan

A Bank Site Plan (BSP) will be developed for each Bank Site (BS) identified by the Bank Sponsor (WFI-B). The BS will evaluate and provide wetland design techniques to clearly identify areas, acres, construction features and locations within the BS for forested, emergent, enhanced forested or preserved wetlands for the project.

The following items will be provided for each BS:

- Project Description: The bank will lie within on a specified acreage site;
- Existing land use classification, (prior converted cropland, farmed wet, emergent, river channel, and existing wooded wetlands).
- Description of BS future acreage and restrictions. The BS will outline cumulative acreage and restrictions used to protect the site/property in perpetuity.

- How BS shall maintain the BS condition for a minimum of seven years in accordance with the Bank Closure Procedures.

- BS Goals for future land classification, such as re-established to Bottomland Hardwoods Forested Wetlands with acreages, establishment of Streambank Riparian Corridor with acreage, establishment of Emergent Wetland with acreages and any Preservation acreage on the BS.

4.6.1 Forested Wetlands

BSPs will identify actions to be taken to improve, increase functions to the BS for establishment of Forested Wetlands. These will include, but is not limited to, the following items to evaluate, design and construct forested wetlands at the BS:

- Analysis for unpredictable flooding and a mix of vegetation that can tolerate a wide range of water/hydrologic levels;

- Analysis and steps to be taken for improving hydrology across the site is to re-establish historic hydrology in support of forested restoration;

- Analysis and design of excavation and tillage/fill features that will replicate a natural high bank and associated oxbows of historic wetland environments;

- Analysis and descriptions of tillage techniques to improve hydrology whether increasing or decreasing BS hydroperiod to meet the goals of forested wetlands;

- Location of berms or mounds allow for flood flowage in and around the forested planting;

- Enhancement techniques to open up existing aquatic/forested habitat such as clearing operation, Timber Stand Improvement (TSI) techniques of thinning, girdling and falling trees and Spraying applications to clean up understory habitats.

- Other features in managing hydrology will consist of removal or modification of agricultural drainage ditches to manage hydrology for wetland forest restoration;

- Analysis of weirs to manage water depth around the site and reduction of velocity will determine material use for these structures (dirt or rock);

- Support of hydrophytic vegetation throughout the BS;

- These actions focus on providing a streamlined approach to reach a Climax forest status in a shorter timeframe than the typical 180 years (+) normal successional model.

In the Bank Site Plan there will be various construction maps and features for the project.

4.6.2 Emergent Wetlands

BSP's will identify actions to be taken to improve, increase functions to the BS for establishment of Emergent Wetlands. These will include, but is not limited to, the following items to evaluate, design and construct emergent wetlands at the BS:

- Creating historical low area through the management of a drainage channel (rock checks or cleaning of ditches) and the utilization of berm construction.
- Constructing rice levee berm around boundaries that will extend hydrology duration of low areas
- The restoration of historic meander scars through excavation and placement of material will generate an emergent wetland feature.
- Utilization of low profile stop log structures for management of emergent areas.

4.6.3 Riparian Corridor

BSP's will identify actions to be taken to improve, increase functions to the BS for establishment of Forested Wetlands. These will include, but is not limited to, the following items to evaluate, design and construct forested wetlands at the BS:

- Utilizing the Illinois Stream Method guidance stream bank riparian corridor component will employ bottomland hardwood forest plantings similar to the forested wetland plantings outlined above.
- The use of rice levee plow berms will allow for less flood tolerant species to survive and re-generate at higher elevations.
- The general width of the riparian corridor will range from 100 to 175 feet in most locations.
- In the preservation area the width of the riparian corridor will range from 50 feet to 300 feet.

4.6.4 In-Stream Enhancements

BSP's will identify actions to be taken to improve, increase aquatic functions at the BS. These will include, but is not limited to, the following items to evaluate, design and construct aquatic wetlands features at the BS:

- Rock-riffle structures to improve stream quality and physical habitat through the development of pools, riffles, and runs and ultimately increased water levels and dissolved oxygen.
- Rock-riffle structures will aid in providing increased stability of eroding streambanks.

- Modification of flow characteristics through the installation of rock riprap instream structures such as bendway weirs, stream barbs, chevrons, and/or J-Hooks will promote scouring of various depth pools and increase the stability of eroding banks.

- Installation of boulder arrangements (3 to 5 bedrock material boulders in a small grouping) to help create, diversify, and improve quality cover habitat for fish species

- Improve stream macroinvertebrate assemblages.

- Stabilization of vulnerable and eroding stream banks will occur through the installation of stone-toe protection

- Tree root wad installation to address aquatic habitat via woody structure at multiple locations.

- Utilization common techniques and Best Management Practices to construct in stream features, these include boulder clusters, J- hooks and stream barbs.

- To the extent possible all construction to be implemented will be from the bank of the river with little impact to the existing riparian border.

4.6.5 Phased Construction

The BS will be established in multiple phases, ideally based on phases that range from 40-to 100-acres. Phase construction will allow for lower risk of planting hazards such as flooding, drought and unknown mechanical habitat damage. This will allow the Mitigation Team an opportunity to Adaptively Manage the site over a two-or three-year cycle. A detailed paragraph outlining specific restoration activities will accompany all BSPs. Reference below for a Two-Phase Construction example.

4.6.5.1 South Phase (1) Example

This phase will consist of approximately 55.0 acres and will encompass 2,000 linear feet of the Kaskaskia River. The major habitat types related to the South Phase (1) will include Forested Wetlands, Stream Riparian Corridor and channel modifications for the entire project, Emergent Wetland and Wooded Wetland Preservation. The Root Production Method produced trees will be planted on mounds, unconnected berms and in-situ with an identified cover crop supporting the planting. Hydrology will be modified to extend duration on the site. This will be accomplished through creating historic meander scars and closing agricultural drainage ditches with rock weirs and stoplog structures. This will augment hydrology for both longer duration on lower elevation and less hydrology on berm and mound plantings.

4.6.5.2 North Phase (2) Example

This phase will consist of approximately 35.00 acres and will encompass 12,860 linear feet of the Kaskaskia River. The major habitat types related to North Phase (2) will include Forested Wetlands, Stream Riparian Corridor and channel modification, and Wooded Wetland Preservation. The Root Production Method produced trees will be planted on elevated mounds and in-situ soil areas with an identified cover crop supporting the planting. Hydrology will be modified via mounds and meander scar enhancement construction. This will augment hydrology for both longer duration on lower elevation and less hydrology on berm and mound plantings.

4.6.6 Mitigation Plan

PROPERTY SIZE: Specific Acreage of BS -acres

WETLAND MITIGATION BANK (Forested, Emergent, Wooded Wetland Preservation): Specific Acreage of BS - acres

STREAM MITIGATION BANK: Specific Acreage of BS - acres

TOTAL WETLAND AND STREAM MITIGATION BANK: Specific Acreage of BS - acres

Bottomland Hardwood Forest – Specific Acreage of BS - acres
Carya illinoinensis, Carya aquata, Quercus bicolor, Quercus palustris, Quercus nuttallii, Quercus lyrata, Quercus macrocarpa, Quercus x schuettei "Kimberly", Crataegus viridis, Platanus occidentalis, Betula nigra, Celtis laevigata, Cephalanthus occidentalis, Forestoiera acuminata, Quercus phellos, Fragus spp., Diospyros virginaina, Nyssa aquatica, Taxodium distichum, Gymnocladus dioicus, etc.

Emergent Wetland – Specific Acreage of BS - acres
Amorpha fruticose, Cephalanthus occidentalis, Forestiera acuminata, Hibiscus laevis, Quercus lyrata, Spartina pectinata, Taxodium distichum, Nyssa aquatica, etc.

FOREST:
Bottomland Hardwood Forest Preservation – Specific Acreage of BS - acres
Carya illinoensis, Quercus bicolor, Quercus macrocarpa, Quercus palustris, Crataegus viridis., Cornus spp., Gymnocladus dioicus, Platanus occidentalis, Diospyros virginiana, - etc.

STREAM BANK RIPARIAN CORRIDOR:
Bottomland Hardwood Forest – Specific Acreage of BS - acres
Carya illinoinensis, Carya aquata, Quercus bicolor, Quercus palustris, Quercus nuttallii, Quercus macrocarpa, Quercus x schuettei "Kimberly", Crataegus viridis, Platanus occidentalis, Betula nigra, Celtis laevigata, etc.

The planting of woody species will follow the specifications set forth in the following wetland reforestation document.

Wetland Reforestation
Ken Dalrymple
Wildlife Management Biologist

There are five essential elements for plant growth and survival.

1. Light (photosynthesis)
2. Air **(oxygen within the soil is the most essential element needed in wetland plantings)**
3. Water
4. Temperature
5. Nutrients

All of the above basic elements must be in abundance to have accelerated plant growth and flowering and fruiting at an early age.

A prescription for a Wetland Mast Tree Planting System.

1. Planting Site - The following are considerations in selection, planting method and tree species (elevation, soil type, flood frequency, flood duration, past use, management objective, etc.).

2. Tree Species - Select several **hard mast tree species** that grow in wooded wetlands **near the planting site**. Swamp White Oak, Pin Oak, Pecan, Burr Oak, Overcup Oak, or even fruit trees such as Persimmon, and Green Hawthorn are a few of the species that could be considered depending on the latitude of the planting site (Cypress is hardy throughout Illinois also). Trees with winged fruit (Ash, Maple, Box Elder, Cottonwood, Sycamore) will invade some of the area thus creating very good woody plant diversity. This invasion is desirable in most locations if numbers are low on a per acre basis.

3. Seed Source - One hundred (100) mile radius of planting sites, adapted to local weather conditions and flooding frequency, collected in the floodplain of the present planting site **(Do not use a seed source from an upland collection site)**.

4. Root Zone Management:
   The driving force that creates the natural movement of water from soil to plant and atmosphere is based on the free energy gradient of the water. Most plants actually have little ability to cope with atmospheric conditions and dependent upon the moisture supply of the soil. Saturated flow, which equals piston flow, pushes the air from the root zone for a period of a few hours t a few days depending upon the soil type. Aeration difficulty is typical in medium to heavy clay soils where saturation may last several days. However, the plant root must respire for the uptake of minerals to metabolize organic compounds.

   Ridge and swale topography, which was present in floodplains before being modified or eliminated by farming and drainage practices, provided the micro-conditions in the root zone that hard mast producing bottomland hardwoods needed for growth and reproduction. The location that these tree species colonized were the elevated areas usually situated adjacent to old channel scars.

In hydric soils with a clay content of 60% or more as well as areas with altered hydrology (an increase in hydrologic events), elevated planting areas (berms) provide a greater probability for plant roots to be located in a zone that can supply the correct air to moisture ratio that is essential for maximized growth, fruit/seed production and survival. An increase of the water usage following establishment may change the hydrologic gradient thus promote regeneration of less flood tolerant species and maintenance of small-scale topographic heterogeneity in the bottomland hardwood forest landscape becomes less valuable.

A grass or grass like companion (cover crop) crop, in the tree plantation, will reduce competition from woody and herbaceous vegetation for sunlight, moisture and nutrients. The cover crop must be established before the tree planting ins implemented and the grass like species, that will withstand inundation for four to six weeks with a maturity height of less than 3 feet, is essential. These elevated areas (berms) should be placed no closer than 40 feet of each other and determined by an environmental wetland scientist, if needed, by evaluating soil texture, existing micro-topography, hydrology, tree species habitat requirement and tree growing method of woody species to be restored to the site.

5. Woody Plant Selection - Select a mast species that has been air root pruned to produce a superior root system. Recommend the **Root Production Method (RPM) process developed at Forrest Keeling Nursery in Elsberry, Missouri. The tree should have a caliper of 5/8 inch at 6 inches above the root collar and a minimum height of 5 feet**. These specifications' increases tree survival from deer depredation and severe flooding events.

6. Ground Cover Mat/Mulch - Place a 1- to 3-year biodegradable ground cover (approximately 9 to 10 square feet) around each planted container tree to reduce container media evaporation and competition from fast growing herbaceous species.

7. Fertilization - A supplemental feeding program with slow release fertilizer for 3 years after establishment will increase survival and enhance growth (for accelerated growth to occur a high level of available nitrogen must be present).

8. Tree Spacing – Spacing between trees will be approximately 20 by 20 feet apart, on center with staggered rows. The hard mast producing species will be planted on berms (if determined the environmental scientist as needed) and other bottomland hardwood species planted between the berms. This design will be similar to the ridge and swale topography that historically existed, before the implementation of cropping practices occurred.

This program enhances the biological atmosphere of the soil plus encourages growth of mycorrhizal fungi.

Advantages

Ridges/berm/mounds - (7-10 inch raised beds) Increase soil air, water availability, soil temperature in spring, and nutrients by concentrating organic matter.

Ground Cover - Increases light (reduces nearby competition), moisture, soil temperature in early spring, and maintains nutrient available for tree growth (reduces competition).

Companion Grass - Provides air for roots, organic matter, mulch to keep soil cool and moist in summer, increases available light by reducing large herbaceous or woody vegetation.

Fertilizer - Nutrients for accelerated growth and fruit production.

ROOT PRODUCTION METHOD (RPM) SYSTEM DESCRIPTION

RPM SYSTEM

The RPM system (Root Production Method) is a multi-step production system of container tree production that places primary emphasis on the root system, which ultimately determines the trees survival and performance in its out planted environment. This particular container production system has been developed to facilitate volume production, of a high-quality tree with good height-caliper balance. Approximately 80% of our production consists of native trees, many of which present transplanting difficulties using conventional nursery growing systems. We specialize in Oak production, currently growing twenty-six varieties.

SEED SELECTION, COLLECTING, PROCESSING AND GRADING QUALITY SEED

This is accomplished by selecting superior trees growing on specific sites for seed collection. Experience has taught us that most species have ecotypes that are site specific. We look towards the wetlands or floodplains as a prime seed source for native species that are found growing on both wetlands and upland sites. Since wetland species have evolved under stress we find they will consistently out perform their upland counterparts on virtually any site, particularly on highly stressed sites.

PROCESSING

After basic cleaning and drying procedures are completed all seed is graded and sized using aspirators or gravity tables. We find the weight of individual seed to be more important than size, thus air separations that use specific gravity give the best result. This step is the first "grading" but of great importance in our goal to produce uniformity.

SUMMARY

The RPM System is a multi-step tree growing program using seed selection and handling, an air root pruning process, careful production planning which will produce container grown tree liners that are uniform in grade and quality. Seedlings propagated from seed provide a broad genetic base, which will insure longevity and protection against diseases plus conditions that might endanger certain asexually produced and over used varieties.

RPM® Trees:

- Provides superior plant survivability and growth rate
- Increases operating efficiency and profitability
- Makes Fall planting a viable alternative

Root Production Method Produces:

- Vastly improved root system through a multi-step program of air-root pruning
- More dense fibrous root system that absorbs and utilizes more oxygen, water and nutrients

The Result Is:

- Improved transplantability
- Accelerated growth pattern and survivability
- Reduced loss, faster turnover time
- Substantial labor savings

RPM®® trees' secret to success is a unique, multi-step system of air-root pruning that enables us to produce trees with a denser, more fibrous root mass that absorbs and utilizes more oxygen, water and nutrients than conventionally grown trees.

Forrest Keeling has worked closely with conservation and private organizations to develop ways to utilize RPM® technology in Wetland Restoration, Wildlife Habitat Development, Buffer Development, Retention Pond Planting and Soil Stabilization to solve a seemingly insurmountable challenge: the survivability and regeneration of native hardwood trees in hostile, competitive growing environments where maintenance presented a severe problem

The Four Step Sequence in the Walk-A-Way-Planting System

- Ground preparation, plowing, discing and creation of berms (June to July)
- Cover crop establishment (August to September)
- Tree installation (October to December)
- Mat placement (weed barrier and moisture retainer) and fertilization (April to May)

SCOPE OF WORK FOR ESTABLISHMENT OF WOODY SPECIES MATERIALS

Seed
Seed Mixture

Seed mixtures shall be proportioned by weight as follows:

Seed	Pounds per Acre (minimum)
Red Top (Agrostis alba)	6
Virginia Wild Rye (Elymus virginicus)	6
Alsike Clover (Trifolium hybridum)	2

The seed quantities indicated per acre for seed shall be the minimum amounts of pure, live seed per acre for each species listed.

SEEDING TIMES AND CONDITIONS

Seeding Time

Seed shall be sown from August 10 to September 20.

Seed Bed Preparation

Immediately prior to seeding, the areas to be seeded shall be prepared by thoroughly working the soil to a depth of not less than 3 inches, with no clumps or clods. Surfaces shall be smooth graded and uniform,

with no abrupt humps or depressions. Surfaces shall be free from clumps, clods, rivulets, gullies, crusting and caking.

APPLYING SEED

A two-gang rolling seeder with ½-inch flutes on each roller gang and a seed box positioned in such a manner to drop seed material between the gangs shall be used to plant the seed. Seed shall be uniformly placed to a depth of 1/4 inch or as recommended by the seed supplier. The total weight of the two gang rolling seeder shall not be less than 200 pounds per foot of the seeders working width.

Trees

DELIVERY, INSPECTION, STORAGE AND HANDLING

Identification: Plants shall be identified with durable waterproof labels and weather-resistant ink. Plants shall have attached labels stating the correct plant name.

Protection During Delivery: Plants shall be protected during delivery to prevent desiccation of the plant or damage to the roots. Branches of plants shall be protected by covering all exposed branches.

Tree Plantings:

MAST BOTTOMLAND HARDWOOD PLANTINGS - This area will follow all recommendation outlined in this section for tree planting requirements. This area consists of approximately 55.5 acres of forested wetlands and 73.0 acres of stream riparian corridor plantings and 20.0 acres of forested preservation buffer. The forested and riparian planting equates to twenty foot by twenty foot (20 ft x 20 ft) spacing.

South Phase (1) Planting Acres:

Forested Wetland = Specific Acreage of BS x 109 trees/acre = XX
Riparian Corridor = Specific Acreage of BS x 109 trees/acre = XX
Total Trees Planted = XX each

Phase 2 Planting Acres:

Forested Wetland = Specific Acreage of BS x 109 trees/acre = XX
Riparian Corridor = Specific Acreage of BS x 109 trees/acre = XX
Total Trees Planted = XX each

EXAMPLE NORTH PHASE (2) – Restored Wetland Forest Trees

Tree Varieties	Trees per Acre	Acres Planted	Total Number of Trees for Site
Pin Oak (*Quercus palustris*)	5		166 - **
Sycamore (*Platanus occidentalis*)	5		166
Willow Oak (*Quercus phellos*)	5		166 - **
Northern Pecan (*Carya Illinoensis*)	10		332 - **
Swamp White Oak (*Quercus bicolor*)	5		166 - **
Green Hawthorne (*Crataegus viridis.)*	5		166
Button Bush (*Cephalanthus occidentalis*)	10		332
Persimmon (*Diospyros virginiana*)	5		166
Overcup Oak (*Quercus lyrata*)	10		332 - **
Water hickory (*Carya aquatic*	5		167
Sugarberry (*Celtis laevigata*)	5		167
Nuttall Oak (*Quercus nuttallii*)	10		332 = **
Swamp Privit (*Forestiera acuminate*)	5		166
Bur Oak hybrid (*Quercus spp. Kimberly*)	10		332 - **
Bald Cypress (*Taxodium distichum*)	5		166
Water tupelo (*Nyssa aquatic*)	5		166
Kentucky coffee (*Gymnocladus dioicus*)	4		133 - **
Totals	109		3,621

Hardmast Trees for berm planting = **

EXAMPLE SOUTH PHASE (1) - Restored Wetland Forest Trees

Tree Varieties	Trees per Acre	Acres Planted	Total Number of Trees for Site
Pin Oak (Quercus palustris)	5		286 - **
Sycamore (Platanus occidentalis)	5		286
Willow Oak (Quercus phellos)	5		286 - **
Northern Pecan (Carya Illinoensis)	10		573 - **
Swamp White Oak (Quercus bicolor)	5		287 - **
Green Hawthorne (Crataegus viridis.)	5		286
Button Bush (Cephalanthus occidentalis)	10		573
Persimmon (Diospyros virginiana)	5		286
Overcup Oak (Quercus lyrata)	10		573 - **
Water hickory (Carya aquatic	5		287
Sugarberry (Celtis laevigata)	5		287
Nuttall Oak (Quercus nuttallii)	10		575 - **
Swamp Privit (Forestiera acuminate)	5		286
Bur Oak hybrid (Quercus spp. Kimberly)	10		573 - **
Bald Cypress (Taxodium distichum)	5		286
Water tupelo (Nyssa aquatic)	5		286
Kentucky coffee (Gymnocladus dioicus)	4		230 - **
Totals	109		6,244

Hardmast Trees for berm planting = **

GROWING METHOD CONDITIONS

Minimum acceptable requirements for the tree stock shall be as follows: Container grown trees shall be at least 5/8 inch and 3-5 feet in height. Container grown trees shall be produced by a root-pruned method to develop a dense, fibrous, non-curling root system.

The required root-pruned growth method shall include: Plants shall be grown under climatic conditions similar to those in the locality of the project.

Seed Source: From a wetland site within 200 miles of the project site. Seed Germination Plus a Two Step Air Root Pruning Process Fertilizer

Controlled release of 30-3-6 analysis fertilizer

LAYOUT

PLANTING TREES WITHIN AGRICULTURAL FIELDS

The Environmental Wetland Scientist will determine if the hard-mast producing bottomland hardwood trees within agriculture fields and forest management areas need to be planted on berms. Should they require beds (berms), the trees shall be planted in raised planting beds (berms), constructed of existing soil materials, 8 to 10 inches in height after being compacted with a roller or a two gang roller of which has a minimum combined weight of 200 pounds per foot of ground contact length (e.g., 8 foot of working width double gang rolling seeder must weigh a minimum of 1600 lbs.). The base of the raised bed (berm) shall have an approximate minimum width of 7 feet with a flat crown being approximately 3 feet in width. The berms shall be constructed in such a manner that restriction of the natural drainage of the site or impound water during high rainfall periods of flooding does not occur.

PLANT PITS

The size of tree pits shall be approximately the same size as the container or slightly larger.

PLANTING TIMES AND CONDITIONS

Trees shall be planted during specified periods. Acceptable planting periods are between October 10 and December 10, and between March 1 and April 30. Plants shall be set plum (within 10 degrees of vertical) and held in position until sufficient soil has been placed around the roots.

CONTROLLED-RELEASED FERTILIZER

Fertilizer shall be placed on top of the soil surface at the time of planting or within 7 days after planting. Thirty grams of 33-3-6 analysis slow release fertilizer shall be placed on the soil surface at the time of planting and 50 grams placed on top of the weed barrier mat/mulch 210 to 240 days after the trees have been planted.

CONTAINER GROWN TREES

Non-biodegradable containers shall be removed without damage to the plant or root system. Biodegradable containers shall be split.

WEED BARRIER MATS/MULCH

Weed barrier mats may be placed in accordance with the manufacturer's recommendations and/or as indicated. The weed barrier mats will be utilized pending the Wetland Scientist decision as it relates to the specific site conditions. Weed barriers will be placed between the dates of March 15 and May 30 on either fall or spring planted trees. The 4-foot by 4-foot mat will be held down by placing 9 flat-topped staples of 11 gauge, 6 inch by 1 inch by 6 inch in size, inserted through the mat and into the soil. The staples will be placed with 1 staple in each of the four corners of the mat, 1 in the edge, 1/2 the distance between corners, and 1 where the mat is split next to the tree stem for a total of 9 staples. These staples shall be pushed into the soil until tight against the weed barrier mat securing it firmly against the soil. Should mulch be utilized, mulch shall be placed around each tree and cover an area of approximately 9 square feet and two inches deep.

TREE PROTECTION

The installation of bamboo stakes will be utilized to support the beneficial characteristics of the RPM plantings. Two bamboo stakes (0.25-0.75 inches) will be placed adjacent to planted trees to reduce wildlife mechanical damage that exists in nature. The use of stakes circumvents the mechanical damage of deer rubs in open management regimes. The stakes will utilize a rubber band to affix/secure the planted tree to the bamboo stakes. After 3-5 years the bio-degradable rubber band will cease to provide function (break) and the bamboo stakes will rot and fall away from the planted RPM tree.

EXCAVATION DEVELOPMENT PLAN:

Bottomland Hardwood Planting:

The excavation plan for the bottomland hardwood tree planting will focus on re-creating historic stream meander scars and a natural high bank system. This will involve the excavation of in-situ soils at existing ground level to a depth of 6-10 inches and a width of 40 feet. The soil generated from this shallow excavation will be placed adjacent to the meander scar at a height of 6-8 inches and width of 30 feet on average. The use of mounds or unconnected berms in other areas of the forested plantings may be utilized. The construction method for historic meander scars will employ either/or a heavy equipment excavator (trackhoe) or a small tractor pulled scraper. The construction method for mound/berm will be a tractor pulled rice levee plow or excavator to manage the in-situ material into unconnected mounds/berms in tree planting areas.

Stream Riparian Corridor:

Specific Acreage of BS of bottomland hardwood RPM tree plantings and natural successional species will be established along stream bank corridors within the bank mitigation site. A berm/mound will be constructed in these locations, as needed, to enhance survival of hard mast tree species.

Berm Construction:

Should they require beds (berms), the trees shall be planted in raised planting beds (berms), constructed of existing soil materials, 8 to 10 inches in height after being compacted with a roller or a two gang roller of which has a minimum combined weight of 200 pounds per foot of ground contact length (e.g., 8 foot of working width double gang rolling seeder must weigh a minimum of 1600 lbs.). The base of the raised bed (berm) shall have an approximate minimum width of 7 feet with a flat crown being approximately 3 feet in width. The berms shall be constructed in such a manner that restriction of the natural drainage of the site or impound water during high rainfall periods of flooding does not occur.

4.7 Operation and Maintenance Plan

All Bank Sites will be designed to be self-sustaining to the largest extent possible for the Long-Term Management and Maintenance of the Bank Site. This section outlines responsibility for the Sponsor on active management Bank Sites that have been constructed and are operating during credit sales and performance standards activities. This maintenance and operations is funded in whole by the Bank Sponsor. Maintenance will be determined based on observations performed during post-construction monitoring and will include these overarching main themes:

- A specific schedule of maintenance for each Bank Site project;
- Investigating for invasive species as listed in this document;
- Evaluation and maintenance of water control structure, both structural or earth work based;
- Evaluation of vegetative success and management at the Bank Site; and
- Evaluation of Instream features of the project, if applicable.

In addition, every Bank Site will evaluate the following items:

- Evaluating the site for animal damage and addressing if the damage is causing or may lead to poor site performance as measured by the ecological performance standards, ensuring stability and designed conditions of the berms/weirs/overflow structures;
- The need for supplemental tree plantings;
- Any invasive, undesirable or noxious species will be addressed through an herbicide or insecticide application program. The timing, application method, type and frequency of the application will be approved prior to commencing with the activity;
- Mowing may be implemented to reduce competition and evaluated periodically after that. Any necessary mowing would occur in the summer and be mowed to a height of approximately 6-inches and used as a tool to stimulate or retard specific species that the site manager has identified as being problematic or beneficial to the habitat being restored;
- Boundary signs marking the perimeter of the mitigation area will be addressed during this initial maintenance period;
- During the monitoring period, slight adjustments may be made to the berms/wiers to prolong ponding or lower water levels to ensure optimum hydrologic conditions to promote the planned wetland communities with native plant species diversity to achieve the ecological performance standards; and
- Instream structures will be visually evaluated for overall functionality of the structure, focused mainly on stability within the banks with no major erosion or deposition.

SEVEN-YEAR OPERATION AND MAINTENANCE PLAN

PHASE ONE AND TWO (BASED ON PLANTING DATE)

POST CONSTRUCTION AND YEAR ONE

1. Conduct a baseline ecological functional assessment using the Rapid Impact Assessment Method **RIAM** (Stein and Ambrose 1998) to compare the site prior to project implementation to conditions present after implementation of the project (assumption used is by best professional judgment) using the following six evaluation criteria: endangered species habitat, structural diversity of

habitat, spatial diversity of habitat, open space habitat, linear contiguity of habitat and adjacent habitats. Transect meander search in accordance with Section I.

2. Restore and plant Bank Site acreage in accordance with the Mitigation Plan.

3. Monitor tree planting and maintain.

YEAR TWO

1. Monitor tree plantings and maintain.

2. Transect time meander search in accordance with Monitoring Plan.

3. Mow as needed based on Mitigation Plan.

YEAR THREE

1. Monitor and replace where needed forested plantings.

2. Monitor all herbaceous and hydrophytic vegetation.

3. Transect time meander search in accordance with Monitoring Plan.

4. Mow as needed based on Mitigation Plan.

YEAR FOUR

1. Monitor and replace where needed forested plantings.

2. Monitor all herbaceous and hydrophytic vegetation.

3. Transect time meander search in accordance with Monitoring Plan.

4. Mow as needed based on Mitigation Plan.

YEAR FIVE TO SEVEN

1. Monitor and replace where needed forested plantings.

2. Monitor all herbaceous and hydrophytic vegetation.

3. Transect time meander search in accordance with Monitoring Plan.

4. Mow as needed based on Mitigation Plan.

4.8 Ecological Performance Standards

This section describes the ecological standards that the Bank Site will use to determine if the Bank Site is achieving its ecological objectives. The performance standards listed below will be used to measure or

assess whether the mitigation project is developing into the desired resource type and providing the expected functions. These performance standards will be applied to determine the success of this compensatory mitigation activity.

1. The wetland will meet jurisdictional wetland criteria as outlined in the Midwest Regional Supplement to the 1987 U.S. Army Corps of Engineers Wetland Delineation Manual (U.S. Army Corps of Engineers 2008, Environmental Laboratory 1987).

    a. Predominance of hydrophytic vegetation. More than 50 percent of the dominant plant species must be hydrophytic at each sampling location.
    b. Presence of hydric soils. Hydric soil characteristics should be present, or conditions favorable for hydric soil formation should persist. Favorable conditions include inundation or saturation to within 12 inches of the surface.
    c. Presence of wetland hydrology. The planned wetlands must be inundated at average depths less than 6.6 feet or have soils that are saturated to the surface for at least 14 consecutive days of the growing season in at least 5 of 10 years on average.
    d. Stream Performance standards shall examine design criteria based on measured relationship to the current position of the bank toe or top of bank, which will show any erosion or deposition. Evaluation of toe undercutting, lateral bank movement, and overall rock structure stability. The stabilization will be determined successful if the rock structures remain functionally in place following high flow events, and the bank line does not move beyond what would reasonably be expected for normal stream dynamics and morphology. To assess the performance of the grade control structures, a channel cross section will be taken at each photo station, when stream conditions allow.

2. The Bank Site area should meet the standards for vegetative cover and floristic composition, and hydrology outlined in the Table below.

Table 4.3 - Performance Standards for Forested Wetlands

Target	1-3-year performance standards	3-7 (further) -year performance standards
Vegetative Success for Wetland Mitigation Area	At least 75% of the vegetative cover consists of native hydrophytic vegetation suitable for the proposed areas water regime and site potential. No single occurrence of invasive species shall exceed 0.25 contiguous acre in area even if the overall abundance of invasive species is less than 25%.	At least 75% of the vegetative cover consists of native hydrophytic vegetation suitable for the proposed areas water regime and site potential. Minimum of 10 hydrophytic plant species per acre. In addition, no single occurrence of invasive species shall exceed 0.10 contiguous acre in area even if the overall abundance of invasive species is less than 10%.
In Stream Channel	Monitoring will include the establishment of fixed photo stations (pins) along the bank based on reaches designed (2 per reach). These pins will be measured in relationship to the current position of the bank toe or top of bank, which will show any erosion or deposition. Monitoring reports will note the presence of toe undercutting, lateral bank movement, and overall rock structure stability. Due to the method of stabilization and the existing bank conditions, some changes in bank conditions may continue to occur as the bank establishes a stable slope. The stabilization will be determined successful if the rock structures remain functionally in place following high flow events, and the bank line does not move beyond what would reasonably be expected for normal stream dynamics and morphology. To assess the performance of the grade control structures, a channel cross section will be taken at each photo station, when stream conditions allow, to monitor any changes in the shape of the stream channel.	Performance for the stream structures will be evaluated by the stability of the structures. Sites deemed not to create any instability for the stream channel shall the considered to meet performance standards for stream stability. A Qualitative Habitat Evaluation Index will be utilized to determine overall ecologic lift for the in stream reaches. The QHEI will be performed every year and be compared to the baseline QHEI for the project. The QHEI will be the main criteria for ecological performance. A macroinvertebrates analysis may be conducted for each project, a baseline and at year 4 analysis can be evaluated for overall lift of macroinvertebrates.
Wetland Hydrology	No more than 5% of the wetland shall consist of a contiguous "unvegetated open water" area measured no later than September 15th of each monitoring year.	
Woody Plantings	75% Survivability of the planted species for each year after initial planting. Minimum of 109 woody stems/acre consisting of 5 or more woody species per acre (Up to 20% natural recruitment is acceptable to meet the stems per acre metric). A modified FQI survey will be performed to identify diversity. The same protocol utilized in Section on Baseline Information.	
RIAM	Between years five to seven, verify if pre-project assessment in Base Information meets post project ranking as determined by best professional judgment.	

PLANTING PERFORMANCE STANDARDS

The following performance assumes near normal behavior of those conditions generally affecting plant establishment and growth. For example, below normal precipitation may delay performance by vegetation.

A. YEAR 1 (determine around November)
35% cover of hydrophytic vegetation
5% cover of woody species
20% of planted forb and species should be found
80% of RPM woody species planted are alive

B: YEAR 2 (determined around November)
50% cover of hydrophytic vegetation
5% cover of woody species
20% of planted forb and species should be found
75% of RPM woody species planted are alive

C: YEAR 3-4 (determine around November)
50% cover of hydrophytic vegetation
10% cover of woody native species
50% of species of planted forbs should be found
75% survival of RPM woody species planted

D: Year 5 – 7 (determine around November) - 75% of the total plant cover within wetlands for which bank credit is sought shall be dominated by species designated obligate wetland or facultative wetland in order to assure the dominant presence are truly wetland species.

E: Planting Performance Year 5 -7
75% survival of RPM woody species planted
75% of relative cover is composed of hydrophytic vegetation
Minimum of 10 hydrophytic plant species per acre
A minimum of 110 woody stems/acre consisting of 5 or more woody plant species.
Stream Performance criteria at year 5 as listed above.

F: The use of hydric soils and their associated seed banks will be expected to produce a variety of volunteer native species, both obligate and facultative, which may or may not have been planted but which will be considered as acceptable cover and species in determining compliance with all of the aforesaid performance criterion.

G: On site RIAM will be conducted to determine if as assessed at pre project by best professional judgment.

Where inspected landscape work does not comply with the requirements, replace rejected work and continue specified maintenance until re-inspected by the Wetlands Forever, Inc. Environmental Scientist and found to be acceptable.

Wildlife monitoring - Observations during spring, summer and fall to determine wildlife migration and breeding seasons, nesting, brood-rearing and migratory and/or resident wildlife recruitment over winter.

4.9 Monitoring Requirements

This section describes the parameters to be monitored and monitoring methods and procedures to determine if the Bank Site is on track to meet performance standards or if adaptive management is needed.

A seven-year monitoring program will be initiated after installation of the planting material for all Bank Sites and for each phase of construction. The Sponsor or their assigned Environmental Scientist shall conduct all monitoring.

Monitoring and data collection will be conducted annually during the first year. The monitoring will be repeated annually through year 7. Monitoring Reports will be written by the Wetlands Forever, Inc. Representative, Environmental Scientist and provided to Corps of Engineers to document all monitoring events in accordance with Regulatory Guidance Letter 06-3. The reports shall provide a description of site assessment, results, and recommendations. Monitoring Report summaries will be prepared and submitted to the Corps of Engineers by December 31 of each scheduled year following the issuance of the mitigation banking instrument. The monitoring will continue for a minimum of seven calendar years after planting is completed.

The following information shall be collected during each monitoring event:

- General ecological condition of the wetland;
- Percent of surviving planted RPM woody species;
- Height and diameter at breast height (dbh) of the trees [10 percent of the total planted.];
- Estimated percent cover of emergent and woody species;
- Hydrologic indicators – depth of inundation, primary and secondary indicators;
- Photographs at four pre-determined locations (locations and view direction are to be marked in the field for consistency at repeat visits, Reference Figure 10.2);
- Wildlife observed; and
- Wetland Data Form (vegetation, hydrology, soils, and comments).

The goals of the monitoring plan are to identify and document wetland functions at the site, specifically the vegetation, hydrology and soil characteristics. A WFI-B Representative, Environmental Scientist shall

monitor the site for the entire seven-year monitoring plan per phase. The WFI-B Representative, Environmental Scientist shall conduct the following monitoring actions:

- Random and transect based meander search for each class at every site.
- The transect meander search will follow defined transects that intersect specific wetland classes on the site.
- The random meander search will seek to quantify wetland classes on the site.
- The transect meander will be performed as a baseline, verification of hydrology and final meander search.
- The random meander search will be performed during regular monitoring events as identified in this Section.
- The random search shall be conducted in October - November of each year. The samples will be randomly taken at approximately 200 feet intervals for classes that were seeded and/or planted.
- The Corps of Engineers Wetland Delineation Manual of 1987 will be used as the standard for this transect sampling.
- Hydrology monitoring will utilize a "Water Level Monitoring" device identified as a Telog WLS-31 for a period of 2-3 years until hydrology confirmation is approved.
- The number of devices utilized will be outlined in each Bank Site plan, typically one in an unchanged area of the mitigation site and another within the modified hydrology zone to document duration and depth modifications.
- In stream channel monitoring will include the Monitoring in fixed photo stations (pins) based on reaches along the bank, based on 2 per reach. These pins will be measured in relationship to the current position of the bank toe or top of bank, which will show any erosion or deposition.
- Monitoring reports will note the presence of toe undercutting, lateral bank movement, and overall rock structure stability. Due to the method of stabilization and the existing bank conditions, some changes in bank conditions may continue to occur as the bank establishes a stable slope.
- The stabilization will be determined successful if the rock structures remain functionally in place following high flow events, and the bank line does not move beyond what would reasonably be expected for normal stream dynamics and morphology.
- Visual Monitoring Worksheet will be utilized for all in stream structures to determine stability, See Little Muddy reference example provided below.

- The Visual Monitoring Worksheet will examine structures and determine if the stream bank has experienced any stream dynamics from an erosional and depositional perspective. It will examine stability of the structure regarding cross sectional area and undercutting of the toes of the structures.

- Subsequently, any in stability will be outlined and addressed in the actions section of the worksheet.

- A macro-invertebrate survey may be performed to identify a baseline condition. A subsequent macro-invertebrate survey may be performed in Year 4 to evaluate any possible ecologic lift associated from in-stream features.

- Compliance inspection by the MBRT may be conducted every year upon their request.

- Inspections shall be conducted to assess compliance with long-term performance standards as outlined in the Performance Section above.

Visual Monitoring Worksheet- Example

Little Muddy Wetland and Stream Mitigation Bank - Addendum 1							
In Stream Restoration - Visual Monitoring Worksheet							
Reach 1 - 11 structures	**Photo**	**Bank**	**Bank**	**In Stream**	**In Stream**	**Stable Structure**	**Actions**
Description of Structure		**Erosion**	**Deposition**	**Erosion**	**Deposition**		
Chevron 1-1							
Chevron 1-2							
Boulder Weir 1-1							
Chevron 1-3							
Stream Barb 1-1 ***							
Chevron 1-4							
Boulder Weir 1-2							
Chevron 1-5							
Stream Barb 1-2							
Chevron 1-6							
Riffle 1 ***							
Reach 2 - 9 structures	**Photo**	**Bank**	**Bank**	**In Stream**	**In Stream**	**Stable Structure**	**Actions**
Description of Structure		**Erosion**	**Deposition**	**Erosion**	**Deposition**		
Stream Barb 2-1							
Chevron 2-1							
Chevron 2-2 ***							
Boulder Weir 2-1							
Chevron 2-3							
Chevron 2-4							
Chevron 2-5							
Chevron 2-6 ***							
Chevron 2-7							
Reach 3 - 3 structures	**Photo**	**Bank**	**Bank**	**In Stream**	**In Stream**	**Stable Structure**	**Actions**
Description of Structure		**Erosion**	**Deposition**	**Erosion**	**Deposition**		
Stream Barb 3-1							
Stone Toe Protection							
Riffle 2 ***							
Reach 4 - 21 structures	**Photo**	**Bank**	**Bank**	**In Stream**	**In Stream**	**Stable Structure**	**Actions**
Description of Structure		**Erosion**	**Deposition**	**Erosion**	**Deposition**		
Boulder Weir 4-1							
Boulder Weir 4-2							
Boulder Weir 4-3							
Root Wad 4-1							
Root Wad 4-2							
Boulder Weir 4-4							
Boulder Weir 4-5							
J-Hook 4-1 ***							
Stream Barb 4-1							
J-Hook 4-2							
Bendway Weir 4-1							
Bendway Weir 4-2							
Bendway Weir 4-3							
Bendway Weir 4-4							
Bendway Weir 4-5							
Bendway Weir 4-6 ***							
Bendway Weir 4-7							
Root Wad 4-3							
Root Wad 4-4							
Root Wad 4-5							
Riffle 3 ***							
8 Established Monitoring Site	***						
will have additional monitoring							

4.10 Long Term Management

This section describes how the Bank Site will be managed after performance standards have been met and achieved, to ensure the long-term sustainability of the Bank Site. The mitigation site will have a long-term management plan that focuses on the survival and success of the wetlands being restored. Long-term management will be implemented after the performance standards are met.

Heartland Conservancy has been identified as the primary long-term manager/steward. In the event that is not possible, WFI-B will utilize another reputable third-party non-profit organization.

STRUCTURE OF LONG-TERM FINANCING

The goal of Long-term Management is to secure the site in perpetuity for both physical and financial stability. Long-term financing for HeartLands Conservancy's services will be outlined in each chosen WFI-B UMBI Bank Site. The method for securing the financial stability will be handled through the creation of endowment.

PROVISIONS FOR LONG-TERM MANAGEMENT AND MAINTENANCE LONG-TERM CARE

The Bank Site has been designed to be self-sustaining to the largest extent possible, therefore, long-term care is deemed to be minimal once the project has met the specified performance standards. However, a management and maintenance plan is located in the Bank Site Appendix to address the management requirements of the project.

4.11 Adaptative Management Plan

During the mitigation bank progress to completion there may be a time when the bank cannot be constructed in accordance with mitigation plan. When this is discovered the Sponsor will notify the Corps immediately and provide an alternative to the activity for approval. Remedial measures will be based on information contained in the monitoring reports (i.e. the attainment of prescribed Performance Standards) and site inspection by the COE and/or MBRT.

Performance standards are established to show that the compensatory mitigation bank is providing ecological benefits as it was planned and intended. However, due to unforeseen circumstances either caused by construction or environmental factors these performance standards may not be met. The sponsor will act immediately once this deficiency is identified and notify the Corps. The sponsor will work with the Corps to rectify the deficiency and determine if the ecological benefits will still be met.

Some of the measures that will be considered to rectify the deficiencies may include site modifications, design changes, altering construction techniques and revising maintenance requirements. These changes will be reviewed by the Corps to ensure they meet the original goals for aquatic resource functions as outlined in the mitigation plan.

Where measures have been taken to overcome deficiencies and management strategies have changed it may be necessary to revise the performance standards. Only will the performance standards be revised if it is agreed that the changes are comparable or exceed the original goals for the aquatic resource functions as outlined in the mitigation plan.

4.12 Financial Assurances

STRUCTURE OF ASSURANCE

The mitigation site will have a plan of financial assurances and long-term management that focuses on the survival and success of the forested wetlands being restored. Financial Assurances will support the project during construction and monitoring while long term management will be implemented after the performance standards are met.

CONSTRUCTION FINANCIAL ASSURANCES

The Sponsor agrees to provide the following financial assurances for the work described in the Banking Instrument. The following items will be addressed in the Section:

- The Sponsor will coordinate a sum of dollars based on the BSP to be termed Contingency Funds to be used by a third party to be approved by the COE in the event that the Sponsor fails to comply with the terms of the Banking Agreement to rectify any unforeseen events as determined by the MBRT.
- Said sum of dollars shall consist of an Irrevocable Standby Letter of Credit.
- The Letter of Credit shall be in force for a minimum of five years. (The five-year term coincides with a Section of the BSP.)
- The Letter of Credit can be reduced after two-year performances standards are met in coordination with the MBRT.
- The financial assurances may be phased-out or reduced, once it has been demonstrated that the bank is increasing in functionality and/or self-sustaining (in accordance with performance standards).
- The Sponsor may utilize multiple forms of financial assurance on different BS, including but not limited to, letters of credit and insurance products.

STRUCTURE OF LONG-TERM FINANCING ENDOWMENT

Heartlands Conservancy has been identified as the primary long-term manager/steward. Long-term financing for HeartLands Conservancy's services are referenced below and will be provided as part of each BS:

- An Endowment will be established along with Financial Assurances component of the project;
- The Total Endowment funding for each BS will outlined in the BSP for a specified amount and rate of return which generates an estimated return over 10 years.

- WFI-B recommends a stepped funding strategy for this project's Endowment. The strategy will consist of two major activities:
  - A Fixed Annual Payment, and
  - A Final Endowment Funding at Project Close-Out;

- Fixed Annual Payments in the amount of $X,XXX per year
  - Timing of Annual Payment: within 90 days of beginning of calendar year for prior calendar year (example: annual payment for 2023 to be made by end of March 2024).

- Final Endowment Funding action to fund the remainder of Endowment;
  - Timing of Final Endowment: Project Close-Out:
    - Amount: equal to an amount to bring the endowment to a total of the coordinated amount in the BSP.
    - Total Endowment Funding from the BSP, less sum of Fixed Annual Payments, less sum of interest earned
    - Shall not exceed a maximum of Total Endowment Funding of the BSP less sum of Fixed Annual Payments

- Total Endowment funding identified in the BSP at time of Project Close-Out: $XX,XXX;

- WFI-B will typically fund a TSI/Pruning Management action at Close-out; and

- An endowment in the amount of said dollars based on the BSP will be completely funded to an interest accruing account at Project Close-out of mitigation project. Based upon financing and anticipated forested management action, the non-diminishing endowment will have financial stability in perpetuity.

PROVISIONS FOR LONG-TERM MANAGEMENT AND MAINTENANCE LONG-TERM CARE

The site has been designed to be self-sustaining, therefore, long-term care is deemed to be minimal once the project has met the specified performance standards. However, a management and maintenance plan will be established as part of site development to address the minimal management requirements of the project.

4.13 Credit Release Schedule

This section describes the credit release schedule, which is tied to achievement of specific milestones.

Generally, below is the credit release schedule for wetland credits at each Bank Site. It can be changed at the discretion of the MBRT after reviewing Bank success and complexity of establishment.

1. Upon Bank Establishment (USACE signing of the Banking Instrument, recording of an MBRT-approved Conservation Easement, confirmation of LTMF account establishment, and acceptable financial assurances as described in the BI), 15% of anticipated credits will be made available for sale.

2. Upon Bank Establishment, USACE approval of as-built drawings (for all construction, structures, and complete seeding of approved species) and confirmation of the use of the Long-term Management Fund (LTFM) from the Account holder, an additional 25 percent (cumulative total of 40 percent) of anticipated credits will be made available for sale.

3. Upon Bank Establishment, USACE approval of as-built drawings, confirmation of the establishment of the LTMF and USACE-approved documentation indicating the presence of wetland hydrology (including full supporting monitoring well data and delineations completed according to the 1987 Manual and its Supplement) for at least one year, an additional 15 percent of anticipated credits (cumulative total of 55 percent) will be made available for sale.

4. For each following year (beyond the first year that wetland hydrology was documented and approved) when vegetation and hydrology performance standards are met and approved in writing by the USACE, up to 15 percent of anticipated credits will be approved for sale if unsold, successfully restored credits are present.

5. After one year has passed from the date of the first credit sale, if wetland hydrology is not present in the majority of years, native plant communities are not developing or if any performance standards are not met, additional coordination will be necessary.

4.14 Default and Closure Provisions

A. Default Provisions

1. If the Corps determines that a Bank Site is not meeting performance standards or complying with the terms of the instrument, appropriate action will be taken. Such actions may include, but are not limited to, suspending credit sales, adaptive management, decreasing available credits, utilizing financial assurances, and/or terminating the Bank Site specific instrument.

B. Bank Closure Plans

1. A Bank Closure Report (Close-out Report) will be provided upon completion or termination of operation of the Bank Site. The report will include aquatic resource delineation and Cowardin Classification of each identified resource, pre-construction and current aerial photography, expected land use and management of the site, a finalized credit ledger, long-term management steward identification and ownership records. It is anticipated that the BS will be a self-sustaining system to the largest extent possible with little operation or maintenance required. The long-term management plan will be outlined and included within the Bank Site Close-out Report.

4.15 Force Majeure

In the event of a complete or partial mitigation area failure attributed to natural catastrophes, such as flood, fire, wind, drought, disease, regional pest infestation, etc., the permittee, The Bank Site or an approved third party, will contact the Corps to evaluate the physical and functional changes to the mitigation site. If such events occur before performance standards are met, the Sponsor, with consultation from the USACE and the MBRT, will determine the extent of site changes and follow the adaptive management plan outlined to either take corrective action or modify performance standards. The Sponsor or an approved third party,

will not be held responsible for natural catastrophes that may occur after the mitigation site has successfully met performance standards.

5.0 WFI-B UMBI ADMINISTRATIVE PROCESS

5.1 Validity, Modification, and Termination of UMBI

This WFI-B UMBI will become valid on the date of the signature of the designated representative of the Corps of Engineers, St. Louis District. Each Bank Site, when approved by the Corps, in consultation with the MBRT, will be executed as a modification of this WFI-B UMBI as provided for at 33 CFR 332.8[g]&[h]. In addition, any proposed modification to this WFI-B UMBI, including, but not limited to, additions of different types of mitigation credit resources (e.g. stream or wetland credits), or alteration of performance standards, may require review and amendment of the approved WFI-B UMBI, and will require use of the most current, approved mitigation banking procedures and protocols in use in Illinois at the time of modification. Should the Corps develop new guidance regarding mitigation banking in the future (for example, functional assessments), the Bank Sites developed prior to the change shall continue to operate using the original WFI-B UMBI and BSP provisions.

This WFI-B UMBI may only be amended or modified with the written approval of all signatory parties. In the event the Sponsor determines that modifications must be made to the WFI-B UMBI or a site-specific BSP to ensure successful establishment of a Bank Site, the Sponsor will submit a written request for such modification to the Corps for approval. The Corps, in consultation with the MBRT, agrees to not unreasonably withhold or delay such approval. Documentation of implemented modifications will be made consistent with this WFI-B UMBI.

Any of the MBRT members may terminate his/her participation upon written notification to all signatory parties without invalidating this WFI-B UMBI. Participation of the MBRT member seeking termination will end 30 days after such written notification.

This WFI-B UMBI and any associated BSP may be considered null and void by the Corps, in consultation with the MBRT, if the physical improvements identified in the mitigation plan have not been completed within five years of the last date of signature or approval. The Sponsor may reinitiate the process by submitting a new prospectus consistent with the latest Banking procedures and protocols in use in Illinois at the time the project is reinitiated.

5.2 Specific Language of the WFI-B UMBI Will Be Controlling

To the extent that specific language in this document changes, modifies, or deletes terms and conditions contained in those documents that are incorporated into the WFI-B UMBI by reference, the specific language within the WFI-B UMBI and any associated amendments to and modifications of the WFI-B UMBI will be controlling. However, if a conflict exists between the language of the WFI-B UMBI and an Addendum to the WFI-B UMBI governing a specific Bank Site, the language of the Addendum will be controlling.

5.3 Notice

Any notice required or permitted hereunder will be deemed to have been given (i) when delivered by hand, or (ii) when sent electronically, or (iii) three days following the date deposited in the United States mail, postage prepaid, by registered or certified mail, return receipt requested, or (iv) the day sent by Federal Express or similar next day nationwide delivery system, addressed as follows (or addressed in such other manner as the party being notified will have requested by written notice to the other party):

MBRT MEMBERS:

Tyson Zobrist – CHAIR
US Army Corps of Engineers
St. Louis District Regulatory Office
1222 Spruce Street
St. Louis, MO 63103

Matt Mangan
US Fish and Wildlife Service
Ecological Services Field Office
Crab Orchard Lake
Marion, IL 57501

Melanie Burdick
U.S. Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, IL 60604

Brad Hayes
Division of Real Estate Services and Consultation Office of Realty & Capital Planning
Illinois Department of Natural Resources
One Natural Resources Way
Springfield, IL 62702

SPONSOR:

WFI Holdings-B LLC
Chris Elliott, Principal
248 Southwoods Center
Columbia, IL 62236

5.4 Entire Agreement

The WFI-B Umbrella Agreement signed by the agencies and Bank Sponsor that are parties hereto, this Umbrella Mitigation Bank Instrument Prospectus, and any addenda and/or modifications to the Agreement or this WFI-B UMBI, constitute the entire agreement between the parties concerning the subject matter hereof and supersedes all prior agreements or undertakings.

5.5 Invalid Provisions

In the event any one or more of the provisions contained in this WFI-B UMBI are held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability will not affect any other provisions hereof, and this WFI-B UMBI will be construed as if such invalid, illegal or unenforceable provision had not been contained herein.

5.6 Binding

This WFI-B UMBI will be immediately, automatically, and irrevocably binding upon the Sponsor and its heirs, successors, assigns and legal representatives upon execution by the Sponsor and the Corps, even though it may not, at that time or in the future, be executed by the other potential parties to this WFI-B UMBI. The execution of this WFI-B UMBI by members of the MBRT will cause the executing agency to become a party to this WFI-B UMBI upon execution, even though all or any of the other potential parties have not signed the WFI-B UMBI. Execution does not signify the agencies' agreement with the use of credits from any Bank Site in connection with any specific permit or project.

5.7 Transfer of Mitigation Responsibility

In consideration of the Sponsor's agreement to be bound by the terms of this WFI-B UMBI and the Bank Sites established hereunder, the Corps and other MBRT agencies acknowledge that upon approval of a proposal by a Permittee to secure mitigation bank credits through a contract with Sponsor from an approved Bank Site under this WFI-B UMBI to satisfy all or part of the compensatory mitigation requirements for that Department of the Army and/or other agency permit.

Fully executed contract between the Sponsor and the Permittee, in concert with notification to the Corps of such agreement as detailed in Section 6.0. above, will act to transfer to the Sponsor all responsibility and liability for the required compensatory mitigation in accordance with the subject permit conditions, and Sponsor hereby accepts such transfer of responsibility and liability.

5.8 Transfer of Bank Site Ownership

Sponsor may transfer ownership of any Bank Site, and/or this WFI-B UMBI to a third party. In the event of such sale or transfer, this transfer provision of this WFI-B UMBI must be met in its entirety. The Sponsor will first notify the Corps prior to the transfer. The Sponsor and Transferee/new Owner will, prior to the transfer, participate in an orientation meeting with the Corps to establish a new Point of Contact and means of communication with the Transferee/new Owner. Once the transfer has been executed by the Sponsor, the Transferee/new Owner remains responsible for any and all Bank Sites and all applicable provisions of this approved WFI-B UMBI and any subsequent amendments and modifications.

6.0 WFI-B UMBRELLA AGREEMENT SIGNATURE PAGE

WFI-B UMBRELLA AGREEMENT

FOR THE ESTABLISHMENT AND OPERATION OF BANK SITES IN THE STATE OF ILLINOIS

This WFI-B Umbrella Agreement, entered into by WFI Holdings-B LLC and the U.S. Army Corps of Engineers (Corps), is for the purpose of establishing and operating mitigation Bank Sites ("Bank Sites") in the State of Illinois. Bank Sites will be used to mitigate for unavoidable wetland and stream impacts approved through the Corps, which is responsible for administering Section 404 of the Clean Water Act. The creation, operation, and use of this Umbrella Bank and the Bank Sites hereunder will be in accordance with the WFI-B Umbrella Mitigation Banking Instrument, dated_____, and enclosed.

The Mitigation Banking Review Team (MBRT) that provided technical support to the Corps includes the following agencies: U.S. Environmental Protection Agency (EPA); U.S. Fish and Wildlife Service (FWS); and Illinois Department of Natural Resources (IDNR); These agencies sign in support of the creation of this WFI-B Umbrella Mitigation Bank.

The goal of this WFI-B Umbrella Agreement, Umbrella Mitigation Banking Instrument Prospectus, and the component Bank Sites, is to compensate for impacts to waters of the United States, and more specifically special aquatic sites such as wetlands and streams. The objectives for each Bank Site are to produce, through restoration, enhancement and/or preservation, highly functional wetlands, along with creditable upland buffers and inclusions, as well as riverine habitat, which will be allocated compensatory mitigation credits in accordance with the provisions articulated in within this document.

The coverage area for this Umbrella Agreement will be the State of Illinois, and Bank Sites will be establish to provide compensatory mitigation credits within Geographic Service Areas as illustrated in Figure 2-Service Areas, which basins are based on the United States Geological Survey Hydrologic Unit Code watershed boundaries. A geographic service area will be defined for each Bank Site and will consist of one or more eight-digit HUC watersheds as approved by USACE, in consultation with the Interagency Review Team. At the discretion of the USACE, credits may be approved for use outside the geographic service areas on a case-by-case basis.

USACE approval of this Instrument constitutes the regulatory approval required for the Illinois Umbrella Bank to be used to provide compensatory mitigation for Department of the Army permits pursuant to 33 CFR 332.8(a)(1). This Instrument is not a contract between the Sponsor or Property Owners and USACE or any other agency of the state or federal government which may be signatory hereto. Any dispute arising under this Instrument will not give rise to any claim by the Sponsor or Property Owners for monetary damages. This provision is controlling notwithstanding any other provision or statement in the Instrument to the contrary.

Signatures

Date Signed: _____

Chris Elliott, Principal

WFI Holdings-B LLC

Date Signed: _____

Colonel Kevin R. Golinghorst, District Engineer

U.S. Army Corps of Engineers, St. Louis District

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Lower Illinois

Macoupin

The Sny

Peruque-Piasa

Cahokia-Joachim

Lower Kaskaskia

Upper Mississippi-Cape Girardeau

Cache

Shoal

Middle Kaskaskia

Upper Kaskaskia

Big Muddy

0 12.5 25 mi

SCALE 1"=25 mi

GENERAL NOTES/LEGEND

DIMENSIONS AND LOCATIONS ARE APPROXIMATE; ACTUAL MAY VARY. DRAWING SHALL NOT BE USED OUTSIDE THE CONTEXT OF THE REPORT FOR WHICH IT WAS GENERATED.

PROJECT NAME

UMBRELLA MITIGATION BANKING INSTRUMENT
VARIOUS COUNTIES, ILLINOIS

ILLINOIS WATERSHEDS IN THE SAINT LOUIS DISTRICT

N W E S

JOB NUMBER 2020-0311.30

DATE 11/2020

DRAWN BY RCV

CHECKED BY SEB

FIGURE 1

Lower Illinois

Macoupin

The Sny

Peruque-Piasa

Cahokia-Joachim

Lower Kaskaskia

Shoal

Upper Kaskaskia

Middle Kaskaskia

Big Muddy

Upper Mississippi-Cape Girardeau

Cache

Service Area A - Lower Illinois (HUC code 07130011) & Macoupin (07130012)

Service Area B - The Sny (07110004), Peruque-Piasa (07110009) & Cahokia-Joachim: (07140101)

Service Area C - Shoal (07140203) & Lower Kaskaskia (7140204)

Service Area D - Upper Kaskaskia (07140201) & Middle Kaskaskia (07140202)

Service Area E - Big Muddy (07140106)

Service Area F - Upper Mississippi-Cape Girardeau (07140105) & Cache (071401408)

0 12.5 25 mi

SCALE 1"=25 mi

GENERAL NOTES/LEGEND

DIMENSIONS AND LOCATIONS ARE APPROXIMATE; ACTUAL MAY VARY. DRAWING SHALL NOT BE USED OUTSIDE THE CONTEXT OF THE REPORT FOR WHICH IT WAS GENERATED.

PROJECT NAME

UMBRELLA MITIGATION BANKING INSTRUMENT
VARIOUS COUNTIES, ILLINOIS

PROPOSED SERVICE AREAS

N
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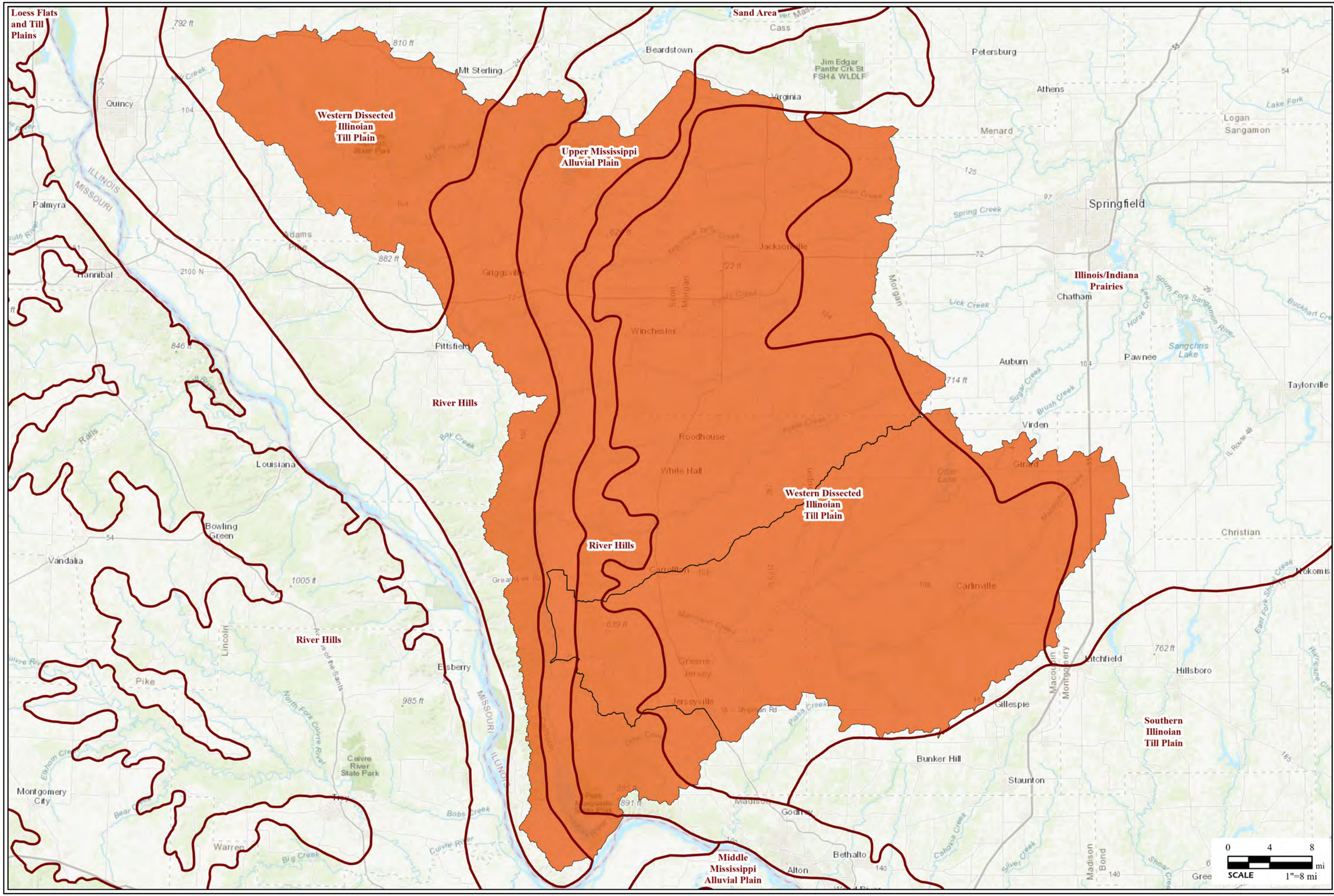
JOB NUMBER 2020-0311.30

DATE 10/2020

DRAWN BY RCV

CHECKED BY SEB

FIGURE 2



GENERAL NOTES/LEGEND

DIMENSIONS AND LOCATIONS ARE APPROXIMATE; ACTUAL MAY VARY. DRAWING SHALL NOT BE USED OUTSIDE THE CONTEXT OF THE REPORT FOR WHICH IT WAS GENERATED.

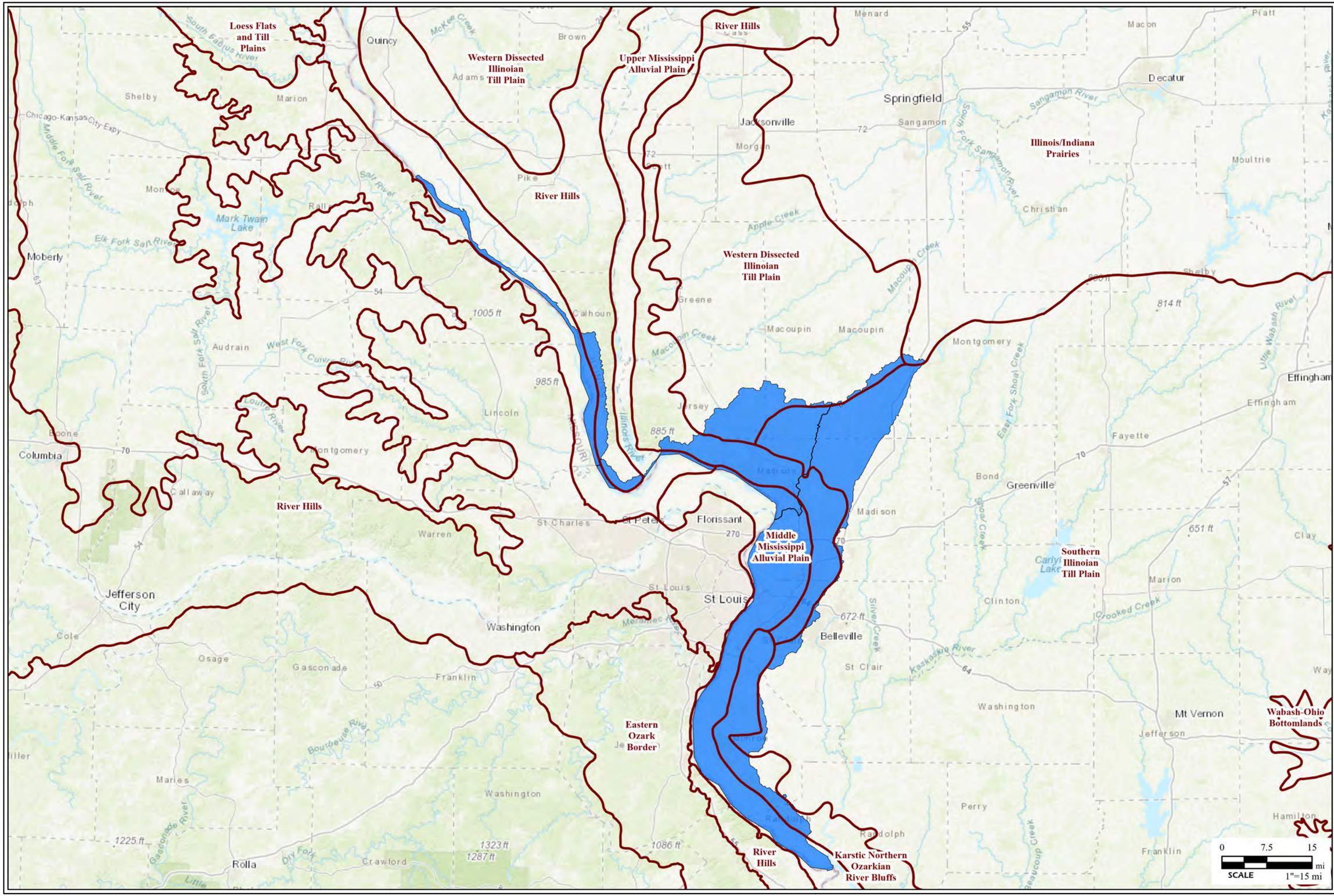
PROJECT NAME

UMBRELLA MITIGATION BANKING INSTRUMENT
VARIOUS COUNTIES, ILLINOIS

ECO REGIONS -
LOWER ILLINOIS & MACOUPIN

N
W E
S

JOB NUMBER	2020-0311.30
DATE	10/2020
DRAWN BY	RCV
CHECKED BY	SEB
FIGURE	3A



GENERAL NOTES/LEGEND

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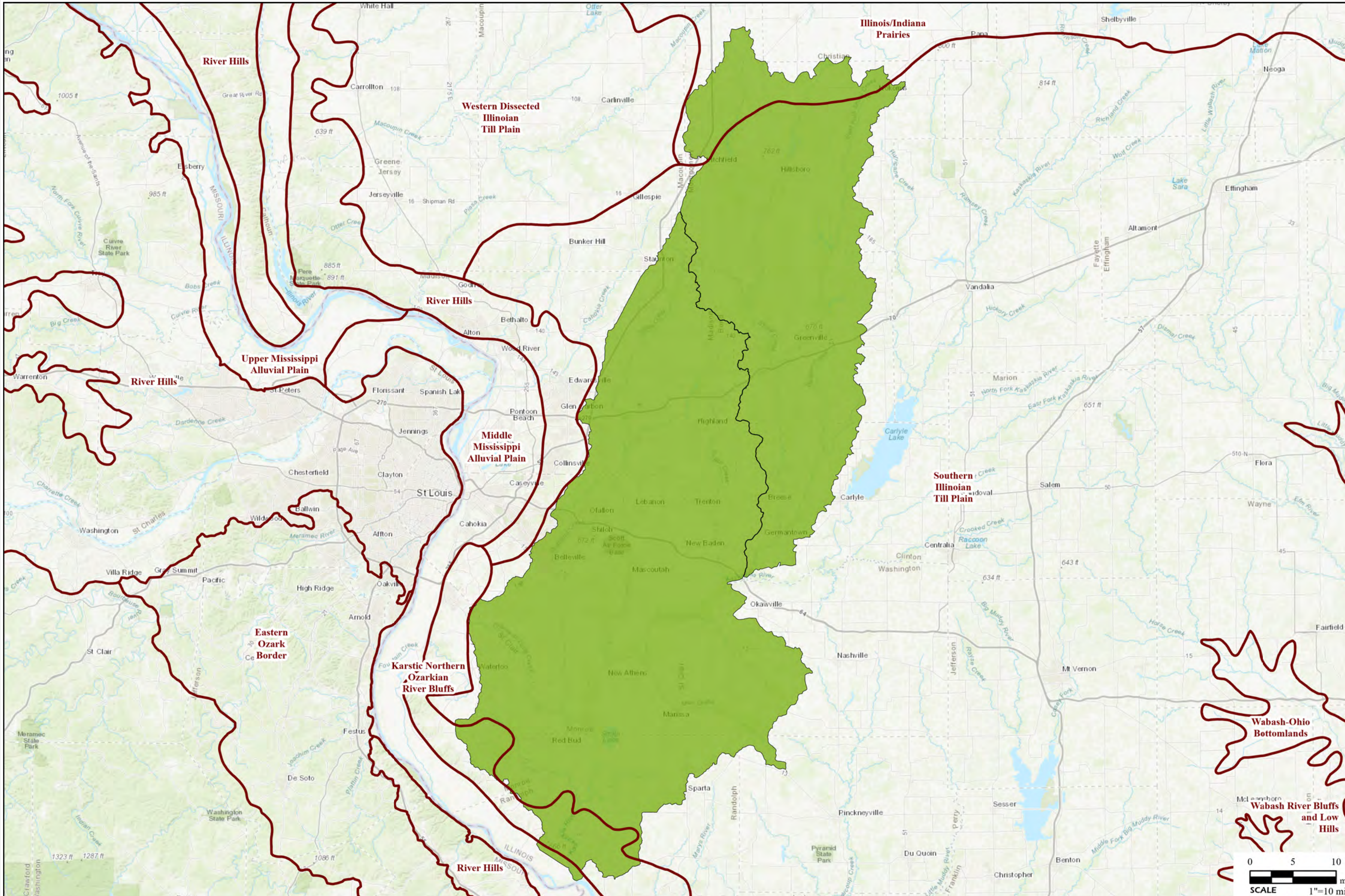
PROJECT NAME

UMBRELLA MITIGATION BANKING INSTRUMENT
VARIOUS COUNTIES, ILLINOIS

ECO REGIONS -
THE SNY, PERUQUE-PIASA & CAHOKIA-JOACHIM

N
W E
S

JOB NUMBER	2020-0311.30
DATE	10/2020
DRAWN BY	RCV
CHECKED BY	SEB
FIGURE	3B



GENERAL NOTES/LEGEND

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PROJECT NAME

UMBRELLA MITIGATION BANKING INSTRUMENT
VARIOUS COUNTIES, ILLINOIS

ECO REGIONS -
SHOAL & LOWER KASKASKIA

JOB NUMBER 2020-0311.30

DATE 10/2020

DRAWN BY RCV

CHECKED BY SEB

FIGURE 3C

Western Dissected Illinoian Till Plain

Sand Area

Upper Mississippi Alluvial Plain

River Hills

Western Dissected Illinoian Till Plain

River Hills

River Hills

Eastern Ozark Border

Karstic Northern Ozarkian River Bluffs

Illinois/Indiana Prairies

Southern Illinoian Till Plain

Middle Mississippi Alluvial Plain

Wabash River Bluffs and Low Hills

Glaciated Wabash Lowlands

Wabash River Bluffs and Low Hills

Wabash-Ohio Bottomlands

Mason
Lincoln
De Witt
Lake Clinton
Champaign
Danville
Fountain
Vermilion
Logan
Menard
Macon
Pratt
Cass
Brown
Springfield
Sangamon
Jacksonville
Morgan
Douglas
Edgar
Moultrie
Christian
Mattoon
Charleston
Terre Haute
Clay
Greene
Calhoun
Macoupin
Montgomery
Cumberland
Effingham
Jasper
Crawford
Sullivan
Jersey
Fayette
Bond
Greenville
Madison
Clinton
Clay
Richland
Lawrence
Knox
Daviess
Vincennes
Charles
St Peters
Florissant
St Louis
St Clair
Belleville
Wayne
Edwards
Wabash
Gibson
Pike
Washington
Mt Vernon
Jefferson
Monroe

0 7 14 mi
SCALE 1"=14 mi

GENERAL NOTES/LEGEND

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PROJECT NAME
UMBRELLA MITIGATION BANKING INSTRUMENT
VARIOUS COUNTIES, ILLINOIS

ECO REGIONS -
UPPER & MIDDLE KASKASKIA

N
W E
S

JOB NUMBER
2020-0311.30

DATE
10/2020

DRAWN BY
RCV

CHECKED BY
SEB

FIGURE
3D

River Hills
Belleville
Base
Mascoutah
Clinton
Washington
643 ft
Okawville
Kaskaskia River
Fairfield
Nashville
New Athens
St Clair
Mud Creek
Mt Vernon
Horse Creek
Marissa
Monroe
Red Bud
Smith Lake
Wabash River Bluffs and Low Hills
Skillet Fork
Southern Illinoian Till Plain
Sparta
Randolph
Pinckneyville
Sesser
McLeansboro
Hamilton
White
Du Quoin
Pyramid State Park
Benton
Christopher
Wabash River Bluffs and Low Hills
Karstic Northern Ozarkian River Bluffs
Chester
Jackson
Zeigler
West Frankfort
Saline
Eldorado
Wabash-Ohio Bottomlands
Middle Mississippi Alluvial Plain
Herrin
Carterville
Williamson
Harrisburg
Carbondale
Marion
Carrier Mills
Northern Shawnee Hills
Perryville
River Hills
Eastern Ozarkian Border
Crab Orchard Lake
Crab Orchard Nat'l Wildlife Refuge
Cedar Lake
Giant City State Park
Northern Shawnee Hills
Southern Ozarkian River Bluffs
Shawnee National Forest
Hardin
OZARK PLATEAU
0 3.5 7
SCALE 1"=7 mi

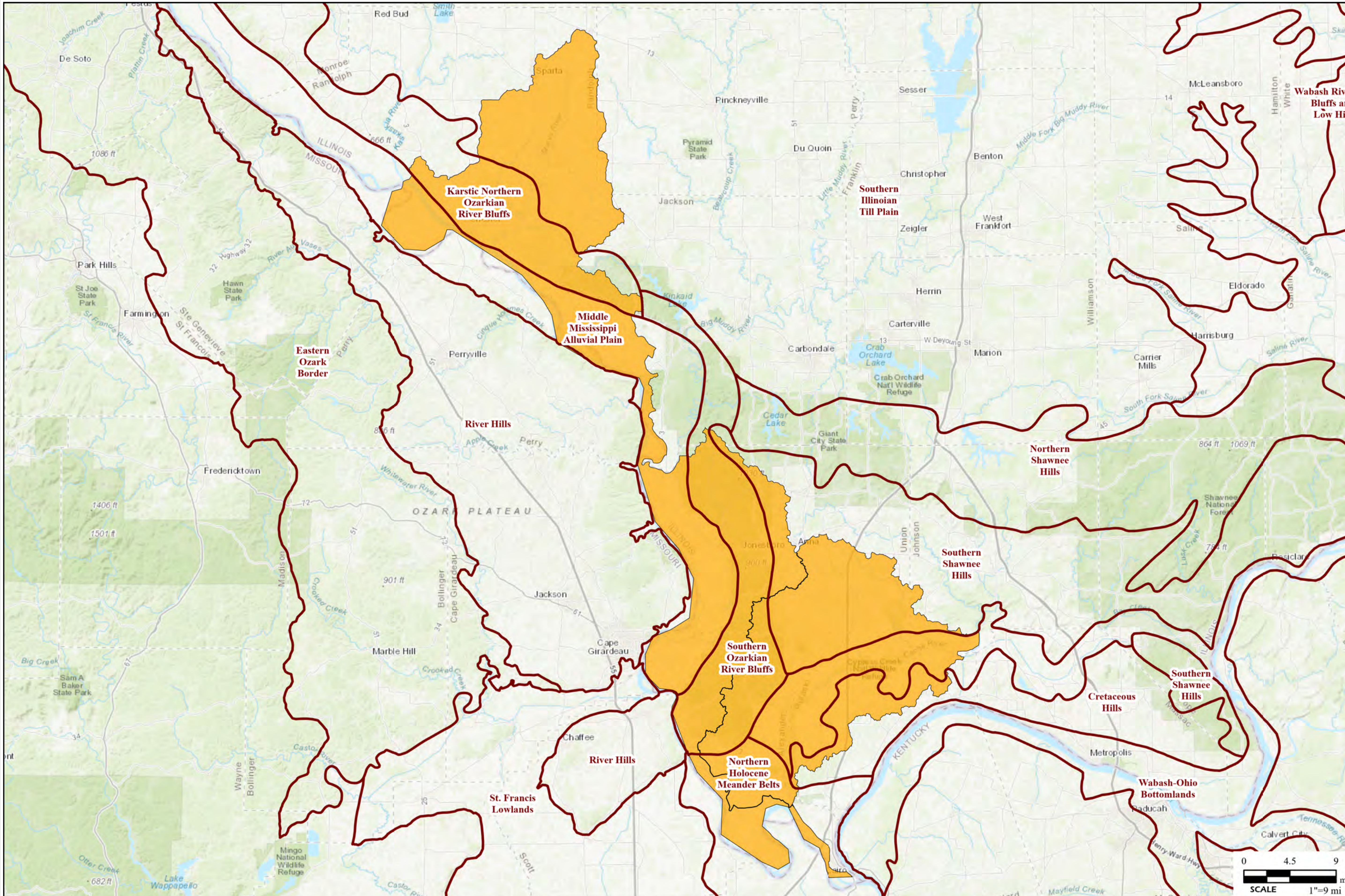
GENERAL NOTES/LEGEND

DIMENSIONS AND LOCATIONS ARE APPROXIMATE; ACTUAL MAY VARY. DRAWING SHALL NOT BE USED OUTSIDE THE CONTEXT OF THE REPORT FOR WHICH IT WAS GENERATED.

PROJECT NAME
UMBRELLA MITIGATION BANKING INSTRUMENT
VARIOUS COUNTIES, ILLINOIS

ECO REGIONS - BIG MUDDY

JOB NUMBER 2020-0311.30
DATE 10/2020
DRAWN BY RCV
CHECKED BY SEB
FIGURE 3E



SCI

DIMENSIONS AND LOCATIONS ARE APPROXIMATE; ACTUAL MAY VARY. DRAWING SHALL NOT BE USED OUTSIDE THE CONTEXT OF THE REPORT FOR WHICH IT WAS GENERATED.

GENERAL NOTES/LEGEND

PROJECT NAME

UMBRELLA MITIGATION BANKING INSTRUMENT
VARIOUS COUNTIES, ILLINOIS

ECO REGIONS -
UPPER MISSISSIPPI-CAPE GIRARDEAU & CACHE

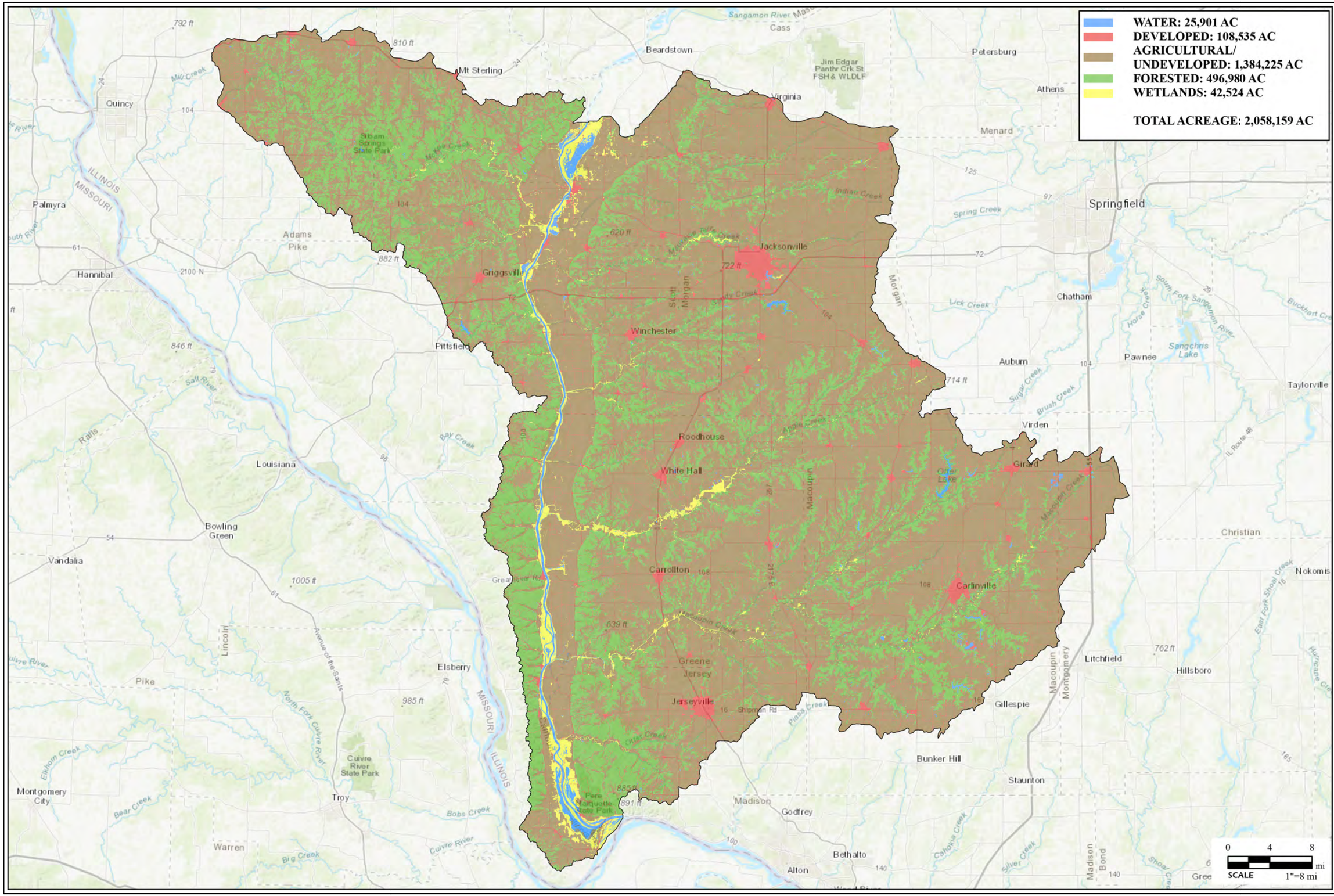
JOB NUMBER 2020-0311.30

DATE 10/2020

DRAWN BY RCV

CHECKED BY SEB

FIGURE 3F



GENERAL NOTES/LEGEND

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PROJECT NAME

UMBRELLA MITIGATION BANKING INSTRUMENT
VARIOUS COUNTIES, ILLINOIS

LAND USE/LAND COVER -
LOWER ILLINOIS & MACOUPIN

N
W E
S

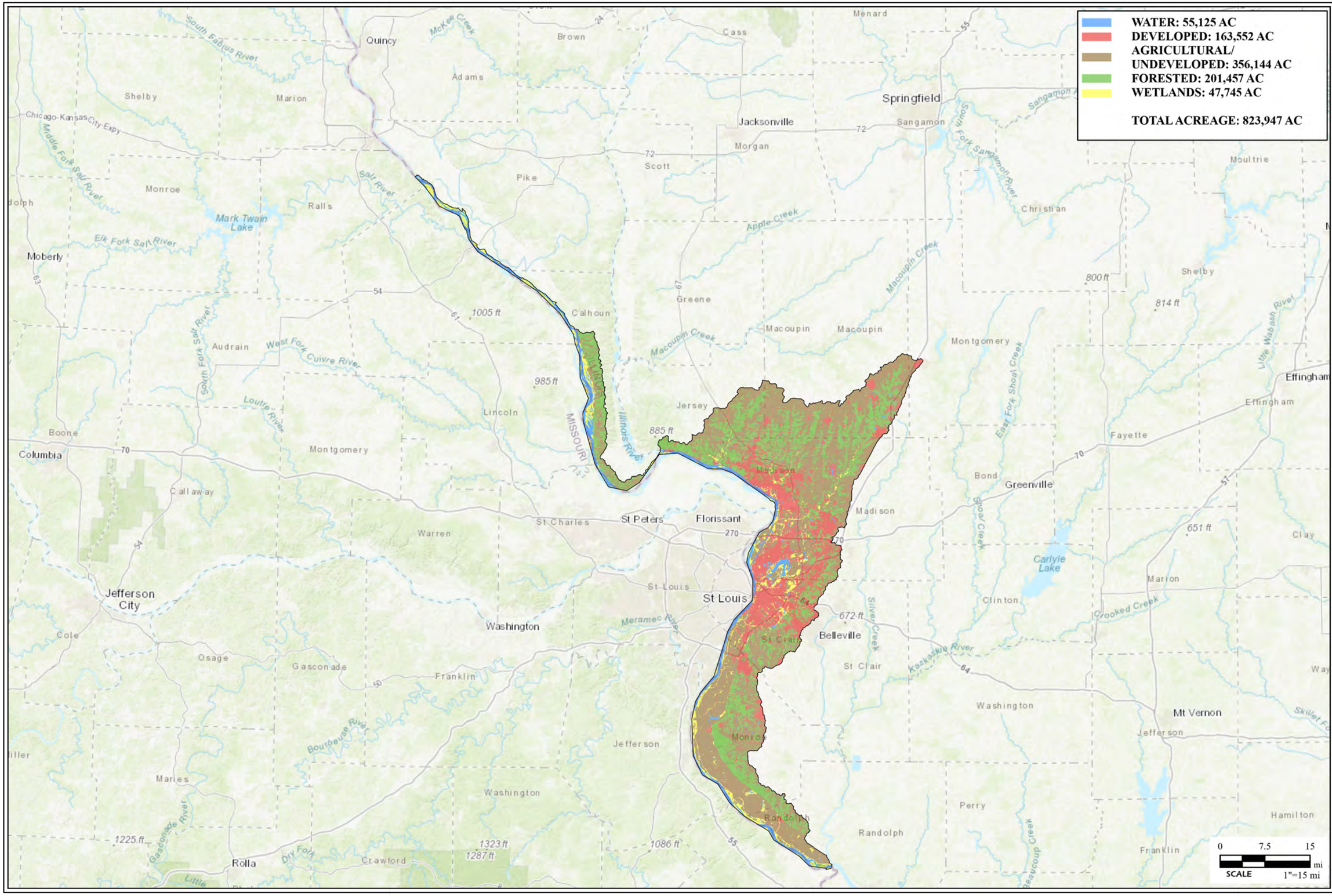
JOB NUMBER 2020-0311.30

DATE 10/2020

DRAWN BY RCV

CHECKED BY SEB

FIGURE 4A



GENERAL NOTES/LEGEND

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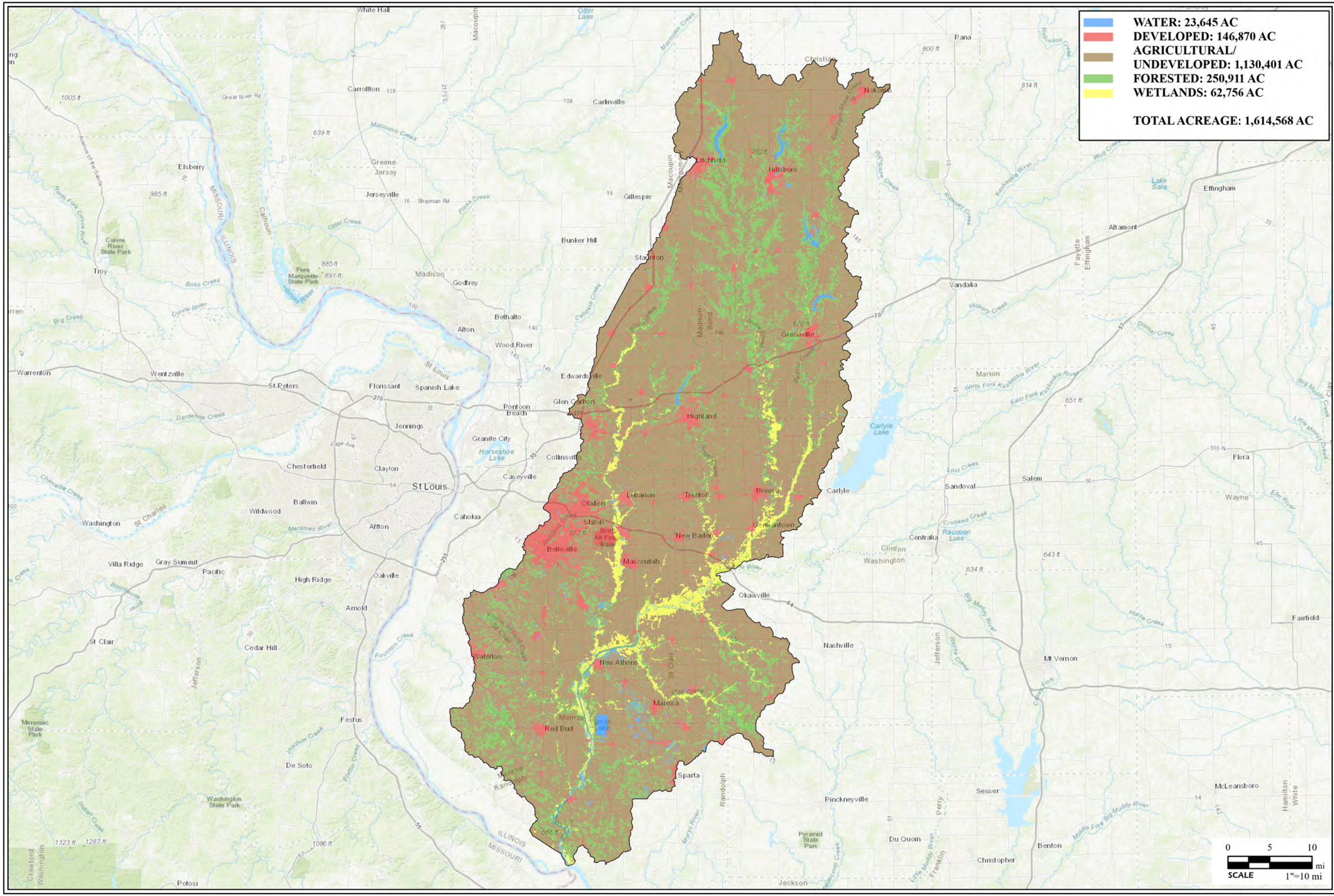
PROJECT NAME
UMBRELLA MITIGATION BANKING INSTRUMENT
VARIOUS COUNTIES, ILLINOIS

LAND USE/LAND COVER -
THE SNY, PERUQUE-PIASA & CAHOKIA-JOACHIM

N
W E
S

JOB NUMBER	2020-0311.30
DATE	10/2020
DRAWN BY	RCV
CHECKED BY	SEB
FIGURE	4B



GENERAL NOTES/LEGEND

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PROJECT NAME

UMBRELLA MITIGATION BANKING INSTRUMENT
VARIOUS COUNTIES, ILLINOIS

LAND USE/LAND COVER -
SHOAL & LOWER KASKASKIA

N
W E
S

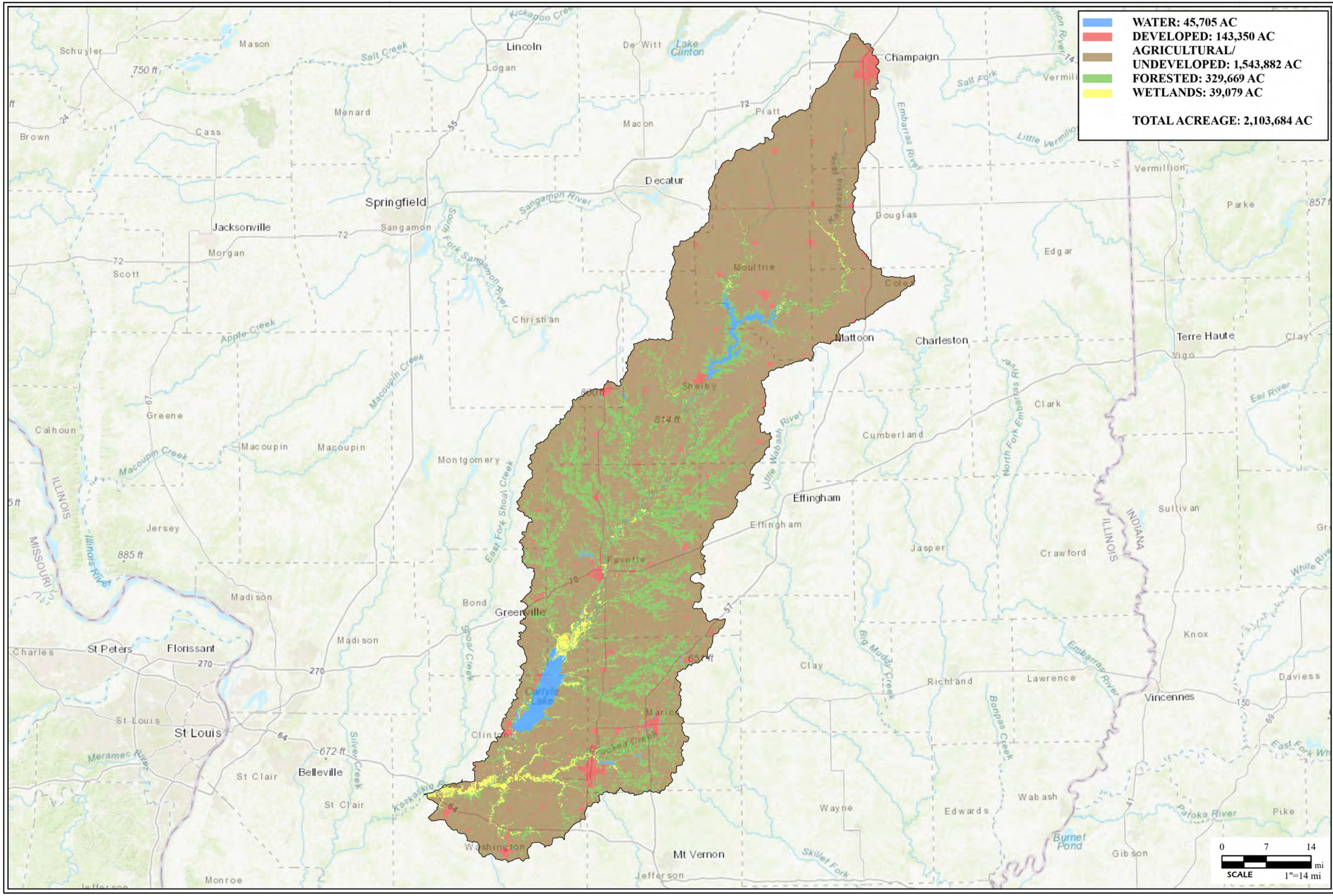
JOB NUMBER 2020-0311.30

DATE 10/2020

DRAWN BY RCV

CHECKED BY SEB

FIGURE 4C



GENERAL NOTES/LEGEND

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PROJECT NAME

UMBRELLA MITIGATION BANKING INSTRUMENT
VARIOUS COUNTIES, ILLINOIS

LAND USE/LAND COVER -
UPPER & MIDDLE KASKASKIA

JOB NUMBER
2020-0311.30

DATE
10/2020

DRAWN BY
RCV

CHECKED BY
SEB

FIGURE
4D

WATER: 58,752 AC
DEVELOPED: 133,959 AC
AGRICULTURAL/
UNDEVELOPED: 817,820 AC
FORESTED: 444,483 AC
WETLANDS: 71,755 AC

TOTAL ACREAGE: 1,526,793 AC

GENERAL NOTES/LEGEND

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PROJECT NAME

UMBRELLA MITIGATION BANKING INSTRUMENT
VARIOUS COUNTIES, ILLINOIS

LAND USE/LAND COVER -
BIG MUDDY

N
W E
S

SCALE 0 3.5 7 mi
1"=7 mi

JOB NUMBER	2020-0311.30
DATE	10/2020
DRAWN BY	RCV
CHECKED BY	SEB
FIGURE	4E

WATER: 31,374 AC
DEVELOPED: 36,315 AC
AGRICULTURAL/
UNDEVELOPED: 315,816 AC
FORESTED: 231,836 AC
WETLANDS: 57,924 AC

TOTAL ACREAGE: 673,275 AC

GENERAL NOTES/LEGEND

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PROJECT NAME

UMBRELLA MITIGATION BANKING INSTRUMENT
VARIOUS COUNTIES, ILLINOIS

LAND USE/LAND COVER -
UPPER MISSISSIPPI-CAPE GIRARDEAU & CACHE

0 4.5 9
SCALE 1"=9 mi

JOB NUMBER
2020-0311.30

DATE
10/2020

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RCV

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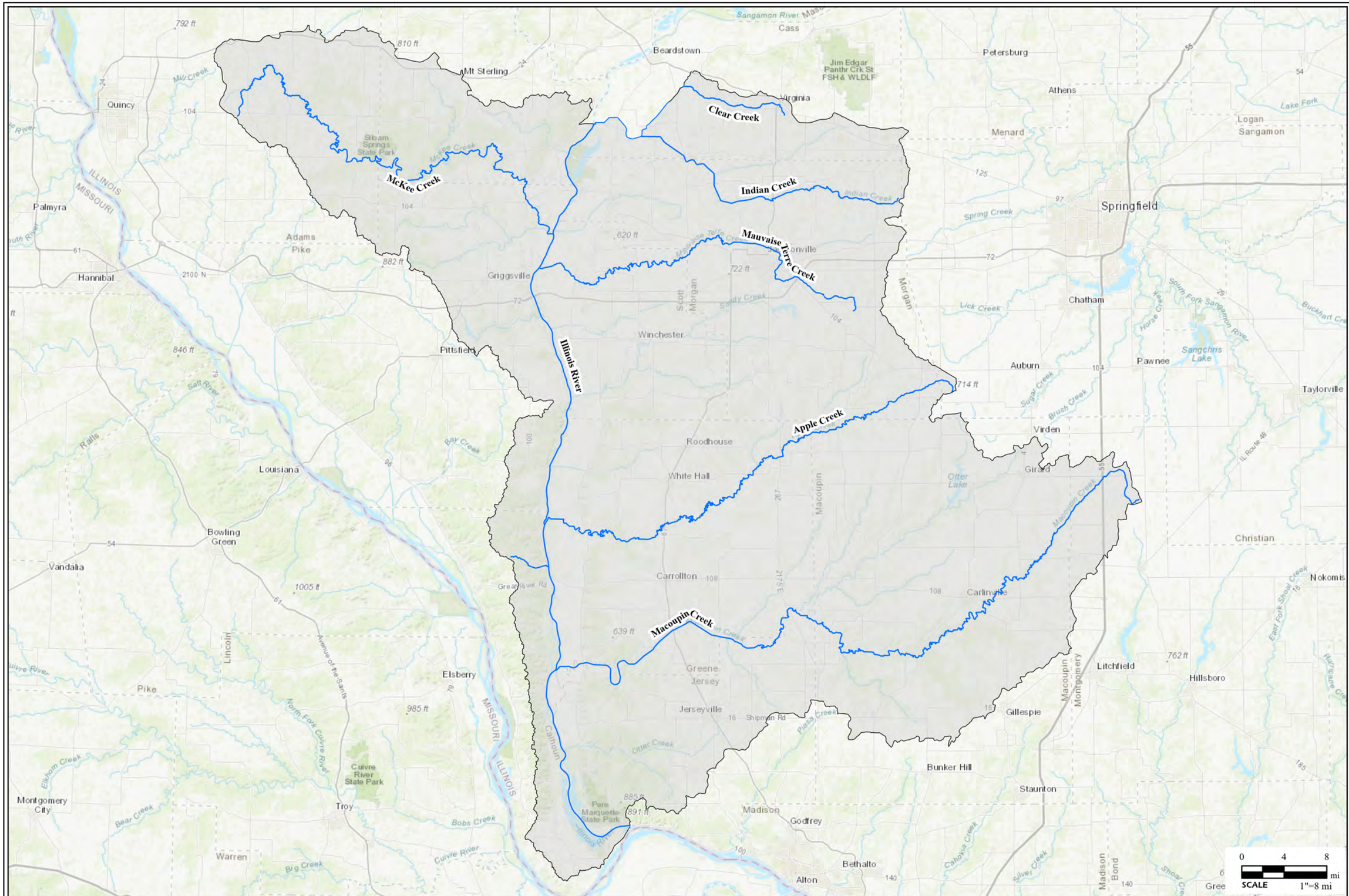
SEB

FIGURE
4F



GENERAL NOTES/LEGEND

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PROJECT NAME

UMBRELLA MITIGATION BANKING INSTRUMENT
VARIOUS COUNTIES, ILLINOIS

PRIMARY TRIBUTARIES-
LOWER ILLINOIS & MACOUPIN

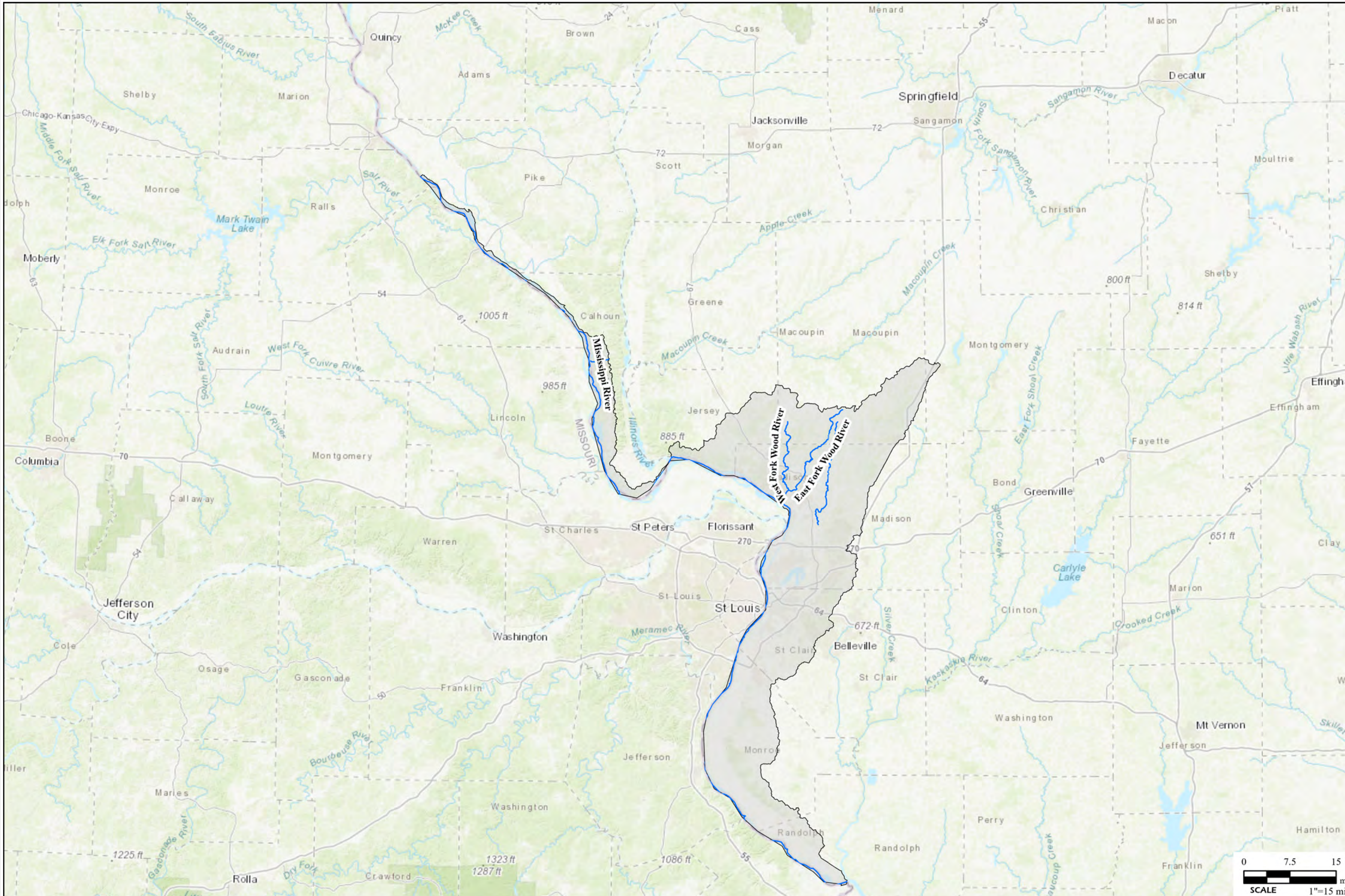
JOB NUMBER
2020-0311.30

DATE
10/2020

DRAWN BY
RCV

CHECKED BY
SEB

FIGURE
5A



GENERAL NOTES/LEGEND

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PROJECT NAME

UMBRELLA MITIGATION BANKING INSTRUMENT
VARIOUS COUNTIES, ILLINOIS

PRIMARY TRIBUTARIES-
THE SNY, PERUQUE-PIASA & CAHOKIA-JOACHIM

JOB NUMBER	2020-0311.30
DATE	10/2020
DRAWN BY	RCV
CHECKED BY	SEB
FIGURE	5B

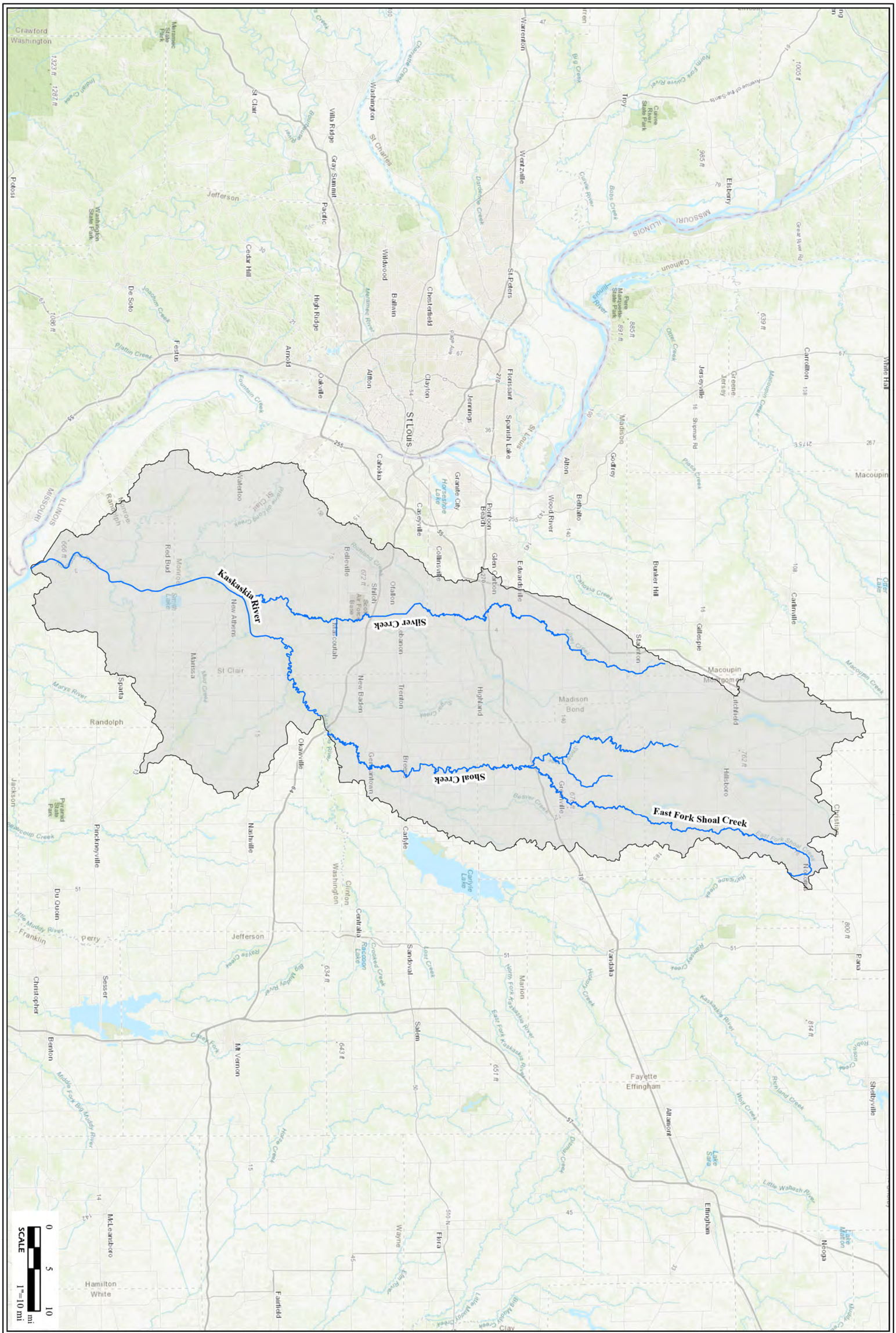

FIGURE	5C
CHECKED BY	SEB
DRAWN BY	RCV
DATE	10/2020
JOB NUMBER	2020-0311.30

PROJECT NAME

UMBRELLA MITIGATION BANKING INSTRUMENT
VARIOUS COUNTIES, ILLINOIS

PRIMARY TRIBUTARIES-
SHOAL & LOWER KASKASKIA

GENERAL NOTES/LEGEND

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West Okaw River

Kaskaskia River

North Fork East Fork Kaskaskia River

East Fork Kaskaskia River

0 7 14 mi

SCALE 1"=14 mi

GENERAL NOTES/LEGEND

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PROJECT NAME

UMBRELLA MITIGATION BANKING INSTRUMENT
VARIOUS COUNTIES, ILLINOIS

PRIMARY TRIBUTARIES-
UPPER & MIDDLE KASKASKIA

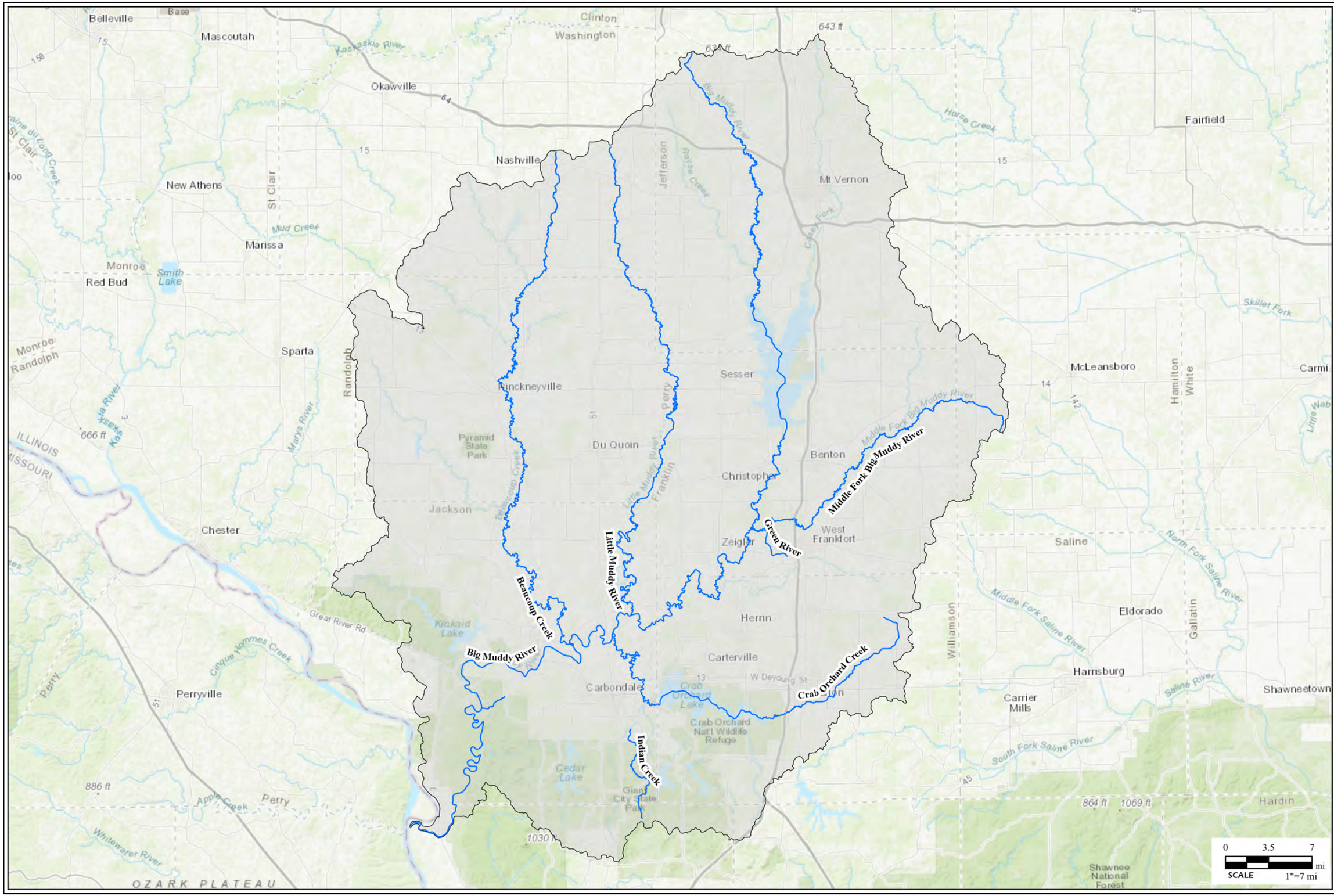
JOB NUMBER 2020-0311.30

DATE 10/2020

DRAWN BY RCV

CHECKED BY SEB

FIGURE 5D



GENERAL NOTES/LEGEND

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PROJECT NAME
UMBRELLA MITIGATION BANKING INSTRUMENT
VARIOUS COUNTIES, ILLINOIS

PRIMARY TRIBUTARIES-
BIG MUDDY

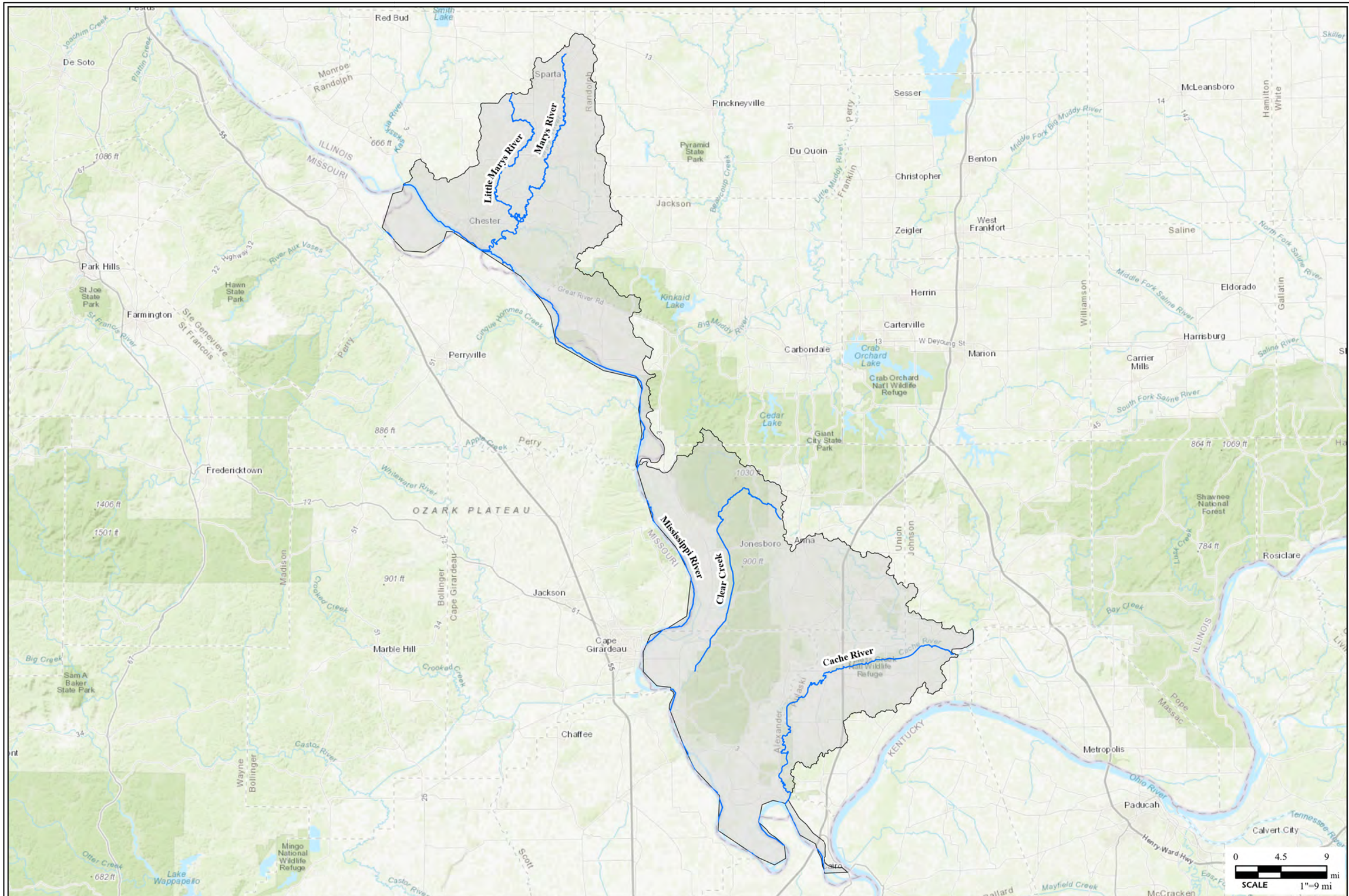
JOB NUMBER
2020-0311.30

DATE
10/2020

DRAWN BY
RCV

CHECKED BY
SEB

FIGURE
5E



GENERAL NOTES/LEGEND

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PROJECT NAME

UMBRELLA MITIGATION BANKING INSTRUMENT
VARIOUS COUNTIES, ILLINOIS

PRIMARY TRIBUTARIES-
UPPER MISSISSIPPI-CAPE GIRARDEAU & CACHE

JOB NUMBER 2020-0311.30

DATE 10/2020

DRAWN BY RCV

CHECKED BY SEB

FIGURE 5F