



HAMILTON CO.  INDIANAPOLIS

# Task One Inventory & Peer Research

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In this task, the team developed an understanding for existing context, current trends, planned projects, and jurisdiction/stakeholder priorities along the White River. The team evaluated previous and ongoing planning efforts to ensure this plan provides a comprehensive vision for the corridor.

The following pages detail our understanding of the current conditions and plans for the river.

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VISIT INDY  
RECONNECTING TO OUR WATERWAYS

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RATIO ARCHITECTS  
SHREWSBERRY

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# A Shared Asset

It is a time of growth and change for communities along the White River. While development in downtowns is accelerating and arts and cultural institutions are expanding their visions, the White River is the region's next frontier. Long invisible, the river is awakening from an extended period of underutilization and ecological degradation and transforming into an economic and community amenity. The river is a powerful, unifying and timeless flow. Reclaimed and enhanced, it can be a beacon of stewardship, a healthy contributor to the area's economy and a tool for the betterment of the lives of the region's residents.

The White River Vision Plan is a community driven process in Hamilton County and Indianapolis to develop a holistic vision and comprehensive plan that explores the enormous potential of our river to enhance regional vibrancy, ecological integrity, livability and economic vitality. The White River Vision Plan is a joint effort between the City of Indianapolis and Hamilton County Tourism, Inc. in partnership with Visit Indy's philanthropic arm, Tourism Tomorrow, Inc. to develop a coordinated regional plan, together with the community, to enhance 58 miles of the White River in Marion and Hamilton counties. The goal of the vision plan is to create an accessible, recreational, and cultural environment that encourages a unique sense of place for the community as a whole.





*The White River Vision Plan will promote:*

- Connected communities with access to the White River for residents and visitors — our two largest, most important audiences;
- Opportunities to experience nature and enhance the environmental value and ecological quality of the river corridor, including its water quality and natural habitats;
- New ways to get outdoors and visit attractions, arts and entertainment venues, hiking and biking trails, and neighborhoods;
- Places along the water that reveal history and contribute to our shared cultural heritage and legacy;
- The freedom to express our identity and highlight the diversity of our communities on the river and economic strength of our region; and
- A path forward that solidifies the role of the river in our everyday lives and stewards our future around this shared asset.



## Call to Action

The Indianapolis region is known for its abilities to set its collective sights on transformational change and rally together around a shared vision. The White River Vision Plan calls for both ambitious planning and a regional commitment to implementing change. Looking ahead, achieving these goals will require the following commitments:

### Cooperate Regionally

A river's environmental health and quality is a reflection of the community's commitment. Today for the White River, the picture is muddy. Water quality challenges and flood dynamics are just two of the critical problems that face the region – neither of which can be fully addressed at the local scale. Environmental challenges like these require watershed-scaled thinking and regional cooperation. The White River Vision Plan is the region's opportunity to move the dial on river health – bringing together the benefits and passions of ongoing initiatives (like Dig Indy) and partners (like the White River Alliance and Reconnecting to Our Waterways) under one unified vision and implementation roadmap.

### Shift the Mindset

In surveying the river's physical landscape and conversing with the community, one thing is abundantly clear: The river has been largely “invisible” in the daily life of residents for decades. Although connections between human health and river health are well-known to aware users and likely intuitive to even non-users, this interconnectedness is not yet resulting in positive interactions in day-to-day life. This planning process and its outcomes can unlock the river for the community, promoting more frequent visual, physical and symbolic engagement. Only when loved, remembered, and stewarded by the community can the river truly be reclaimed. A mindset shift is necessary.



## Ensure Future Competitiveness

While the region's recent decades have been marked by growth and economic prosperity, our research demonstrates that workforce aged population is actually declining. For the region to maintain economic competitiveness, it must offer an exceptionally high quality of life and be a desirable place for all, but particularly young professionals and families. The river is a character defining natural resource for the region; yet, it remains largely untapped for its recreational and cultural benefits. Opening the river to greater recreational use will also support attracting and retaining a strong workforce, enhance tourism, and improve quality of life for residents, workers and visitors alike.

## Take Strategic Advantage of Diversity

The White River Vision Plan's study area, multi-jurisdictional and reflective of many different physical and cultural conditions, offers an exceptionally broad canvas. From the rural north to suburban villages to the urban

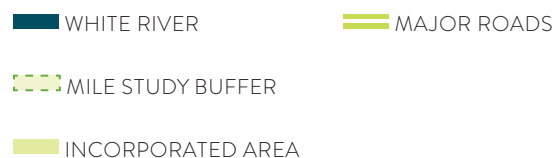
core to the industrial south, we have identified up to four typical cross sections, each with different opportunities and challenges, and a broad spectrum of passionately expressed and unique community perspectives. This diversity of place allows for an incredible range of experience and qualities – from quiet naturalized stretches to intensely programmed places. Seasonal change – of weather, of water flows, of color and light – extends this diversity into a seemingly endless palette of experience.

## Cultivate an Inclusive Vision

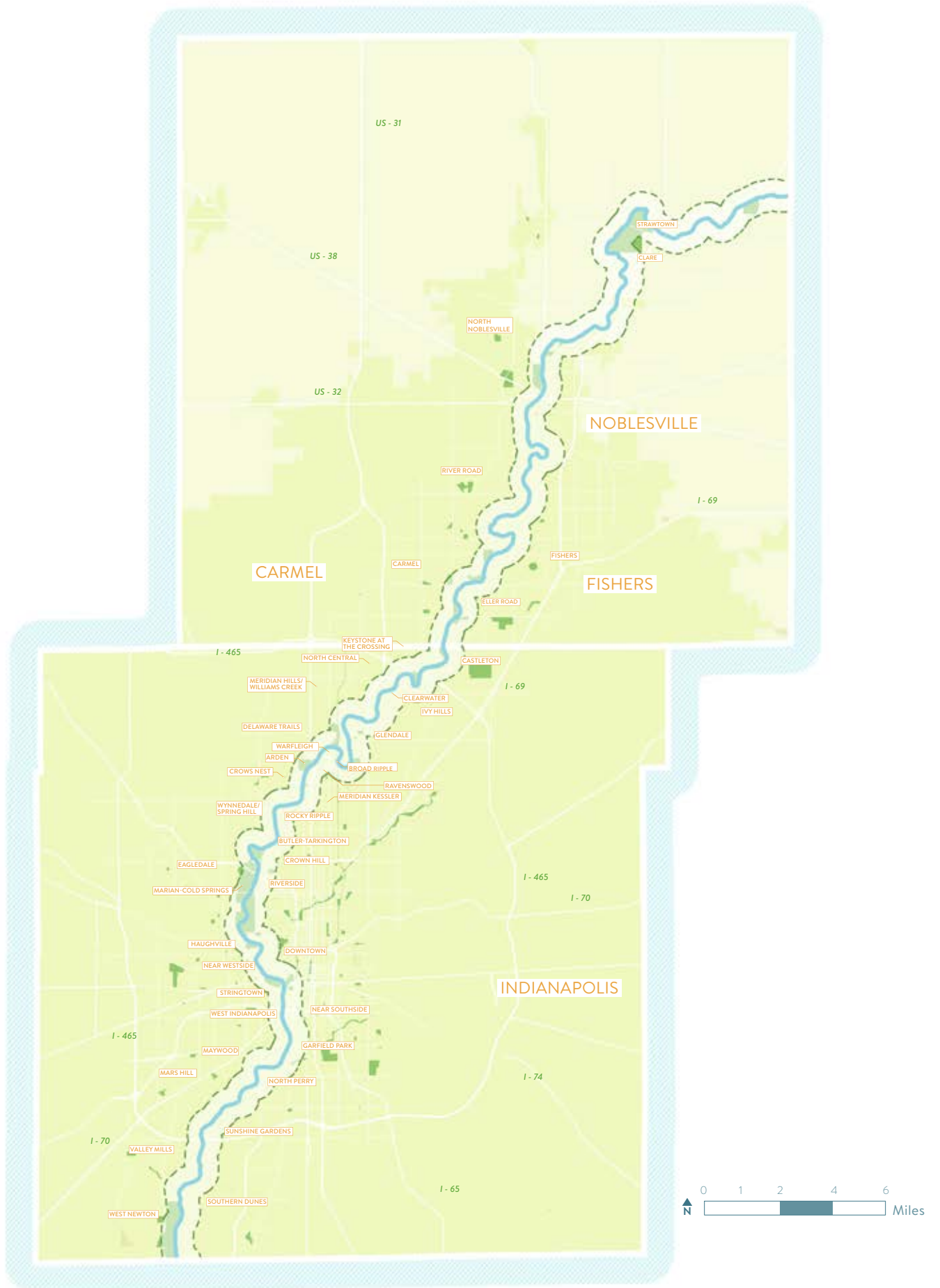
The first steps of the White River Vision Plan process engaged a broad spectrum of residents, visitors and stakeholders. We reached out and connected to the partners, institutions and advocates already engaged in the good work of river reclamation and those that might benefit from more engagement. This effort will help ignite passions in those currently unaware of the river and harness the power of those already advocating. It can put words and pictures the shared ambitions, illuminate the areas of potential conflict and strengthen capacity for future change.

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### WHITE RIVER VISION PLAN STUDY AREA







# Engagement

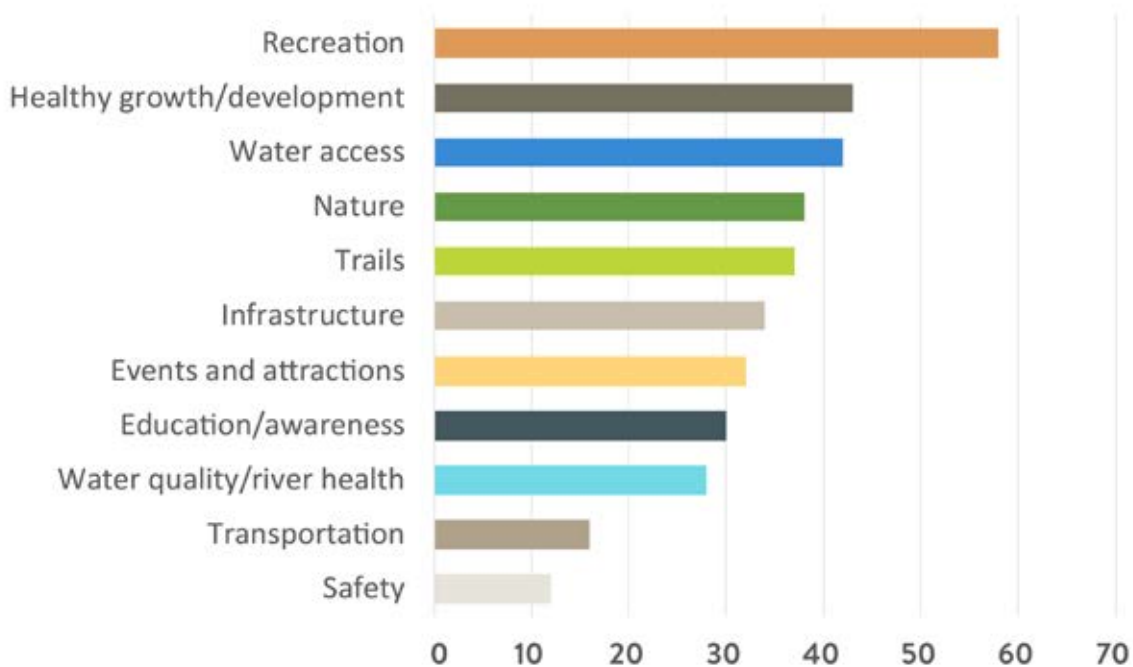
The transformation of the White River must be shaped by desires and aspirations of Hamilton County and Indianapolis' residents, property owners, developers, and regional visitors, working together with governmental agencies and other key partners.

In the first phase of the White River Vision Plan, stakeholders reflected on their experiences on and along the river and voiced concerns and ideas for its future. A wide variety of stakeholders from throughout the two counties participated online and in person to the plan during the three-month

period. The White River Vision Plan's public engagement strategy included:

- Appointed committee and task force representation
- In-person community conversations
- Public meetings and attendance at community events
- Project website
- Social media

A detailed summary of engagement efforts and outputs begins on page 16 of the full Task One report and in *What We Heard* sections of the Vision Theme chapters.



RECREATION AND HEALTHY DEVELOPMENT WERE AMONG THE TOP THEMES FROM PHASE ONE OUTREACH EFFORTS.



PUBLIC MEETING PARTICIPANTS AT NOBLESVILLE CITY HALL

I am thrilled to hear that the White River is becoming a priority for the city! It is a huge resource and if done right, can be another big draw to the city.

Will the protection of the property rights of riparian owners, especially farmers, be a priority in the plan?

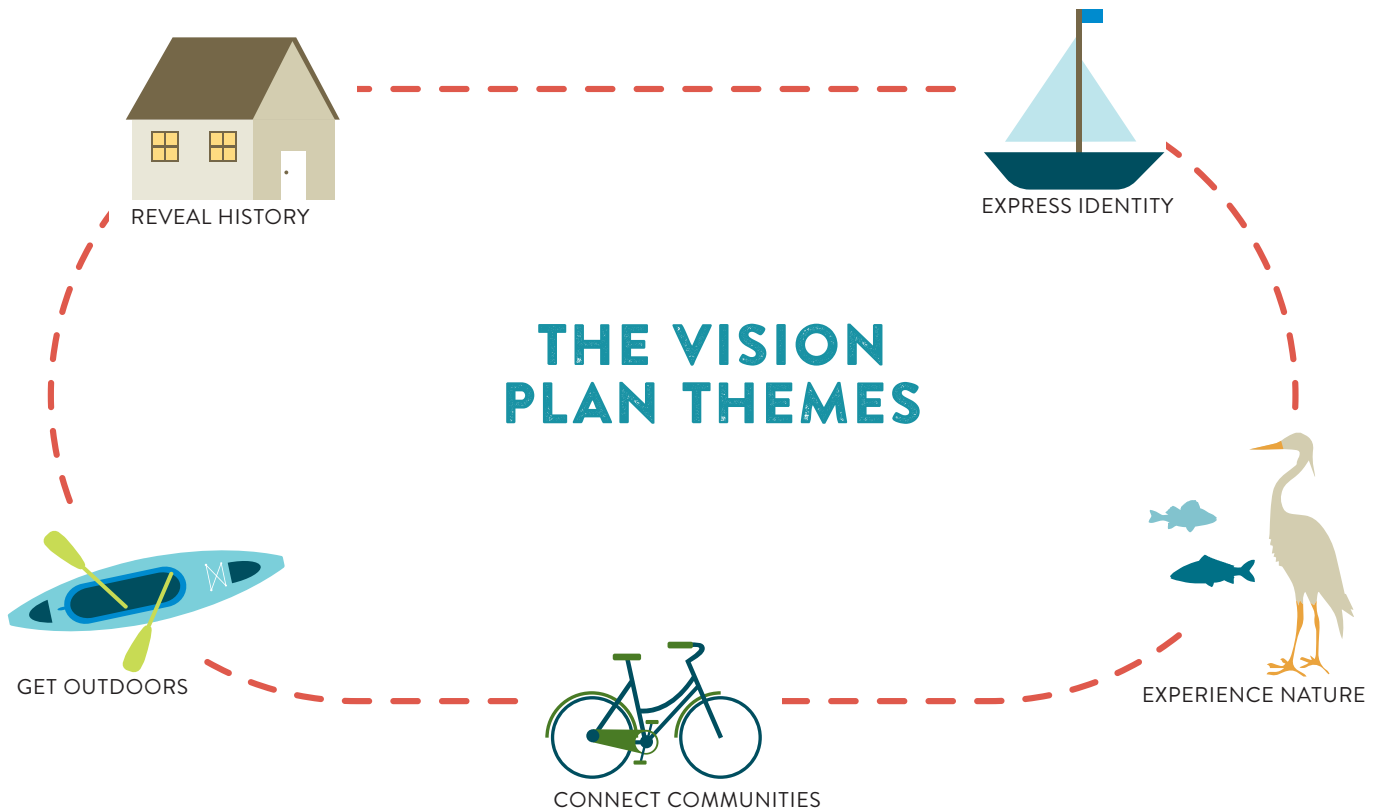


PRE-EXISTING EVENTS DREW HUNDREDS TO LEARN ABOUT THE WHITE RIVER.

My property is just within the flood plain and I pay flood insurance. I do not want to see potential risk of increased flooding as a result of any new development.

Many happy memories canoeing and fishing, and my parents even got married on an island on the river. I look forward to seeing the river become a sought-after destination.

# The Vision Themes



River systems are complex environments where many different cultural, technical and ecological conditions come together. The charge of the Vision Plan is broad and comprehensive, requiring the planning team to investigate everything from regional demographic change and existing cultural destinations to water quality and flood infrastructure considerations. To make these systems accessible and legible to the community writ large, the planning team devised a series of themes that organize and promote synthesis of the challenges and opportunities. They are:

## Reveal History

The history of the White River corridor is part of what makes today's experience of the river unique. Providing physical linkages to this history and revealing it through strategic use of media and programs will add to users' sense of place along the greenway and provide entertaining and compelling learning opportunities for a wide variety of audiences. This theme synthesizes the physical resources that demonstrate the evolution of human stories within the White River Corridor, describes in general the chronology and resources, and suggests themes that help to illuminate and commemorate those stories. The history of the White River and its unique historic resources begins on page 14 of the full Task One report document.



## Express Our Identity

Over the last several decades, communities along the White River have evolved from small farming towns into a larger, vibrant metropolis that is home to over 2 million people. The 58 miles of river that run through Indianapolis and Hamilton County flow through racially and ethnically diverse neighborhoods, connecting east and west into a vibrant quilt of homes, businesses, and places for people to come together. This theme summarizes the character of communities along the White River, describes economic development trends of the greater Indianapolis region, and reviews successful plans and projects in other riverfront cities to shed light on opportunities for White River communities to work together to protect and leverage this shared asset. Express our identity begins on page 32 of the full report.

## Experience Nature

The White River can become a place of immersion in nature – where the landscape feels safe, clean and endlessly intriguing. To build greater stewardship for the river and enable immersion in a healthy system, we want to grow the ability for all residents to tell the story of how the White River can be a clean, safe and remarkably beautiful place where unexpected encounters with wildlife and beauty are waiting around every bend. This theme summarizes the environmental considerations of the river that underpin that story, including ecological health, water quality and hydrologic / infrastructural conditions. Turn to page 52 for a detailed inventory of natural resource areas, river infrastructure, flood mapping and water quality.

## Get Outdoors

The Vision Plan aspires to create year-round seasonal interest and activity along the banks of the White River. It intends to be strategic and balanced in program placement and activation, providing different forms of engagement to the communities along the river, while celebrating and bolstering areas of ecological refuge. Whether catching a fish or enjoying a quiet and contemplative hike, the river's edge can mirror different perspectives held by the diversity of constituents. This theme summarizes the existing places and uses along the river and catalogs a series of potential new and enhanced recreational opportunities. Get Outdoors begins on page 96.

## Connect Communities

Providing physical connections to the White River in Hamilton and Marion Counties is critical to the long-term sustainability and viability of this important Indiana asset. Enhanced points of connection to the river and increased options for safe, easy access will lead to more people seeing, using and appreciating all the White River has to offer. This theme summarizes existing connectivity systems, identifies gaps, and advocates for the development of safe, varied and meaningful ways to connect the region's communities along this vital 58-mile stretch. The inventory of existing connectivity systems and mobility improvements begins on page 124.

# Reveal History

The history of the White River corridor is a foundational part of what makes today's experience of the river unique and special. This chapter provides a brief history of the physical resources that demonstrate the evolution of human stories within the White River Corridor, describes in general the chronology and resources, and suggests themes that help to illuminate and commemorate those stories.

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## HISTORIC DISTRICTS

 WHITE RIVER	 RAIL
 MILE STUDY BUFFER	 NATIONAL AND INDIANA HISTORIC PRESERVATION COMMISSION (IHPC) DISTRICTS
 INCORPORATED AREA	
 MAJOR ROADS	



# Relevant Planning Studies

*Comprehensive Plan for Indianapolis and Marion County: Land Use Element.*

*Indiana's Cultural Resources Management Plan for 2013 to 2019.*

# Observations and Findings

## Methodology

### SOURCES

Observations and findings are based on:

- Mapping of known sites and districts, generally those listed in the National Register and available in GIS form from the State Historic Preservation Office and the Indianapolis Historic Preservation Commission;
- Collection of National Register nominations related to sites and districts within a half-mile to a mile of the White River and review of their statements of significance (which often reveal useful detail about the general history of the area as well as information about the resource in question);
- Touring Hamilton and Marion counties, with the assistance and guidance of local experts;
- Telephone and in-person interviews with local experts; and

- Reading other historical materials suggested by local experts (e.g., *The Indiana Way: A State History*, by James H. Madison, 1986/1990).

### TIMELINE AND CHRONOLOGY

Typically, the history of a place like the White River is best developed chronologically and this is reflected in the Phase One timeline. The timeline uses the following time periods:

- Deep time – The development of landforms through glaciation, in the case of this region.
- Human Prehistory - indigenous people living and hunting along the White River
- Early settlement by non-indigenous people (Europeans, Africans) through the Indiana Territory phase.
- The “early Republic” period, up to the Civil War, which includes statehood and early governmental development (identification of city and town locations, building of early government buildings), the evolution of subsistence agriculture to market agriculture, early industry and manufacturing; “internal improvements”
- The Civil War to the late nineteenth century
- The Gas Boom and the City Beautiful Movement, 1890 to 1929
- The early to middle twentieth century, 1930 – 1980
- The late twentieth century to the present (1981 to present)



## DEEP TIME AND INDIGENOUS ERA

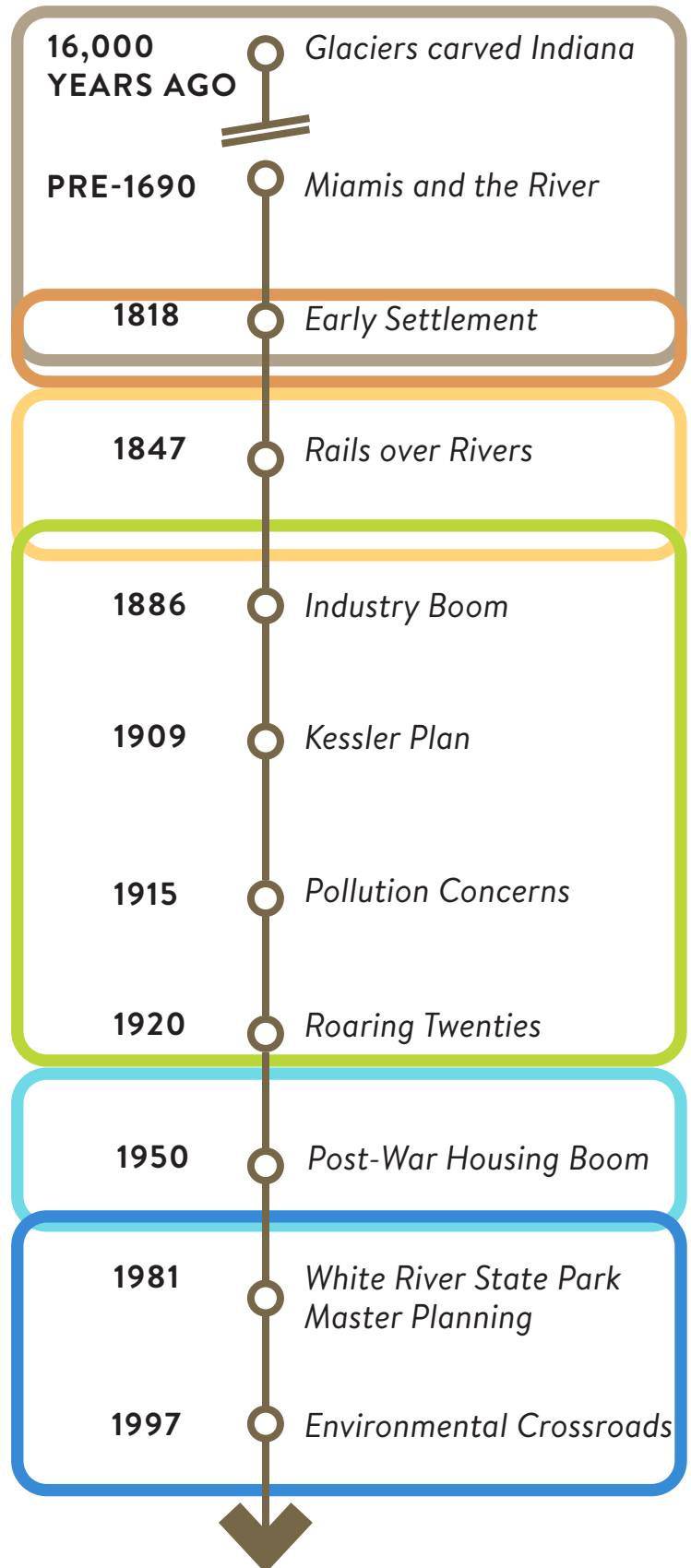
## EARLY SETTLEMENT

## EARLY REPUBLIC

## CIVIL WAR GAS BOOM AND CITY BEAUTIFUL

## EARLY TO MIDDLE TWENTIETH CENTURY

## LATE TWENTIETH CENTURY TO TODAY



In addition to understanding this simple chronology, it is helpful to maintain an equally clear checklist describing resources that can be highlighted within the White River landscape:

- Archeological (prehistoric; historic)
- Transportation (bridges, canals, railroads, toll roads, other roads and highways, aviation, boating)
- Milling and manufacturing (and associated dams)
- Agricultural
- Commercial
- Residential
- Governmental
- Military
- Public works (parks, water works, boulevard systems, public housing, other public facilities)

Each of these types of resources might be found in any of the chronological divisions suggested in the previous list. A brief explanation of the resources that can be found throughout the region that reflect Indiana's chronology and development can be found in the statewide historic preservation plan.

## A Brief History of the White River

### ORIGINS

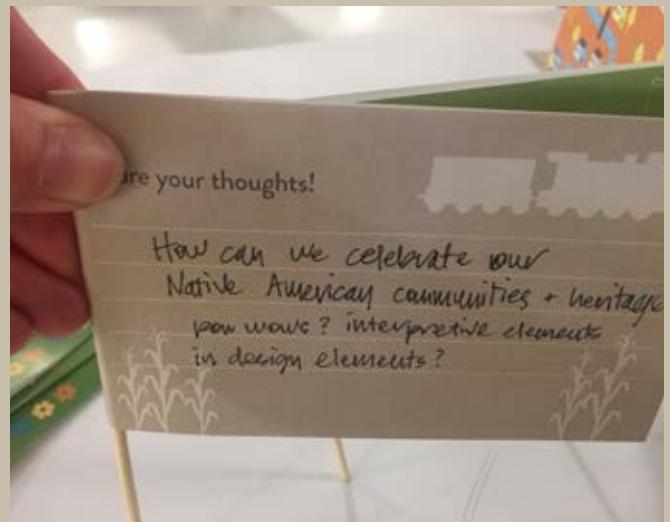
The land we experience today in the White River drainage was shaped through geological processes and the evolution of natural resources – soils, plants, animals – in response to evolving climate conditions. Central Indiana's geological hallmark is evidence of glacial activity. Throughout the Pleistocene (the "ice age," which began about 2.6 million years ago), glaciers moved just south of the present location of Indianapolis. The last glacier, the late Wisconsin, affected this area of the White River drainage between about 22,000 Before Present (BP) and 17,000 BP. According to the Indiana Geological and Water Survey of Indiana University-Bloomington, "Marion County lay near the southern terminus of ice sheets throughout the Pleistocene, a position that helped protect older deposits from erosion during younger ice advances and contributed to the preservation of a fairly robust, though complex and locally incomplete, record of glacial events."

South of Indianapolis, at the far end of the corridor, Southwestway Park, part of Indy Parks, displays the last gasp of the last glacier, a kame known as Mann Hill. A kame is a hill or mound of outwash deposited on or at the edge of a glacier (Camp 1999). As the ice melted, these materials were deposited onto the ground. The materials are stratified,

or layered, by the flowing action of the melting ice. The melting or stagnant ice formed kames. According to the Center for Earth and Environmental Science of Indiana University-Purdue University Indianapolis, the park “contains some of the most outstanding geological features in central Indiana. Mann Hill and the adjacent river valley are part of a delta complex that were formed during the last glacial period. More specifically, Mann Hill can be described as a kame. Camp (1999) references the kames in this area of Indiana as being ‘as large and impressive as any kames anywhere.’” <https://igws.indiana.edu/>

Humans arrived in this region at least 10,000 years ago, in the first of four prehistoric periods, the Paleo period. Each such period of occupation shows distinctive use of technology and differing lifeways, all in response to the changing environment. The White River corridor became a rich habitat for early humans about 4,000 years after the last glacier receded. Evidence of the second period, the Archaic, occurs in Riverton Culture sites dated from the very end of the period, Terminal Late Archaic, 3450 BP to 2650 BP, in the White River drainage, along with the Lower Wabash and Ohio drainages. Southwestway Park preserves at least seven prehistoric archeological sites, including a number with the earliest evidence of human occupation from the Archaic period.

The third period, the Woodland, is when evidence of pottery emerges; it is followed in Indiana by the Mississippian period, the time when mound building cultures were created,



## What We Heard

A preliminary historic timeline and a presentation, both developed from early research, met with general enthusiasm and confirmation from audiences. Many expressed an interest in access to the river's stories related to its history, but few were specifically knowledgeable. One person provided an overall opinion that archeological sites along the river may be significant but are endangered in many locations.



GENERAL HISTORICAL TRIBAL DISTRIBUTIONS IN INDIANA. IMAGE SOURCE: INDIANA DEPARTMENT OF NATURAL RESOURCES

950 BP to 300 BP, especially south and west of the White River. In White River drainages in central and south-central Indiana, sites from the Oliver Phase are found, referring to a transitional late Woodland “emerging Mississippian” culture. Strawtown Koteewi Park, a 750-acre park in northern Hamilton County that was once home to Delaware Native Americans, offers archaeological exhibits including artifacts dating back to 550 BP to 750 BP. According to Hamilton County’s description for Strawtown Koteewi Park, Koteewi is the Miami Native American word for “prairie”. Grasslands, like that of

Strawtown, were important ecosystems for the region, a role which is also interpreted at the park today. Similarly, Lafayette Trace is a significant place in the origin story of the region. The land was used by native people and early settlers for its access to the White River and opportunities to cross the river when low.

Following this period, in many parts of the country, “protohistoric” cultures evolved into indigenous cultures known from historical exploration by nonindigenous voyageurs, traders, and settlers. However, the state historic preservation office notes that, “In Indiana, a difficulty in connecting prehistoric cultures with historically recorded ones is that during the Iroquois wars in the mid-late 17th century, Native American groups were apparently displaced from the area. Thus, there appears to be a ‘break’ between prehistoric and historic occupations here” as seen in the archeological record. In the late 18th and early 19th centuries in central Indiana, Native Americans known as the Delaware or Lenape were associated with the two forks of the White River. The first European settlers came to the region in the 1700s and increased over the next century, after the War of 1812.

By 1816, the migration of European and American settlers ballooned populations in the midwest and led Indiana and Ohio to statehood, even though much of the land in these territories were occupied by Native American tribes. In 1818, to bring the states under the control of the US Government,



six separate treaties were signed with Native tribes. These treaties brought vast amounts of land under control of the US and dramatically increased the populations and developments in both states. The negotiations resulted in the removal of a number of tribes from their homelands.

Another well-known settler along the White River who greatly influenced the development of what is now Hamilton County and Noblesville was William Conner, a fur trader and frontiersman who came to the region as a businessman looking to invest in farms, mills, and distilleries. He founded Hamilton County and Noblesville and was actively involved in the search for a proper capital for the eventual state. Today, visitors come to his home in Hamilton County, now Conner Prairie Interactive History Park, to learn about early settlement and Native American heritage.

Agricultural industries thrived in the fertile banks along the River, with settlers coming from far and wide to lay claim to a piece of farming land in growing towns like Carmel, where Quaker farmers found similar soils to their previous Pennsylvania homes; Fishers; Noblesville; and Indianapolis.



POTTER'S BRIDGE



WILLIAM CONNER HOUSE

## TRANSPORTATION FRAMEWORK

Looking back, the location of Indianapolis on a river seems almost an afterthought. The White River was originally a key factor in siting Indiana's capital, Indianapolis, in the state's early years, in the expectation that the river would provide a major advantage in transportation. This is how nearly all American cities established prior to Indianapolis had prospered, and a location along a water route was almost always critical. Transportation proved to be a driver for the region's growth; yet, with the river in the backseat for a time.

It was the city's central location in the state, however, along critical geographic pathways both east-west and north-south, that caused it to prosper. After a false start with canal building, to address the river's impediments – it was shallow, with unreliable flow – Indianapolis flourished and became the place where seven railroads converged early

in the history of railroading. Noblesville was settled at about the same time as Indianapolis, and benefited from an early railroad. While canals were effective to the east early in the nineteenth century, by the time this technology reached Indiana – at a time when the state's finances were threatened, for nearly a decade, by the national Panic of 1837 – rail was beginning to make much more sense than transport by water.

In fact, there was so much private investment in railroads in Indiana that after the Civil War, 1861-1865, the city created the nation's first "union" station, a place where independent lines were brought together for transshipment of passengers and freight. "Union Stations" were built subsequently throughout the nation. Previously, long-distance movement required in-city transportation from one railroad to another. During the Civil War, for example, Northern troops destined for the Battle of Chickamauga in Tennessee debarked from the end of their east-west transport on an "Ohio gauge" line and stepped onto a different train with a different gauge that would carry them (ultimately) to Chattanooga.

Where was the White River in this development history? Early on, it (and its tributaries) provided drinking water and a source of power for a variety of mills. The towns of Riverwood and Clare originally started as milling communities that took advantage of the river's power to capture energy and power mills. Later, the Holliday Hydroelectric Power Plant harnessed the



PRATT TRUSS RAIL BRIDGE OVER THE WHITE RIVER

river's power to support the surrounding neighborhood. In the late nineteenth century, as coal and steam replaced water power, the growing number of factories along the White River's banks in both Hamilton and Marion counties were able to use it to dispose of their wastes. Indiana remains a manufacturing powerhouse thanks to this legacy; but, the pollution of the river became a recognized problem early in the twentieth century that persisted for more than a hundred years. While the 1972 federal Clean Water Act helped to initiate the modern process of cleaning the river, in 1999, a chemical discharge originating in Anderson decimated aquatic life for 57 miles downstream, killing an estimated 4.6 million fish. The incident spurred redoubled action through federal and state policies and investment. According to a 2010 retrospective by The Herald Bulletin of Anderson, "It rallied government agencies, conservationists and the public behind a common cause. That sense of cooperation led to a landmark settlement and restoration effort and, 10 years later, the White River has exceeded expectations for its recovery." Even today, consuming any catch from its thriving fish population remains ill-advised. Toxins, though long banned, persist in submerged sediments that can accumulate in the food chain from tiny sediment-dwelling animals that provide many fish with a part of their diet. As more and more people float and fish and walk along the river, however, enjoying its fun and its natural and historic qualities, they are motivated to join in the long-term action that will help the White River

to continue to grow even healthier over time. Only in recent years, thanks to a wide variety of diligent advocates and federal and state policies and investment, has it been possible to canoe the White River more safely with respect to health effects and people do come to boat, fish, and water ski without problems.

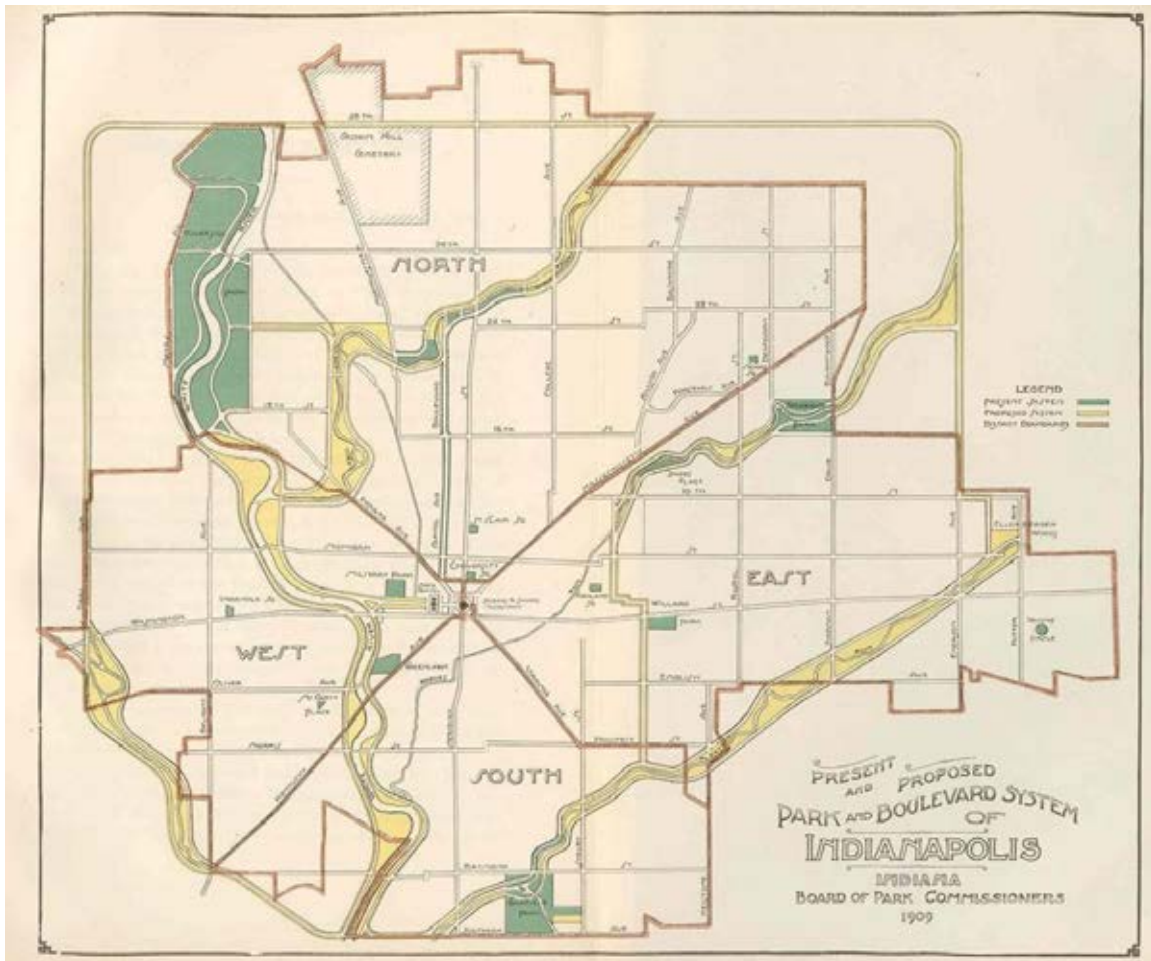
## **LANDSCAPE AND PLANNING HISTORY**

### *Indianapolis' Kessler Plan*

Despite this pollution, the river provided inspiration to one of the nation's great landscape architects. As Indianapolis prospered at the turn of the twentieth century, larger, wealthier cities aspired to beautification, in a trend called the City Beautiful Movement. The movement was inspired by the 1893 World's Columbian Exposition in Chicago – although famous works in Indianapolis precede this date. The State Capitol, for example, not far from the river and built for the ages from 1880 to 1888, is an enduring example of the transition from Greek Revival to Second Empire (French, exterior) and Italian Renaissance (interior), anticipating the later Beaux Arts style now closely associated with City Beautiful. Two blocks away at Monument Circle is the spectacular and iconic Indiana State Soldiers and Sailors Monument, built 1888-1901 and dedicated in 1902.

When German-born landscape architect and pioneer city planner George Edward Kessler (1862-1923) was recruited by Indianapolis





KESSLER PLAN FOR INDIANAPOLIS

leaders to resolve a dispute over park planning in 1908, he already had local examples of high style and ambition that he amplified in a new city plan inspired by the White River and its tributaries. Today, the Indianapolis Park and Boulevard System he designed, accepted by city leaders in 1909, is listed in the National Register of Historic Places and has continued to shape the city. Kessler, who had previously worked in Kansas City, Memphis, and Dallas, remained with the city's Park Commission from 1909 to 1915. According to Wikipedia, "Over the course of his forty-one year

career, George E. Kessler completed over 200 projects and prepared plans for 26 communities, 26 park and boulevard systems, 49 parks, 46 estates and residences, and 26 schools. His projects can be found in 23 states, 100 cities, in places as far flung as Shanghai, New York, and Mexico City." Kessler wrote that planning should be comprehensive, stating that "Cities grow mostly by accident in response to trends in the real estate market. Very little thought is given to their qualitative characters. But there comes a time when development must be subject to control,



when further growth must be planned such that urbanization will no longer proceed at the expense of devastating ‘nature.’”

## THE TWENTIETH CENTURY

The City Beautiful Movement subsided by around 1920, but as Indianapolis continued to prosper, properties such as Oldfields – today the site of Newfields and a National Historic Landmark – and a number of outlying neighborhoods within the White River corridor continued to exhibit the evolution of residential high styles. Off the beaten track, sometimes protected by levees, are smaller neighborhoods with modest housing and a 1956 clubhouse for the Indianapolis Yacht Club, whose members enjoy water recreation in smaller boats on Geist Lake.

As the economic effects of the 1929 Wall Street crash and the subsequent Great Depression took hold, public works became important to the city’s prosperity. Within the White River corridor are two excellent examples of public investment, the Indianapolis Veterans Administration Hospital, a National Register historic district (and modern non-VA medical facility) whose period of significance is 1931-1950; and Lockefield Gardens, the first public housing built in Indianapolis, constructed 1935 to 1938, listed in the National Register on the basis of its significance as “one of the Nation’s first group of federally initiated, funded, and supervised peacetime housing projects” and “because of its unparalleled importance to



LOCKEFIELD GARDENS, THE FIRST PUBLIC HOUSING BUILT IN INDIANAPOLIS



ARCHITECT MINORU YAMASAKI DESIGNED BUTLER UNIVERSITY'S IRWIN LIBRARY IN 1963.

the local black community.” The only original structures remaining are those along Blake Street north of the State Capitol.

Architecture in Indianapolis and the region have continued to evolve, evidencing still more changes over time in the way people in the region have organized their lives and institutions. “Mid-century modern” buildings built between World War II and 1968 today are among buildings more than 50 years old and “aging into” potential eligibility for the National Register. Flanner House Homes, a historic district listed in the National Register and built between 1950 and 1959, is significant for “its ethnic heritage, social history and community planning ties.” It was built in phases by Flanner House, an Indianapolis settlement house, and the Indianapolis Redevelopment Commission, to “clear slum areas and offer low-income African Americans the chance to own their own homes.”

Among the more spectacular architectural treasures from this period is Butler University’s Irwin Library (1963) by Minoru Yamasaki, American architect noted for designing the original World Trade Center in New York City and one of the most prominent architects of the 20th century. Together with gigantic Hinkle Field House (1928), a National Historic Landmark also on the campus and noted as one of the first such structures in the nation, Butler University offers two major attractions to architecture buffs.

More recently, the landscaped remains of the old Central Canal in downtown Indianapolis offer an in-city water feature. Its route provides a link from the headquarters of the White River State Park (in a repurposed mid-century modern industrial headquarters) and the river itself to the museums of the park, the State Capitol, the old Military Park – mustering ground for Civil War volunteers, the city’s earliest park, and site of the state’s first agricultural fair – up to the Indiana Historical Society’s headquarters, the Eugene and Marilyn Glick Indiana History Center, and nearby modern housing and office space.

### *Hamilton County’s Growth*

Noblesville was indeed the product of the organic growth Kessler once described. Laid out as a grid of streets along the White River’s high banks at the center of Hamilton County soon after Indiana was founded in 1816, Noblesville is a classic midwestern county seat with a county courthouse that is listed in the National Register. Built between 1877 and 1879, the massive brick and limestone Second Empire style courthouse itself exhibits similar ambitions for enduring, high-style public edifices as seen downstream in Indianapolis. The small downtown surrounding the courthouse square is also listed in the National Register, as are the Catherine Street and Conner Street historic districts, whose prosperous late-Victorian residences are evidence of a short-lived gas boom that began in central Indiana around 1890.

In between the Hamilton County courthouse and the State Capitol, the river's landscape today largely exhibits modern influences – suburbs and neighborhoods – and economic evidence of the last glacier in the form of extensive sand and gravel quarries, especially in Hamilton County. North of Noblesville, it is possible to see earlier farm landscapes and evidence of both the (failed) canal and other historical sites as Potter's Bridge, the last covered bridge still standing in Hamilton County. Uniquely, the factory constructed by the Potter's Bridge builder, Josiah Durfee, to provide timber parts for his bridge business, survives as the earliest part of the Noblesville Milling Company Mill, today adapted as office space.

Downstream from Noblesville, in the town of Fishers on a spectacular bend of the river, is one of Indiana's great attractions, Conner Prairie Interactive History Park, founded by pharmaceutical executive Eli Lilly in the 1930s. It contains the county's first brick home, built at the site by Noblesville's founder William Conner in 1831, and other historic buildings moved to the site.

## **HISTORIC RIVER STRUCTURES**

The river's tendency to flood has influenced some of the availability of historic resources. Many of the river's bridge crossings have been lost to flooding and those historic bridges have been replaced by either necessity or design to meet modern standards. The Washington Street crossing, for example, was first bridged for the National Road early in the

nineteenth century, but the original bridge was later converted to pedestrian use within the White River State Park.

Many dams are also historic structures along the river, either to improve the water level for aesthetic reasons or to provide depth for drinking water intakes or early water power. (They are, perhaps, the only structures that historic preservationists would be willing to see removed, especially where they are unsafe.)

South of Indianapolis, at the far end of the corridor, Southwestway Park displays the last gasp of the glacier, a kame known as Mann Hill. According to the Center for Earth and Environmental Science of Indiana University-Purdue University Indianapolis, "Southwestway Park contains some of the most outstanding geological features in central Indiana. Mann Hill and the adjacent river valley are part of a delta complex that were formed during the last glacial period. More specifically, Mann Hill can be described as a kame. A kame is a hill or mound of outwash deposited on or at the edge of a glacier (Camp 1999). As the ice melted, these materials were deposited onto the ground. The materials are stratified, or layered, by the flowing action of the melting ice. The melting or stagnant ice formed kames. Camp (1999) references the kames in this area of Indiana as being 'as large and impressive as any kames anywhere.'" Not only is kame unique in the White River corridor, but the ecological communities that persist due to the rough topography are among the best in the corridor.

The White River corridor was a rich habitat for early humans. The survival of archeological sites outside Southwestway Park has been affected by the combination of quarrying and construction along the river, historically and in the present. One recommendation is to undertake a thorough study of archeological resources and integrate their preservation into land conservation planning. Elsewhere, archeological sites have not been as fortunate, as the combination of quarrying and construction has affected their survival. An important next step may be to undertake a thorough study of archeological resources and integrate their preservation into land conservation planning.

## Opportunities and Barriers

### Opportunities

Opportunities to reveal White River and regional history include not only story-telling – finding many ways to link the river’s history to the remaining physical evidence of that history – but also creating physical linkages that radiate out from the river corridor, beyond its banks, to draw in neighborhoods and create a greater awareness today of the river’s presence and influence. The river creates its own powerful sense of place, but beyond its immediate environs, residents nearby may be all but unaware that it is within reach. Finding ways to bring the river’s history to mind – through programming, celebrations, place-making, and other interpretive activities – will build an important constituency for greater investment in the river and its corridor.

In addition, many of the historic resources within reach of the river are in greater need of investment by their owners and, as appropriate, the public. Creating more recreational opportunities related to the river is an economic act – it will encourage greater quality of life for neighborhoods and thus encourage greater property values and owners’ investment. While there is a need to watch out for the negative impacts of increasing property values and demands on

low-income owners and renters, communities generally benefit from this economic action.

## THEME STATEMENTS

Ultimately, an understanding of the White River region's history, chronology and historic resources can be interpreted and encompassed in a series of "theme statements" that are designed to convey context and pique the interest of audiences. These theme statements can then be used to guide choices of media and programming to highlight stories that convey these themes in compelling ways. Media choices might range from the typical "books on sticks" outdoor signage to more adventuresome efforts involving artwork, restoration (judicious), landscaping, or non-textual markers (e.g., footsteps embedded in pavement). Sometimes, simply calling attention to a remnant in the landscape and letting observers bring their own reflections to an object may be more compelling than actual explanation. An example of such a mysterious object is a large tank just upstream from the landscaped portion of White River State Park on the river-left side (east). Clearly industrial, various experts have been consulted about its possible origins without resolving the mystery. It bespeaks a past along the river that has yet to be studied and explained.

Several examples of theme statements that are neither chronological nor resource-specific might be:

- "The White River has drawn humans to its banks for thousands of years. From prehistoric settlements to improvements on the principles of the City Beautiful Movement, evidence of human preferences for living along a river can be found almost anywhere along the White River."
- "Water means power. Free-flowing or moving through canals, water can move people and goods. Captured through dams, it can power mills that create a wide variety of products. Water sweeps away human structures through the natural power of flooding. The White River has seen a series of efforts by humans to enlist its power, or capture its power, or evade its power. Evidence of these efforts to harness the White River can still be seen throughout this landscape today."
- "The White River is named for its sparkling sandy bottom, seen through the clear waters observed by early Europeans and created over geological time since the glaciers weighed down this landscape. Throughout its recent history, the White River's watershed has seen many changes that make its name more goal than reality. Pollution has been a threat for well over a century. Today, it is possible to find evidence of hope that the White River's name will once again be true to its nature."



## Barriers

### PERCEPTION

Barriers may include a negative perception of historic preservation. Best practices are followed in Indianapolis historic districts; but not all areas that include historic properties come under the purview of the Indianapolis Historic Preservation Commission.

Owners are also often resistant to greater governmental oversight. In areas outside the IHPC's jurisdiction and of historic preservation commissions in other communities, owners of historic properties need expertise and encouragement to treat their structures appropriately. This is an added burden on planning agencies that may lack the resources, staff, or expertise to incorporate historic preservation into their responsibilities for urban development and revitalization. The first step is to ensure public awareness through adequate mapping of historic resources related to the White River and ensure that programs are in place to recognize these resources when changes are planned by public agencies and private owners. The White River Vision Plan can raise awareness through interpretation, public outreach, training, and other programs that encourage more preservation.

### LACK OF KNOWLEDGE OR AWARENESS

An added barrier to developing the historic resources of the White River corridor and raising public appreciation is the lack of

knowledge about the corridor's archeological resources. This problem is particularly acute because archeologists are wary of making archeological sites known to avoid vandalism and unauthorized digging. Loss of the stratification in which archeological deposits are found is a grave danger that results in the loss of important scientific knowledge. A thorough public survey with support from relevant public agencies and increased public interest through interpretation (without necessarily naming sites involved) are important first steps to addressing this concern.

### ACCESS TO HERITAGE PROGRAMMING

It is difficult to encourage interest in historic narratives or places until people have actually experienced the historic places and recognize what makes them unique and different from their present day lives.

Visiting historic sites can be a way of venturing "back in time" while reflecting on how our communities and institutions evolved from the choices people have made over many decades past. This disinterest in history can be attributed a lack of school funding and decision to prioritize time for childhood learning. The White River Vision Plan should promote these sites and highlight their significance as part of a distinct, layered history that defines our everyday experiences along the river today.



NATIVE AMERICAN BUILDING REPRODUCTIONS AT  
STRAWTOWN KOTEEWI PARK IN HAMILTON COUNTY.

# Express Identity

Indianapolis and Hamilton County, albeit to different degrees, are driving population growth in the state. This momentum is the result of strong economic growth, adding jobs to the labor force and growing industry presence, and quality of life improvements, including growing wages and affordable housing options, investments in the public realm, and accessible programming for the region's diverse residents and visitors. With such rapid growth comes the challenge of ensuring livability and sustainability for all, as well as the opportunity of greater vitality.

The Express Identity theme focuses on economic development and demographic trends over the last few decades and considers these broader changes in the context of the activities happening right along the White River.

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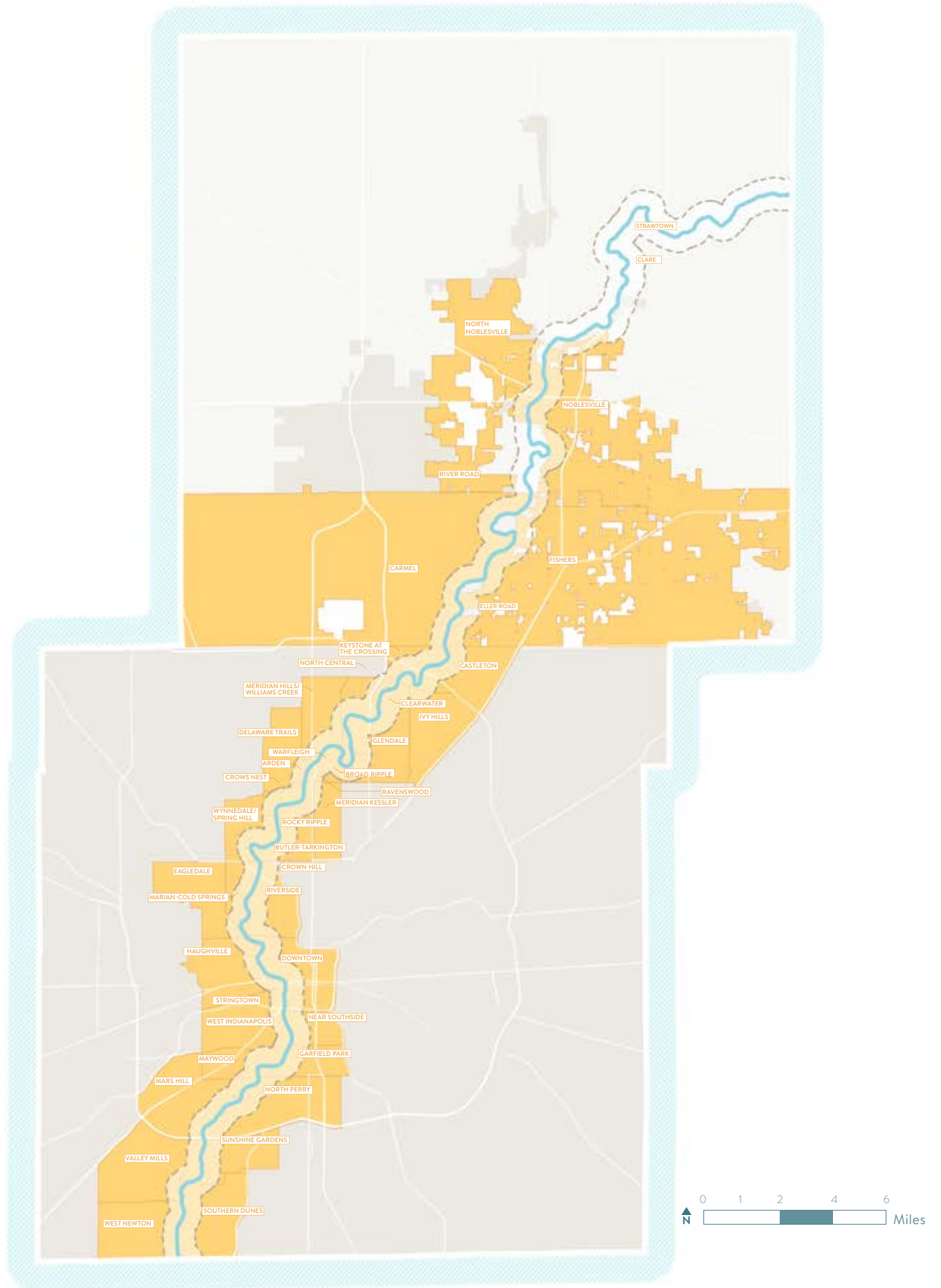
## RIVERFRONT NEIGHBORHOODS

 WHITE RIVER

 MAJOR ROADS

 MILE STUDY BUFFER

 RIVERFRONT NEIGHBORHOOD



## Relevant Planning Studies

*2003 Noblesville Comprehensive Plan*  
*2011 North Midtown Economic Development Plan*  
*2011 West Washington Economic Development Plan*  
*2012 Noblesville Strategic Plan*  
*2016 Central Indiana RDA Regional Development Plan*  
*2016 Fishers 2040 Comprehensive Plan*  
*Carmel 2020 Vision Plan*  
*Carmel Clay Comprehensive Plan (C3)*  
*Indy Plan 2020 planning effort (ongoing)*  
*Indy Regional Tourism Master Plan 2.1*  
*Hamilton County Tourism, Inc. Vision 2025*

## Ongoing Projects

The following summarizes significant recent or ongoing development projects along the White River.

- 16 Downtown Technology District, or 16 Tech, is a 250-acre parcel northwest of downtown Indianapolis along the east bank of the White River. The 16 Tech Master Plan is a development plan for the district's core, which is about 45 acres of land bounded by Indiana Avenue, Fall Cree, Waterway Boulevard, and the railroad. The vision for 16Tech is to create a mixed-use neighborhood that accommodates industry, education, housing, and commercial activities

proximate to downtown. The plan also identifies opportunities for access to the river and recreational open spaces that are publicly accessible and managed by 16 Tech Community Corporation (16TCC).

- The former GM Stamping Plant was recently purchased by Ambrose Property Group to develop a new mixed-use district across the White River from downtown Indianapolis. The 103-acre district will include over 2.7 million square feet of office, retail and commercial space, residential housing, a hotel, community green space and public recreation spaces along the White River. Construction is planned to commence at the end of 2018.

Other relevant, ongoing or planned development projects along the White River include:

- Riverview Apartments, 1541 W Michigan St Indianapolis
- LightBound Expansion, 700 West Henry Street Indianapolis
- Riverside High School, 1802 West 30th Street Indianapolis



# Observations and Findings

## Methodology

### SOURCES

The observations and findings in this section relied on the following federal, state and local sources:

- U.S. Census Bureau's 2000 and 2010 Decennial Census
- U.S. Census Bureau's 2012-2016 American Community Survey 5-year estimates
- Previous and ongoing planning efforts noted above
- Indianapolis and Marion County Geographic Information Systems mapping
- ESRI economic development and demographic mapping
- NAICS industry and economic development trends
- Indiana Business Research Center

## Many Riverfront Users

Residents, workers, and visitors will interact with the River in different ways. The White River has tremendous potential to draw residents, workers, and visitors from the immediate area, the region, and around the country. Each of these groups may interact

with the White River in different ways and have different needs.

- Residents within the region are likely the largest share of visitors to, and users of, the White River and any adjoining facilities. Key interests of residential populations include water-based recreation, such as kayaking and fishing, recreation at facilities such as playgrounds and waterside outdoor space, and community events and programming.
- Workers and businesses in the area may be most interested in development along the White River for its potential to serve as an amenity for workers, accommodate complementary real estate development, host private event space and corporate venues, and for any potential mobility improvements, such as multi-use trails that may make it easier for residents and commuters to travel to and from workplaces.
- Patterns of gentrification and disinvestment are present in culturally-rich, but economically poor communities within the region. With growth and change already happening, the plan needs to consider the impacts of riverfront investments on the community fabric and pursue proactive actions to preserve cultural diversity.
- Visitors to the area may enjoy the same amenities as local residents, workers, and businesses, providing an additional user group for outdoor recreation, cultural and historical attractions, large-scale events such as concerts, and destination retail.

# Demographics: Regional Growth

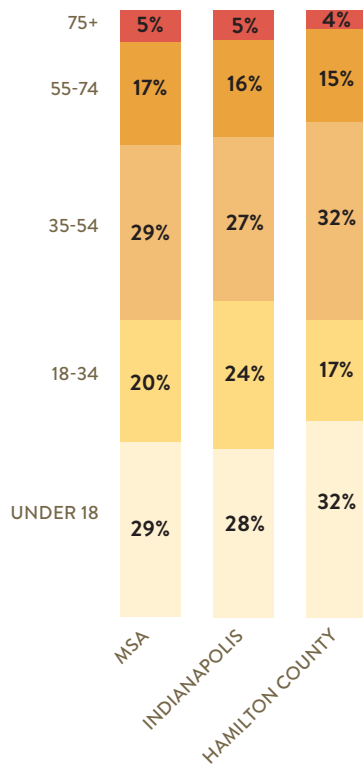
The region’s growth is concentrated in Downtown Indianapolis and suburban areas. Overall, the region has grown from 1.9 million to 2.0 million since 2010. Hamilton County and the Indianapolis Metropolitan Statistical Area (MSA) have grown and are projected to grow faster than Marion County.

Programming in Indianapolis and Hamilton County can meet the needs of the different populations that live there. Today, Marion

County has a larger cohort of young adults aged 18-34, while Hamilton County has more children under 18 and adults ages 35-54, suggesting a higher concentration of families. Hamilton County households also have considerably higher incomes than Marion County and the region. Higher income households are generally concentrated in communities such as Fishers and Carmel. Between 2010 and 2017, Hamilton County and the region gained residents across all income levels. Marion County lost higher income residents, and quality of life improvements may help reverse this decline. Reflecting

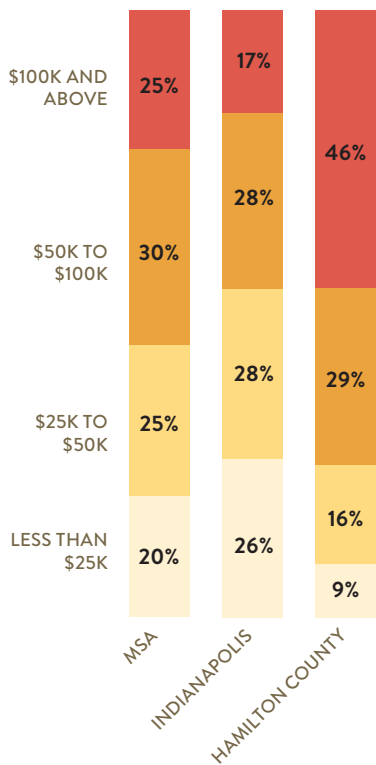
Population by Age

2017 DATA, ESRI



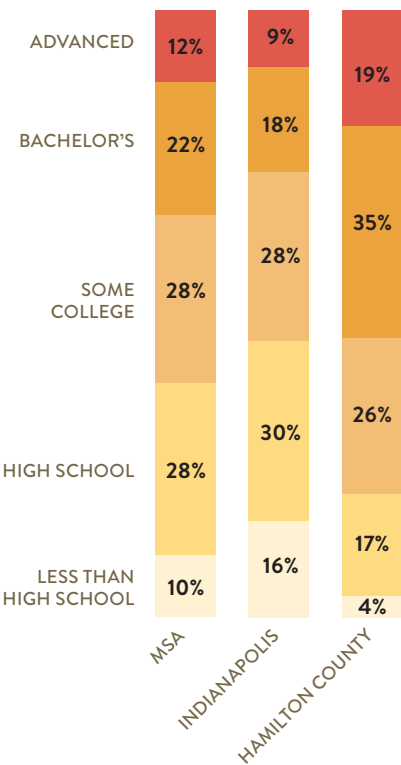
Household Income

2017 DATA, ESRI



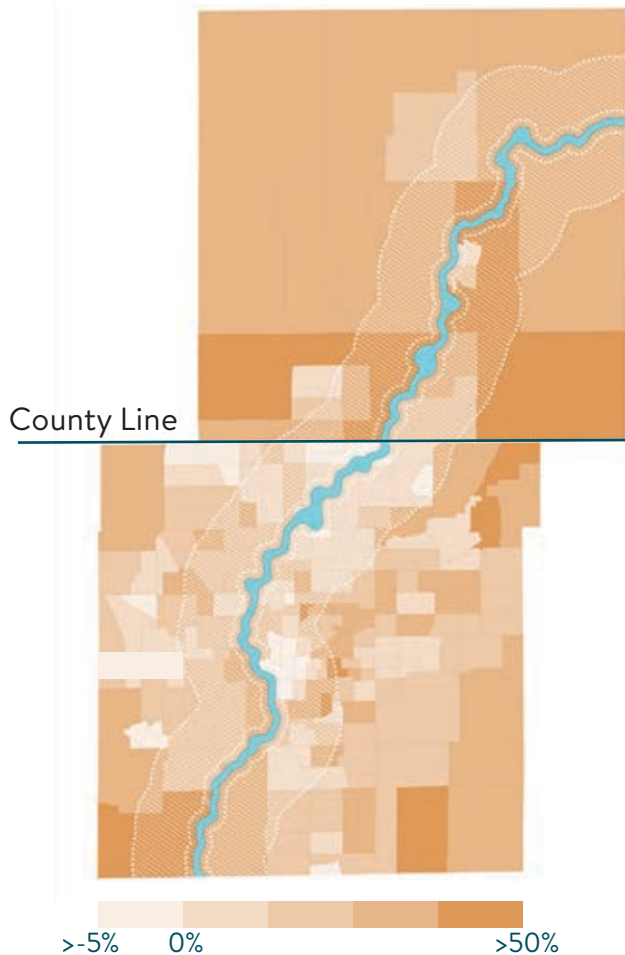
Educational Attainment

2016 DATA, AMERICAN COMMUNITY SURVEY



## Population Growth

2000, 2010 CENSUS DATA



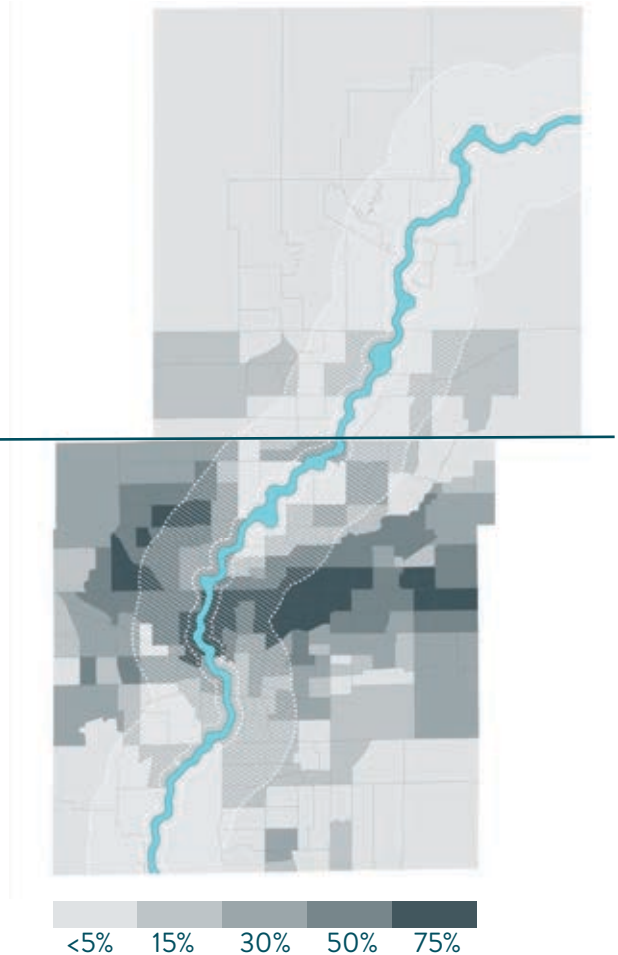
THE TWO-COUNTY REGION HAS EXPERIENCED GROWTH OVER THE PAST TWO DECADES.

higher median incomes, Hamilton County is also home to a larger proportion of college graduates.

Working age residents are critical to the region's growth and future. The population of seniors and children is growing across the region while the population of working-age

## Population of Color (%)

2010 CENSUS DATA



INVESTMENTS ALONG THE RIVER SHOULD CONSIDER THE DIVERSITY OF THE REGION'S RESIDENTS.

adults is declining. There is potential, as part of the White River Plan, to invest in public realm and other improvements that can provide attractive, safe connectivity and recreational options. These improvements can work together to help retain those who live in the area and entice visitors to relocate to the area.

## Neighborhood Character

Within Indianapolis and Hamilton County, the White River is bounded by over 42 distinct neighborhoods. Each neighborhood's special character and mix of amenities contribute to a strong sense of place within each neighborhood but does not always inform the neighborhood at the river's edge.

The region's diverse neighborhoods and demographics all have opportunities to take advantage of their shared assets along the waterfronts. The White River strengthens connections between east and west neighborhoods rather than acting as a barrier. Instead, strong healthy neighborhoods with medium to high wealth distribution, and economic mobility and neighborhoods with low access to and across the rivers, low educational attainment, and continued poverty are separated by county lines. The gradient of income disparities follows a north to south path along the river, with the northern reaches of the study area featuring the highest property ownership and incomes and the furthest south reaches, some of the lowest. The metropolitan region has strong sense of diversity—a experience that is expressed in the tapestry of communities along both sides of the river, noted in the sampling of neighborhood images at right.

The role of the transportation, including the advent of street cars, national train lines, canals and the introduction of the personal

vehicle in the urban form and function of many of these places is evident along major corridors radiating out from the downtown. Older, street car neighborhoods are historic in nature, with tree lined streets and retail establishments clustered along the ground floors close to where rail stations once brought people into and out of the city. Some of these corridors have experienced disinvestment when street car companies went bankrupt and automobiles took residents further out into the suburbs where places to park were in excess. Other neighborhoods evolved to support car traffic, especially in Hamilton County. Communities like Fishers and Noblesville are experiencing increased investment in their own town centers with a mix of retail, restaurant and café establishments along wide street grids intended originally to support large volumes of car traffic. Hamilton County's strong trail network connects these neighborhood centers to and along the river.

However, most communities along the White River have limited to no access to the White River, but are well connected across the river to neighboring communities on the opposite side of the river. Unlike many cities where water bodies serve as a barrier, the White River appears to be invisible – community demographics shift from north to south and are consistent on either side of the river. Neighborhoods along the river that have high need are identified by high residential vacancy rates, low median household incomes with a





Keystone at the Crossing



Eller Road



Marian



Sunshine Gardens



North Noblesville



Rocky Ripple



Downtown



Valley Mills



Castleton



Carmel



Near Westside



North Perry



Noblesville



Clearwater



Meridian Kessler



Fishers



Broad Ripple



Marian-Cold Springs



Meridan Hills



Ivy Hills



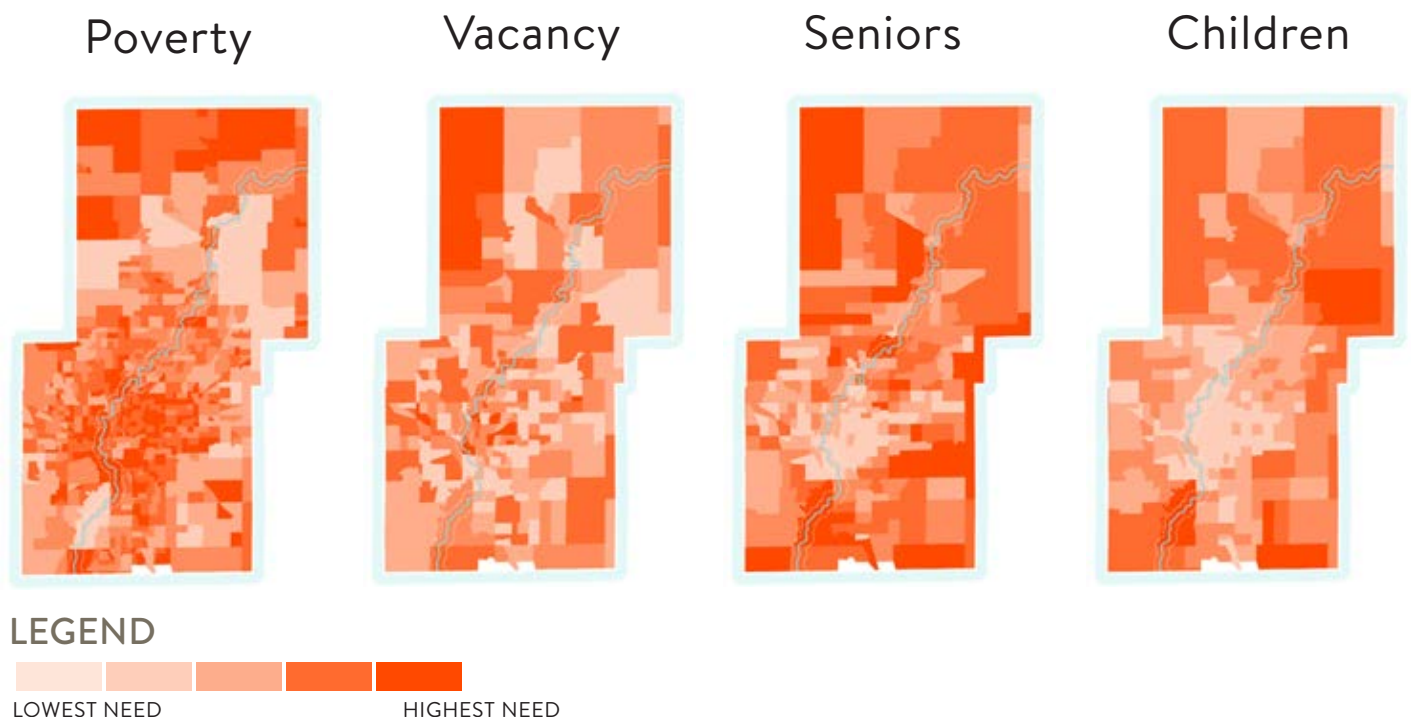
large percentage of non-working populations (seniors and children under the age of 18). These neighborhoods with high need are clustered to along the west banks of the White River in Hamilton County, south of Noblesville and bordering the downtown in Indianapolis on both sides of the river.

## Economic Development

The White River Plan can help attract and retain the talent needed for economic development. Job growth has historically been driven by retail, hospitality, healthcare, and education. While industry mix is similar across the region, Hamilton County has attracted more white-collar jobs while Marion County has a broader base in manufacturing. Regional

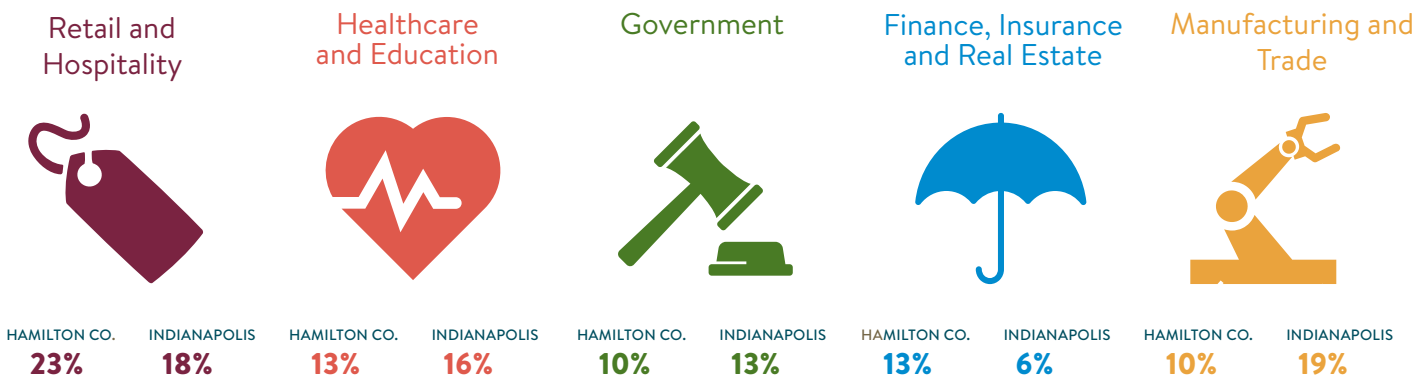
employment has grown steadily since 2010 and is projected to continue to grow, albeit at a slower pace. Improvements made as part of the White River Plan can help attract and retain talent, including those in export sectors that are targeted for growth such as life science, aerospace, transportation and industrial equipment, pharmaceuticals, and technology.

Existing plans indicate four major economic development objectives for this region and the White River. Over fifteen local and regional plans were reviewed that either influence or provide a foundation for the White River initiative. These existing plans indicate four major economic development objectives for



# Top 5 Industry Sectors by Number of Jobs

2017, EMSI



# Historic and Projected Growth in Both Counties

2017, EMSI AND INDIANA DEPARTMENT OF WORKFORCE DEVELOPMENT



this region and the White River:

- Business and talent attraction and retention: Improved amenities near job centers, branding, multi-modal transit pathways, and the installation of corporate event space and sponsorships could support business and talent attraction and retention goals for the area.
- Real estate value creation: Investment in the river could also create additional real estate value, potentially by adding value to adjacent existing land and buildings, and through indirect impacts on tax collections and assessed values.

Projections of increased values can also be leveraged to support value capture and capital investment fundraising. Increasing the value of real estate along the river can also have adverse effects on thriving local communities. Considerations will need to be made to ensure existing residents and businesses are not displaced as real estate values increase.

- Increased tourism: White River investments can enhance the Indianapolis region's brand, coordinate programming with nearby anchors, and create new venues for cultural and outdoor events, increasing the area's tourism spending overall.

- Inclusive growth: Investment in the White River can create new career opportunities in recreation and tourism, including entry-level and management-level opportunities that can prepare workers for other industries; can support diverse, community-driven programming efforts; and can forward an inclusive governance structure that includes all community voices, including those from underrepresented groups.

## Tourism

Tourism is a key element supporting the region's economy. The tourism industry provides significant economic opportunities, with most driven by destinations in Indianapolis. In 2016, there were an estimated 28.6 million total visitors to the Indianapolis region and tourism was the eighth largest industry in the region in terms of total jobs. Major drivers of tourism include large events, cultural offerings, outdoor recreation, businesses and universities, youth/amateur attractions, and family and friends. The area has underway multiple ongoing investments and planned improvements to amenities and cultural offerings, including improvements to Conner Prairie, Newfields, Indianapolis Arts Center, and Grand Park. Coordination of White River initiatives with these improvements will maximize impact.





CONNER PRAIRIE TREETOP OUTPOST



TRAIL INFRASTRUCTURE IMPROVEMENTS AT THE WHITE RIVER CAMPGROUND



16 TECH MASTER PLAN



## Lessons from Peer Projects

While the White River faces funding and governance challenges, the region brings significant assets that can be leveraged for success. The White River initiative faces a range of challenges including region-wide equity concerns; the multitude of jurisdictions and agencies involved in project planning, fundraising, and oversight; funding needs for both upfront costs and ongoing operations; and the range of typologies and land use contexts along the corridor. However, these challenges are outweighed by the region's assets, including a high concentration of existing vibrant destinations and open spaces; a strong local culture of philanthropy; a growing population and tourism sector; and a recent public commitment to develop a shared vision.

### **CASE STUDY #1: GREAT RIVER PASSAGE**

The Great River Passage is located in St. Paul, Minnesota and includes 17 miles of Mississippi River-adjacent open spaces totaling 3,500 acres.

**Equity:** The Mississippi River is surprisingly well connected to every resident. The Great River Passage highlighted the river's strengths as a connector to create valuable connections with neighborhoods and to job centers along and across the river. Open space investments were prioritized close to neighborhoods

with limited existing access and connection recommendations looked holistically at both existing and proposed networks to ensure all community needs were being met.

**Governance:** Unlike many cities, the City of St. Paul has a relatively robust budget for parks and recreation, and successfully managed highly active parks in the past. To manage the Great River Passage, the City created the Great River Passage Initiative division within the Department of Parks and Recreation. The division coordinates planning, funding, and implementation with area nonprofits, and city, regional, state, and federal agencies. Similar to the White River, the plan required coordinated governance and consolidation of the 17 miles into a single park system to facilitate funding and management.

**Funding:** A stable base of public funding is a prerequisite for attracting philanthropy and ensuring the park meets its civic aspirations. Seed funding was provided by the City and State, with 50% of funds from the City's general fund and 50% from a State Legacy Grant. Funding for planning and implementation of individual capital projects are secured as initiatives are identified. The majority of funds for operations and maintenance have been provided by the City's general fund. Over time, the City will seek additional revenues to fill the likely funding gap left by stable City funding and increasing park costs. These sources include philanthropy and sponsorships, real estate value capture, and programming and concessions.



TO MANAGE THE PROJECT, THE CITY CREATED A NEW GREAT RIVER PASSAGE INITIATIVE DIVISION WITHIN THE DEPARTMENT OF PARKS AND RECREATION.



THE GREAT RIVER PASSAGE INCLUDES 17 MILES OF RIVERFRONT AND 3,500 ACRES OF OPEN SPACE.

## **CASE STUDY #2: LA RIVER**

The Los Angeles River (LA River) crosses 15 municipal jurisdictions in Southern California, including 51 miles of riverfront and 32 miles within the City of Los Angeles alone. The project is intended to energize local communities and support economic development along this iconic river.

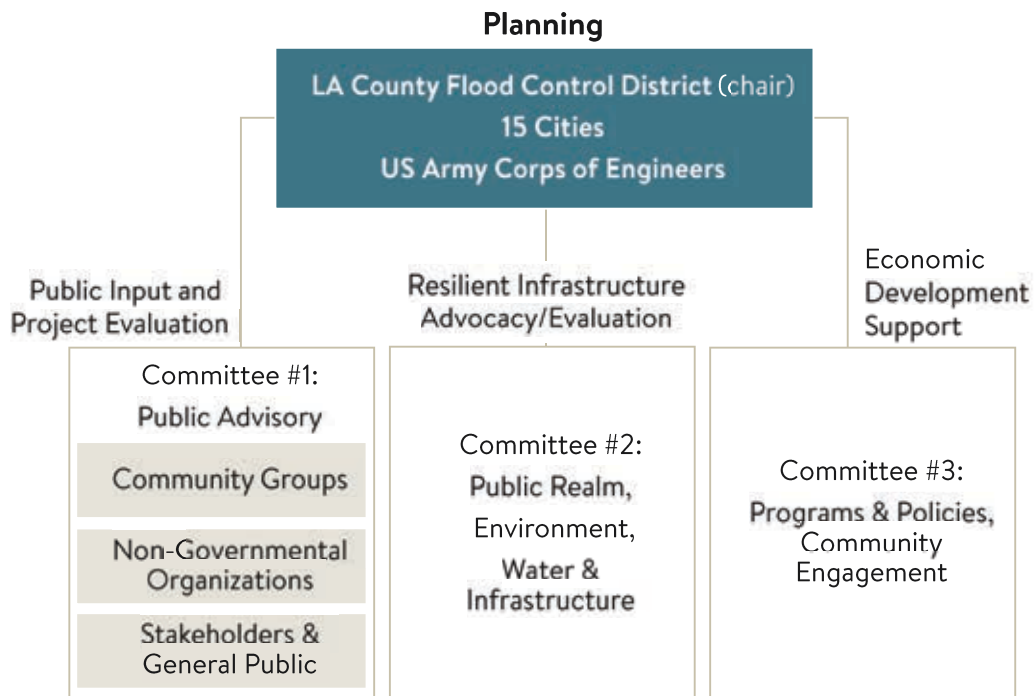
**Equity:** A key goal of the plan was to foster a growth in community awareness of the Los Angeles River, and pride in the Los Angeles River”. The plan process looked at improvements aimed towards celebrating neighborhoods and engaging the public beyond the life of the planning effort. The project honed in on communities along the river with diverse cultural backgrounds to ensure engagement was broad-reaching and crosscutting. As elements of the plan are implemented, the City of Los Angeles continues to monitor disadvantaged communities to ensure all voices are heard.

**Governance:** The LA River Master Plan was adopted in 2007 and incorporated input from three advisory committees with representation from nearby jurisdictions, City agencies, stakeholder groups and the general public. The committees included one for public input and project evaluation, one for resilient infrastructure, and one for economic development. Capital planning and investments are typically joint efforts between the City of Los Angeles, the County

of Los Angeles, and the US Army Corps of Engineers. Ongoing management of the LA river is led by the City of Los Angeles in a coordinating role and includes partnerships with other public agencies, local community groups, and nonprofits. Throughout planning and implementation, the City cooperates with adjacent cities and other river-related agencies to integrate projects and management objectives.

**Funding:** Capital and operations funding is anticipated to come from public sources, supplemented by corporate and philanthropic dollars. Funding sources vary depending on the type of improvement and its ability to attract federal and private funding. For example, while a typical infrastructure or restoration project is funded by City and federal dollars, NBC Universal contributed \$13.5 million to build a 1.7-mile bike path adjacent to its campus as part of the County’s approval of its studio master plan. This is just one example of how municipalities can generate private interest in the river and use value capture mechanisms to fund potential projects.





PLANNING AND DESIGN ADVISORY STRUCTURES WERE ESTABLISHED TO CODIFY RESPONSIBILITIES AND ACTIONS RELATED TO PLANNING EFFORTS.



THE PROJECT IS INTENDED TO ENERGIZE LOCAL COMMUNITIES AND SUPPORT ECONOMIC DEVELOPMENT ALONG THIS ICONIC RIVER.



### **CASE STUDY #3: BOSTON HARBOR ISLANDS**

Boston Harbor Islands is comprised of 34 islands and approximately 3,100 acres of parkland. The islands have historically been managed by different state and federal entities and contain significant cultural, recreational, and historical assets. Although the islands themselves have a very limited number of residents, the islands draw thousands of local, national and international visitors annually.

**Equity:** The Boston Harbor Islands Partnership recognizes the remote nature of the islands, all of which are only accessible by boat. Therefore the Partnership focuses its efforts on programs, transportation options and facilities that are affordable for a diverse range of visitors. The reasonableness of park access became an important goal to ensure a high level of service and increased volumes of passengers.

**Governance:** To provide a permanent and sustainable structure for planning, fundraising, operations and maintenance and in response to federal legislation, the island's stakeholders came together to form the Boston Harbor Partnership. This new partnership includes the National Park Service, Coast Guard, Massachusetts Department of Conservation and Recreation, Massachusetts Water Resources Authority, Massport, City of Boston, the Boston Planning and Development Agency, along with non-profit partners and an advisory council

with representatives from various interest groups and community organizations. This partnership facilitates coordination between the agencies that administer individual islands and continue to provide specific expertise in water management and cleanup, open space management, transportation, and community development.

**Funding:** Between 1996 and 2000, the stakeholders undertook a major cleanup of the harbor. At the time, federal legislation mandated three dollars of matching funds for every dollar of federal funds. Matching funds were provided by local municipalities, the State, nonprofits, and private funders. During this time, the Boston Harbor Island Alliance (now known as Boston Harbor Now) was established as a non-profit to solicit philanthropic support for the islands. Today, Boston Harbor Now is also responsible for cultivating philanthropy and generating earned income from retail sales and special events.



THE BOSTON HARBOR ISLANDS PARTNERSHIP COORDINATES HARBOR CLEAN UP AND MANAGEMENT OF THE ISLAND PARK, WITH REPRESENTATIVES FROM A RANGE OF GOVERNMENT AND NONPROFIT AGENCIES.



BOSTON HARBOR ISLANDS IS COMPRISED OF 34 ISLANDS AND APPROXIMATELY 3,100 ACRES OF PARKLAND.

# Opportunities: Express our Identity

The success of the river as a community asset and the health of the region is dependent on how well it serves the needs of all communities – those that are growing and changing as well as those that are experiencing stability or challenge. The region's demographic trends have significant implications for programming and design along the White River. With added investment along the White River are also opportunities to better connect and make whole the quilt of communities that currently have varying relationship with this incredibly underutilized asset.

Given the demographic diversity along the White River, improvements should be tailored to create distinct nodes and subdistricts with different types of programming tailored to nearby resident, worker and visitor populations. The following opportunities consider methods to think holistically about the relationship between a collective identity for the White River and distinct identities and characters for the communities that surround it.

## CREATING AND ENHANCING EXPERIENCES

Former industrial back doors and transportation corridors that hugged river edges and kept the public away from their shores are now being transformed for public

use to leverage their natural beauty and create a shared experience for all communities.

In places like Louisville, Kentucky and Los Angeles, California, cities and other governing organizations have taken river revitalization a step further. Here along the White River where similar land uses dominate much of the riverfront, the plan is uniquely positioned to develop and enhance this unique tapestry of emerging experiences that celebrate the diverse array of communities along the river. Communities range from very rural, where a fear of over-development exists, to very urban, where there is a lack of activation and programming to bring life to the connections that do exist. The river should be able to provide a variety of experiences that cater to the needs of all of these river communities.

## SUPPORT ECONOMIC GROWTH THROUGH BRANDING

Conversations with stakeholders in public meetings, committee meetings and neighborhood discussions have made it clear that there is no single identity for the White River. In fact, perceptions of the river vary among communities in the north and communities in the south and between the experiences people have on either side of the river.

Consistent branding of new projects and investments in the public realm can help to clarify identity and support economic growth. A unifying brand for the river can provide a way of celebrating experiences and projects along its length and can create momentum

for economic growth and talent attraction as well as enhance national competitiveness with peers. Development of a consistent brand can also help to alleviate negative perceptions of the White River including safety, water quality, and issues of property ownership and wayfinding.

### **BOLSTER PROGRAMMING**

Indianapolis and Hamilton County should take a community-first approach to providing programming. Tourism-driven programming should then be considered to attract visitors from outside the region or state and can bolster ongoing branding and marketing efforts. Investments in the needs of both existing residents and those the region seeks to attract will encourage a riverfront experience that caters to everyone.

### **LEVERAGE INVESTMENT TO BENEFIT EVERYONE**

As anchor projects such as 16Tech and the GM Stamping Plant advance, White River's partners should coordinate with project developers and evaluate value capture mechanisms that can supplement funding for operations and maintenance.

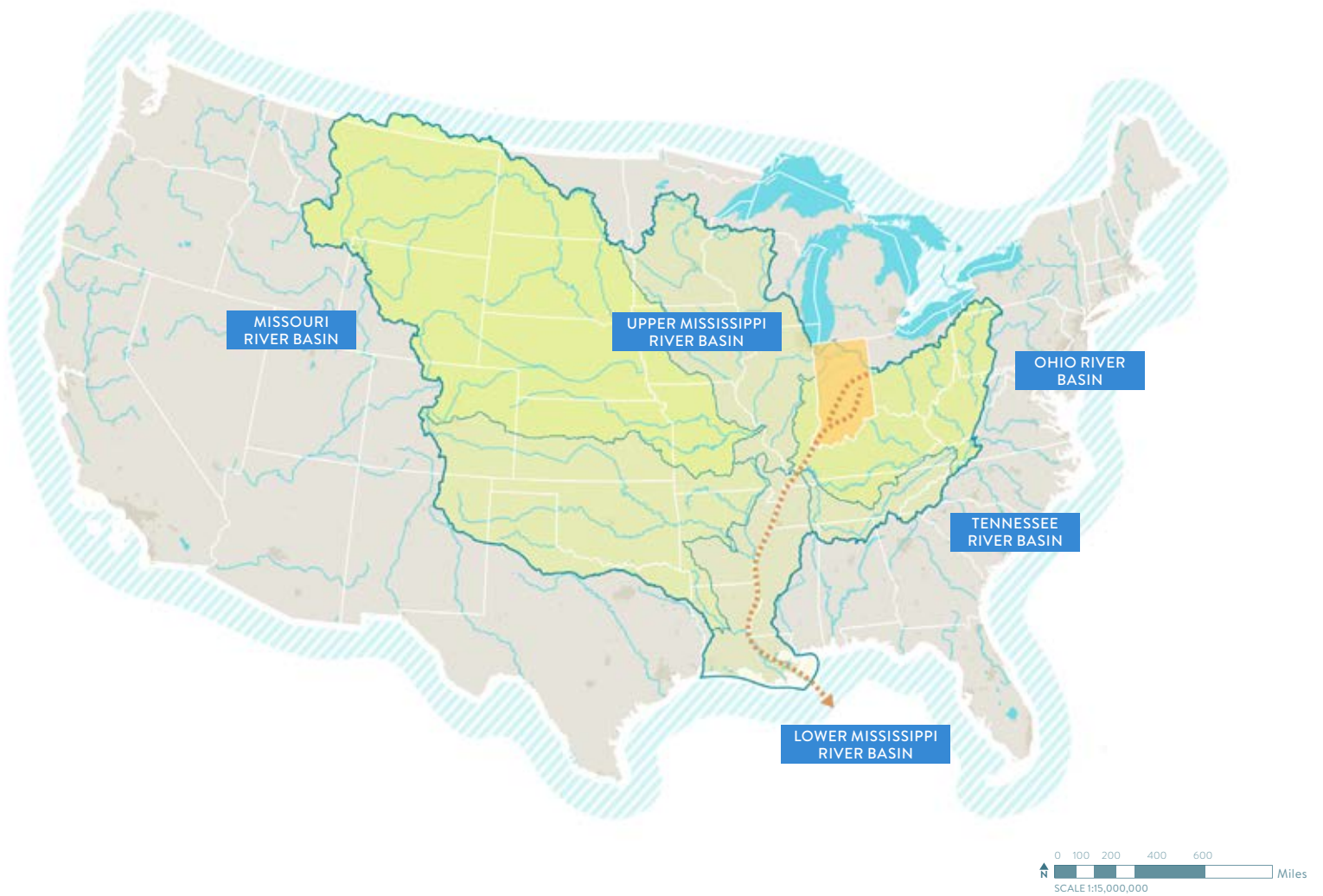
Local stakeholder organizations, such as nonprofits, can play a significant role in both capital campaigns and ongoing open space management. Regional efforts typically require a mix of funding sources to provide financial support for capital and operating expenses, including earned income, value

capture, philanthropy, and public funding. Finally, federal, state, and regional funding can supplement local funding to provide additional support for projects based on scope and eligibility. A significant amount of public coordination is required to secure funds from varied funding sources. Funding mixes generally change over time as public funding is supplemented by a growing amount of earned income, philanthropy, and value capture from nearby real estate. Connectivity investments are vital to ensuring access and visitation from residents and visitors to achieve earned income and value capture funding opportunities.



# Experience Nature

To “Experience Nature” means being able to immerse oneself in a landscape that feels safe, clean and endlessly intriguing. Not everyone believes the White River and its connected landscapes and tributaries are that way—and so they avoid or ignore the river. Turning around that perception—and the reality—will happen when everyone in the watershed can tell the story of how the White River can be clean and safe to swim in, and a remarkably beautiful place where unexpected encounters with wildlife and beauty are waiting around every bend.



# Relevant Planning Studies

## Past Studies

*Indiana's Section 303(d) List of Impaired Waters Total Maximum Daily Load (TMDL) Report*

*Combined Sewer Overflow (CSO) Long-Term Control Plan (LTCP)*

*Upper White River Watershed Restoration Action Strategy (WRAS)*

*Upper White River Watershed Regional Assessment and Planning Report*

*Rapid Watershed Assessment (RWA) Upper White Watershed*

*Watershed Management Plans (WMP)*

*Water and Quality of Life in Indiana*

*Flood Insurance Studies (FIS) and Flood Insurance Rate Maps (FIRM)*

*Fluvial Erosion Hazard (FEH) Study*

*Flood Impact Areas (FIA) from Flood Response Plans (FRP)*

*National Wetlands Inventory (NWI)*

*Indy Greenways Master Plan*

*Indy Parks Master Plan*

*Greening the Crossroads*

*Survey of the Freshwater Mussels of the Wabash River Drainage*

*Fishes of the White River Basin, Indiana*

## Ongoing Studies

*Water Quality Sampling Sites, Indiana Water Monitoring Inventory*

*Fish Consumption Advisory, Indiana State Department of Health*

*Underground Storage Tanks (UST / Leaking UST (LUST), IDEM Office of Land Quality*

*Illicit Discharge and Elimination (IDDE) Outfalls, Municipal Separate Storm Sewers (MS4) entities, including Carmel, Fishers, Noblesville, Hamilton County, and Indianapolis*

*Industrial Facilities Listing, Indiana Chamber of Commerce*

*Tier II Facilities, Hamilton County Emergency Management Agency (EMA) and Indianapolis Department of Homeland Security (DHS)*

## Relevant Projects

### FOREST FOR INDY

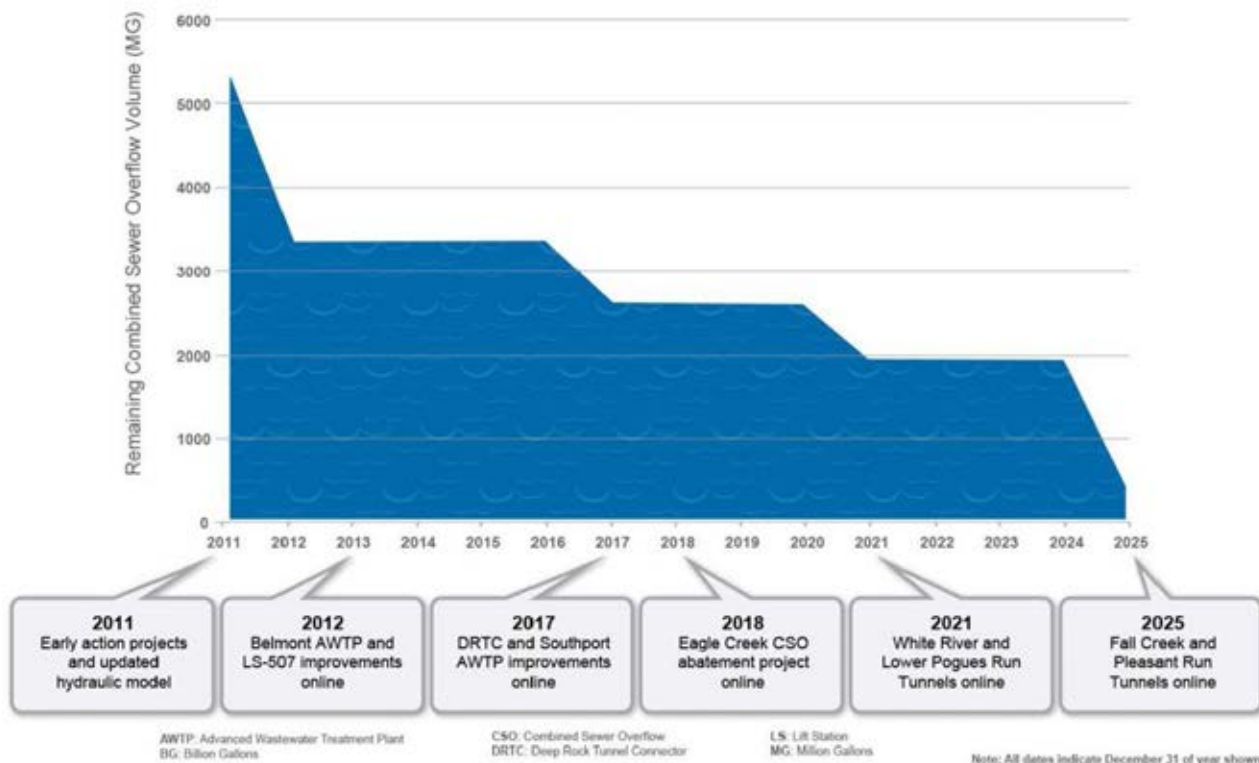
The Indiana Forest Alliance in 2018 launched a project to increase the relatively low tree canopy cover of Marion County—about 33 percent of the ground is shaded by trees—closer to 40-60 percent, which is recommended for urban settings outside the central business district. To reach 40 percent tree canopy cover in Marion County by planting in non-forested areas, some millions of trees would need to be planted, according to the Alliance. The Indiana Forest Alliance will map the forest cover in Marion County, identify forests that are not protected, and assess the quality of forests in order to set priorities for preserving high quality

forest areas and forest cover in general. Some of the forests will be along the White River. See <https://indianaforestalliance.org/forests-for-indy>.

## COMBINED SEWER OVERFLOW (CSO) PROJECTS

Both Indianapolis (via CEG) and Noblesville are actively implementing their LTCPs to reduce sewer overflows into the White River. Implementation of Indianapolis' LTCP will reduce CSO events from 27 active outfalls in the White River by 95% or to four overflows per year by 2025. To do this the city is undertaking a major infrastructure project

called DigIndy Tunnel System as well as improvements to the wastewater treatment plants. DigIndy is a network of tunnels 200 feet underground to store sewage during and after a wet weather event. It is designed to slowly release the sewage into the wastewater treatment plant when capacity is available. The White River Tunnel is one of the tunnels in the network and is currently under construction. All together, the DigIndy project will divert 3.5 billion gallons of sewage from polluting Indianapolis' waterways. The following graphic from CEG shows the schedule, project milestones, volume reduction from CSOs.





Noblesville has 6 active CSOs and is in the process of major infrastructure to their wastewater treatment plant, partial separation, and increased sewer conveyance to reduce to four overflows per year by 2022. The result of Indianapolis' and Noblesville efforts will be improved water quality and quality of life for neighboring (and downstream) residents and businesses.

## **UNSEWERED AREA REMEDIATION**

Within the White River corridor study area there are several pockets of unsewered areas. Regionally, the White River Alliance introduced a campaign, Clear Choices Clean Water Indiana, to increase awareness about the impacts individuals have on local tributaries. The campaign encouraged change through individual efforts to reduce their impact on waterways, including the White River. In Indianapolis, CEG is working to extend sewer infrastructure through their Septic Tank Elimination Program (STEP). Areas are prioritized based on septic system failure rates, housing density, and proximity to a floodplain. In Hamilton County, pockets of unsewered areas can be found along the White River in Fishers, Noblesville, and most of the unincorporated county. The Hamilton County Health Department has identified priority areas with historical septic problems and illegal discharges. Upstream of Hamilton County, a significant portion of the watershed is unsewered. Lack of maintenance of septic systems and poor soil absorption properties contribute to E.coli pollutant loadings. Work

toward remediating septic systems will improve water quality in the White River.

## **MUSSEL AND FISH MONITORING**

Since 2000, the Indiana Department of Natural Resources has periodically sampled the mussel and fish communities of the White River in the study area. Data are available from Brant Fisher, Nongame Aquatic Biologist, Science Unit. In general, mussel and fish diversity is higher today than it was in the 1980s.

# Observations and Findings

## Methodology

### ECOLOGY

#### *Existing Information*

Information about the White River and its nearby habitats was compiled from both published and unpublished sources, including:

- Internet search for scientific studies of the White River ecosystem and adjacent habitats
- Summarized previous and current strategic plans related to White River ecology
- Internet search and phone interviews with subject experts on scientific studies and surveys of mussels and fish in the White River
- Query of the Indiana Natural Heritage Information System for rare plants, animals, and unique ecological features
- Mapping of land cover from the USGS National Land Cover Database.
- Review of pre-1840 vegetation data from the General Land Office Survey notes, as a guide to understanding current ecological conditions
- Review of climate, geology and soils data from NOAA, the USGS, and USDA

#### *Field Investigation and Analysis*

The team's ecology and engineering experts analyzed data and identified the kinds and concentrations of rare natural features and locations of large and moderately-sized natural areas. The river ecosystem was investigated from the shore, near-shore, and a raft. The team visited natural areas along both sides of the 58-mile White River study area, documenting conditions on field forms and in photographs.

Important natural areas were ranked as having moderate, high, and exceptional value using these criteria:

- Size – 1-10 acres; 11-100 acres; 101+ acres
- Surrounding Land Use – Developed; Agricultural; Natural
- Habitat connectivity – Unconnected to Other Vegetation; Somewhat Connected; Connected
- Habitat complexity – Few plant communities & habitats, Some plant communities & habitats; Several plant community types & habitats
- Rare features – No rare plants, animals, rookeries, or other natural features; Few rare features; Several rare features

## **WATER RESOURCES**

### *Existing Information*

Water resource information was assembled for the White River and Upper White River Watershed, through the following methods:

- Review and summarize water resource studies and raw water quality and flood data
- Research ownership, design, and function of flood control infrastructure
- Review climate change data and how it relates to water resources in central Indiana
- Assemble GIS layers for land use, point source pollution, water quality sampling sites, wetlands, flood control infrastructure, flood impact areas and floodplains
- Site visits and additional data collection on the water, stream bank and bridge crossings
- Assign future land use and impervious percentages to the Upper White River Watershed
- Complete a long-term hydrologic impact assessment to compare pollutant loading from current and future land uses
- Model future conditions and changes to floodplain boundaries based on forecasted climate change data

### *Analysis*

The team analyzed water quality and flood data to identify opportunities for public engagement and natural resource/floodplain restoration in the White River corridor

- GIS analysis to create a habitat map (flood control infrastructure, natural areas, land ownership, and special flood hazard area) and water quality map (land use and point source pollution)

## What We Heard

It was clear at the three open houses that **people feel deeply about the river**. Many are already involved in improving it, while others want to see it improved. Specific interests diverged; however, ranging from private property concerns, to individuals wishing to use the dammed pools for recreation, to people simply asking, “When can I eat the fish?” and “Will I get sick if I touch the water?”

The community shared a great deal of **local intelligence**, giving the team a better understanding of river ecology issues from the people living near and using the river for many years. The following bullets summarize the key perspectives of the community:

- **Sediment is a serious and worsening issue.** The community reported that pools are filling in, and pollution encourages the growth of Eurasian water milfoil (*Myriophyllum spicatum*), which further clogs the waterway. The Indiana Dept. of Environmental Management (IDEM) will not allow dredging due to fears of releasing PCBs and other contaminants in the river bed.
- **Sediment can be reduced using existing programs** and ongoing initiatives. The White River Alliance trains and certifies people to prepare stormwater pollution prevention plans (SWPPPs) for construction sites—greatly reducing a significant sediment source in developed areas. The Marion County Soil and Water Conservation District (SWCD) has a soil health program that improves soil’s capacity to take in water quickly (i.e.—

reducing the amount running overland to the river. In Brownsburg, a farmer has significantly reduced his sediment entering the Eagle Creek Reservoir by using no-till farming techniques.

- **Urban areas need better stormwater management.** Sediment and other pollutions flow in pipes directly from streets and parking lots to the river. Tippecanoe County has a stormwater ordinance that could be replicated. The White River Alliance has a stormwater management program. The City of Indianapolis charges ‘user fees’ based on impervious surface to fund stormwater management projects.
- **Dam issues.** The low-head **dam on Williams Creek is too low**; it captures flow from the White River, drying it out. The Williams Creek dam needs to be raised to restore flow in the White River during low-water periods. Other concerns include issues of safety and appropriate recreation along dams, impacts to the ecological function of the White River and sediment capture and maintenance.
- **Wildlife are using the river.** People have observed that beaver, coyote, pileated woodpecker, osprey, eagle, fox, heron, egret, and other wildlife are all living and moving around the river.

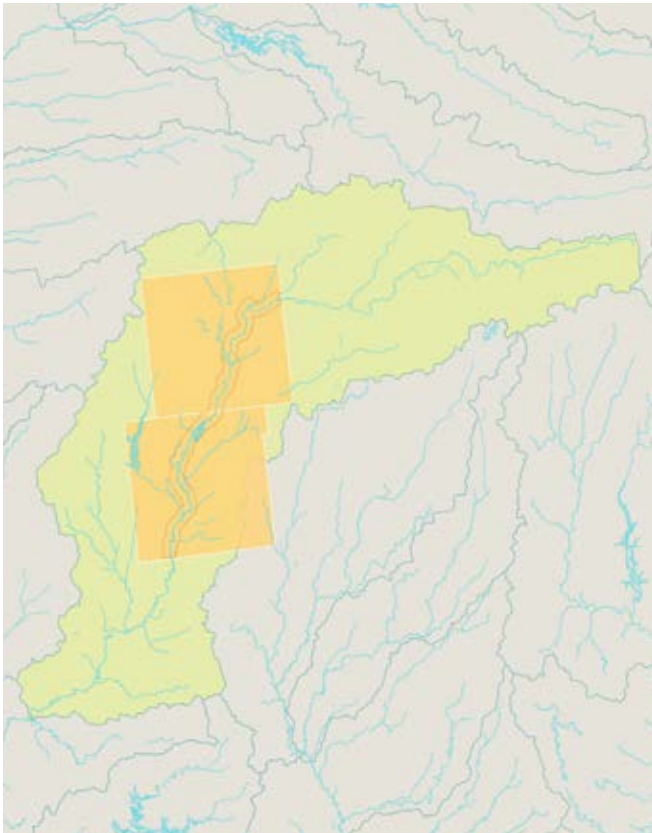
At three public open houses, stakeholder meetings, and a technical advisory committee meeting, the team recorded significant observations, points of fact, recommendations, and general commentary regarding the ecology of the White River and its adjacent habitats, as well as past and ongoing programs and projects.



## The White River Ecosystem

### A BROWN TO BLUE TO CLEAR RIVER

Few of the two million people—30 percent of Indiana's population—living in the 2,271 square mile watershed of the upper White River realize just how much the community has shaped the river's character by how people use the land, various practices in our homes and work places, and what is done directly to river. One visible effect is on the color of the river. After a rain, the river runs brownish with sediment; up to half of the



THE WHITE RIVER WATERSHED IN MARION AND HAMILTON COUNTIES (HIGHLIGHTED) HAVE NEARLY A THIRD OF INDIANA'S POPULATION.

sediment is dislodged from beds and banks of tributaries and the river due to the excessive rush of water. Sediment is a symptom of too much water in the river from too much drainage in the watershed. Nearby areas of pavement, rooftops, and cropland accelerate and increase the volume of water entering the river, causing it to rise and fall with even small rainstorms.

Plants struggle to survive the frequent fluctuations in the water level during larger scouring events. Sediment that is already in the river is agitated by the storm flow as well. Sediment also washes directly in from storm sewers, ditches, and construction sites. The situation is worsening due to the ever-increasing amount of rainfall in the region, with the majority coming from larger storms. The same dams that prevent the movement of fish and mussels are effective to clean the water when sediment drops from the water column in the still water above the dams. On the other hand, limited field inspections in rural areas suggest that in many places the river bottom is composed of sand, gravel, and cobble, which creates a good mussel habitat.

While the river turns brown after rain, in between rains, especially in summer, the river has a green tint created by billions of microscopic green algae and diatoms. At such times, the algae makes it so that it is not possible to see more than 2-3 feet into the water. This effect is primarily caused by phosphorus which comes into the river from many places: streets and parking lots,



AFTER STORMS, THE RUSH OF RISING WATER DISLODGES SEDIMENT—AND ATTACHED PHOSPHORUS—FROM BANKS AND THE RIVERBED, AND BRINGS OTHER SEDIMENT INTO THE RIVER, TURNING THE WATER BROWNISH.



BELOW DAMS, WHICH CAPTURE SEDIMENT, ROCKS ARE RELATIVELY CLEAN AND FREE OF SEDIMENT.



IDEAL MUSSEL HABITAT PROVIDED BY SANDY, GRAVELLY RIVER BOTTOM; SILT AND RUBBLE MAKE IT HARDER FOR MUSSELS TO DO WELL.





THE HUGE AMOUNTS OF PHOSPHORUS WASHED INTO THE RIVER BY STORMS IS CAPITALIZED ON BY MICROSCOPIC, PLANTONIC ALGAE IN THE RIVER, BOOSTING THEIR NUMBERS AND GIVING THE RIVER AN OLIVE-GREEN TINT.

cropland, storm sewers, home septic systems, wastewater treatment plants, and geese and dog droppings. Much of the phosphorus is bound to particles of sediment; hence, if sediment was reduced phosphorus would also go down. Finally, in early spring, late fall, and winter, when temperatures drop, the water runs clear as the algae growth slows down. The White River has a wonderful internal capacity for self-cleaning. But, this “assimilative capacity” of the river is overwhelmed by an abundance of paving and cropland.

## MUSSELS IMPROVE THE RIVER ECOSYSTEM

Freshwater mussels were a dominant feature of the White River in the early 1800s, with over 70 species of mussels cataloged at that time. The Midwest formerly was a global hotspot for mussel diversity. Dense mussel beds covered hundreds of square feet in many reaches of rivers. Mussels were a keystone

species – they strongly influenced the river ecosystem and other species by regulating water quality and influencing the river bed.

Freshwater mussels act as natural filters by removing large amounts of sediment and organic matter from the river. As they move, they mix riverbed sediment with a material



THE WHITE RIVER WAS ONCE HOME TO EXTENSIVE MUSSEL BEDS AND SEVERAL DOZEN SPECIES, BUT TODAY FEWER THAN HALF THE SPECIES PERSIST IN SMALL COLONIES HERE AND THERE—AN INDICATOR OF PAST DAMAGING LAND USE AND TREATMENT OF THE RIVER.



NOT ONLY DO THE DOZENS OF MUSSEL SPECIES COME IN DIFFERENT SHAPES, SIZES, AND COLORS, THEY HAVE EAR-CATCHING NAMES: PURPLE WARTYBACK, RIFFLESHELL, WAVY-RAYED LAMPMUSSEL, HEELSPLITTER, ORANGE-FOOT PIMPLEBACK.

# Freshwater Mussel Species of the White River Watershed

MUSSEL NAME	SPECIES NAME	REPORTED BY CUMMINGS ET AL. IN WHITE RIVER (West & East Forks) (1992)	MUSSELS IN PROJECT CORRIDOR Reported by Natural Heritage Information System (2018)	FEDERAL & STATE PROTECTED STATUS
Brass Mucket	Actinonaias ligamentina	Alive		
Elktoe	Alasmodonta marginata	Alive		
Slippershell	Alasmodonta viridis	Alive		
Threeeridge	Amblema plicata	Alive		
Giant Floater	Anodonta grandis	Alive		
Paper Pondshell	Anodonta imbecillis	Alive		
Flat Floater	Anodonta suborbiculata	Shell		
Cylindrical Papershell	Anodontoides ferussacianus	Alive		
Rock Pocketbook	Arcidens confragosus	Alive		
Purple Wartyback	Cyclonaias tuberculata	Alive		
Fanshell	Cyprogenia stegaria	Shell	Shell, 2013	FE
Butterfly	Ellipsaria lineolata	Shell		
Elephant-ear	Elliptio crassidens	Alive		
Spike	Elliptio dilatata	Alive		
White Catpaw	Epioblasma obliquata perobliqua	Not Found	Shell, 2013	FE
Tennessee Riffleshell	Epioblasma propinqua	Shell		FE
Northern Riffleshell	Epioblasma rangiana	Shell	Shell, 2010	FE
Tubercled Blossom	Epioblasma torulosa	Shell		FE
Snuffbox	Epioblasma triquetra	Shell	Shell, 2011	FE
Ebonyshell	Fusconaia ebena	Shell		
Wabash Pigtoe	Fusconaia flava	Alive		
Longsolid	Fusconaia subrotunda	Shell	Shell, 2013	SE
Plain Pocketbook	Lampsilis cardium	Alive		
Wavy-rayed Lampmussel	Lampsilis fasciola	Alive	Shell, 2013	SC
Pocketbook	Lampsilis ovata	Shell		
Fat Mucket	Lampsilis siliquoidea	Alive		
Yellow Sandshell	Lampsilis teres	Alive		
White Heelsplitter	Lasmigona complanata	Alive		
Creek Heelsplitter	Lasmigona compressa	Alive		
Fluted-shell	Lasmigona costata	Alive		
Fragile Papershell	Leptodea fragilis	Alive		
Black Sandshell	Ligumia recta	Shell	shell, 1991	
Washboard	Megaloniais nervosa	Alive		

EX - EXTINCT  
 FC - FEDERAL CANDIDATE SPECIES  
 FE - FEDERALLY ENDANGERED

FT - FEDERALLY THREATENED  
 SC - INDIANA SPECIES OF SPECIAL CONCERN  
 SE - INDIANA STATE ENDANGERED



## Freshwater Mussel Species of the White River Watershed, cont.

MUSSEL NAME	SPECIES NAME	REPORTED BY CUMMINGS ET AL. IN WHITE RIVER (West & East Forks) (1992)	MUSSELS IN PROJECT CORRIDOR  Reported by Natural Heritage Information System (2018)	FEDERAL & STATE PROTECTED STATUS
Threehorn Wartyback	Obliquaria reflexa	Alive		
Hickorynut	Obovaria olivaria	Alive		
Ring Pink	Obovaria retusa	Shell		EX, FE
Round Hickorynut	Obovaria subrotunda	Shell	Shell, 2013	SE
White Wartyback	Plethobasus cicatricosus	Not Found	Shell, 2013	FE
Orangefoot Pimpleback	Plethobasus cooperianus	Not Found	Shell, 2013	FE
Sheepnose	Plethobasus cyphus	Not Found	Shell, 2013	FE
Clubshell	Pleurobema clava	Shell	Shell, 2013	FE
Ohio Pigtoe	Pleurobema cordatum	Alive		SC
Rough Pigtoe	Pleurobema plenum	Shell	Shell, 2007	FE
Pyramid Pigtoe	Pleurobema pyramidatum	Not Found	Shell, 2013	
Pink Pigtoe	Pleurobema rubrum	Shell		SE
Round Pigtoe	Pleurobema sintoxia	Shell		
Pink Heelsplitter	Potamilus alatus	Alive		
Pink Papershell	Potamilus ohioensis	Alive		
Kidneyshell	Ptychobranhus fasciolaris	Alive	Shell, 2013	SC
Rabbitsfoot	Quadrula cylindrica	Shell	Shell, 2013	FT, SE
Monkeyface	Quadrula metanevra	Alive		
Wartyback	Quadrula nodulata	Alive		
Pimpleback	Quadrula pustulosa	Alive		
Mapleleaf	Quadrula quadrula	Alive		
Salamander Mussel	Simpsonaias ambigua	Shell		SC
Creeper	Strophitus undulatus	Alive		
Purple Lilliput	Toxolasma lividus	Alive	Shell, 2007	SC
Lilliput	Toxolasma parvus	Shell		
Pistolgrip	Tritogonia verrucosa	Alive		
Fawnsfoot	Truncilla donaciformis	Alive		
Deertoe	Truncilla truncata	Alive		
Pondhorn	Unio merus tetralasmus	Alive		
Rayed Bean	Villosa fabalis	Shell	Shell, 1989	FE
Rainbow	Villosa iris	Shell		
Little Spectaclecase	Villosa lienosa	Alive	Shell, 2010	SC

EX - EXTINCT

FC - FEDERAL CANDIDATE SPECIES

FE - FEDERALLY ENDANGERED

FT - FEDERALLY THREATENED

SC - INDIANA SPECIES OF SPECIAL CONCERN

SE - INDIANA STATE ENDANGERED



MANY MUSSELS USE INGENUOUS WAYS TO LURE FISH CLOSE ENOUGH FOR THEIR YOUNG TO LATCH ONTO THE GILLS AND HITCH A RIDE UPSTREAM.

produced by their feet, “cementing” the sediment in place and keeping it out of the water column. Mussel populations usually are in rivers with good water quality. They are important food for heron, egret, duck, goose, otter, raccoon, fish, and other creatures.

Mussels rely on fish to transport their larvae to upstream areas of the river and connecting creeks. Many species of mussel attract fish with special lures (that look like a worm or small prey fish) and release fertilized eggs when the fish is near. Mussel larvae, called glochidia, attach to the gills of fish and mature. When old enough, glochidia drop from the gills in hopes of landing in a good spot. Dams, however, limit fish movement and prevent mussels from recolonizing reaches from which they have disappeared.

Mussels were heavily harvested from the White River from the 1890s through the 1960s for the button and cultured pearl industries.

Many of the colorful common names for these mussels came from the people who harvested the mussels for the button industry in the late 1800s. This harvest depleted many species and dramatically reduced the abundance and effect of mussels on the ecosystem. Harvesting mussels was made illegal in 1991, but their recovery has been slow. There are 17 dams from Martinsville to the headwaters of the West Fork. These dams prevent movement of the fish species mussels rely on for



THE ASIAN CLAM WAS INTRODUCED TO NORTH AMERICA IN THE SECOND HALF OF THE 20TH CENTURY, POSSIBLY FOR FOOD, POSSIBLY ACCIDENTALLY WHILE HITCHING A RIDE ON OTHER MUSSELS IMPORTED FOR FOOD. IT COMPETES WITH NATIVE MUSSELS FOR FOOD AND A PLACE IN THE RIVER ECOSYSTEM.

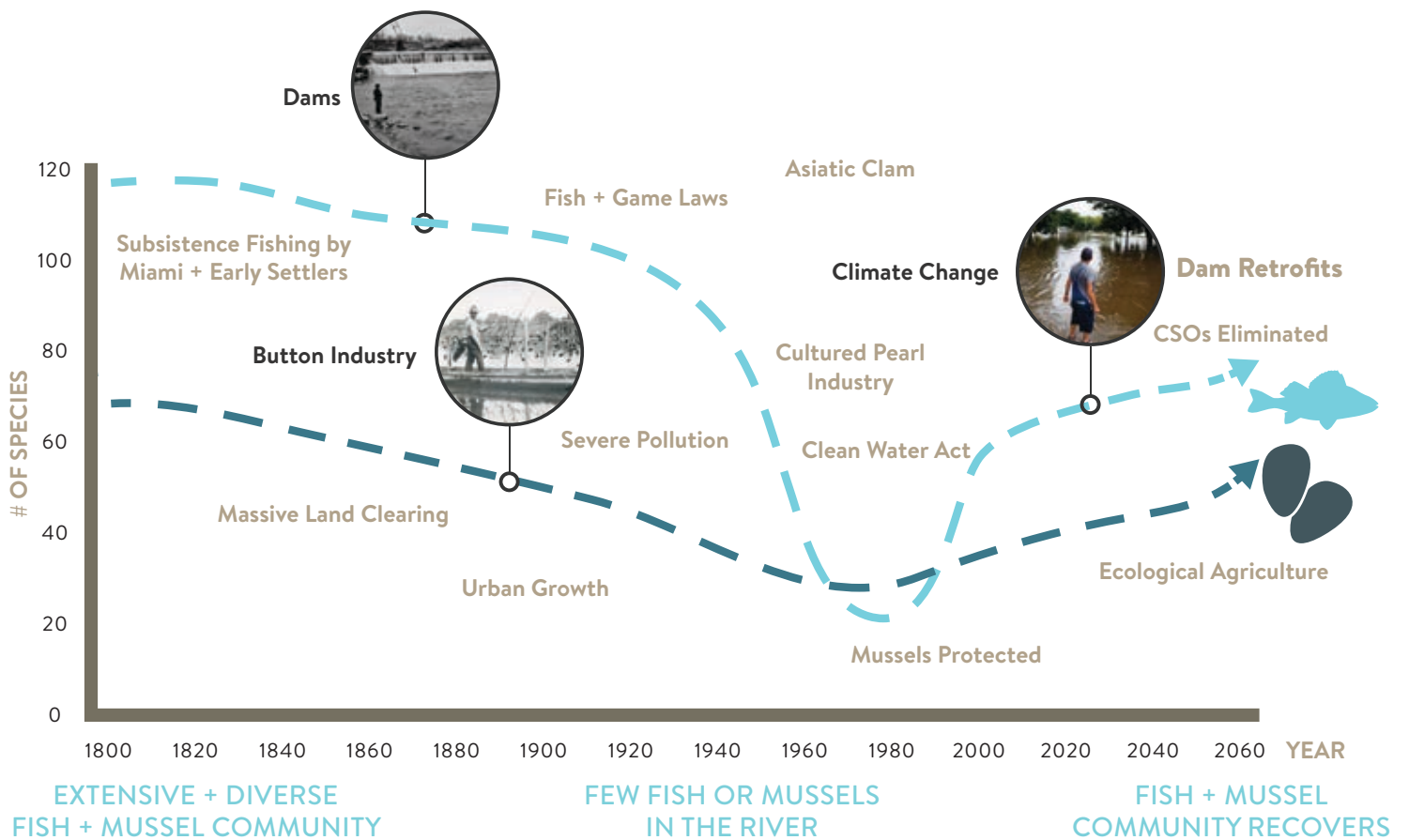
reproduction. Dredging and channelizing the river and its tributaries also eliminates good habitat; runoff from urban areas (especially Marion and Hamilton County) overwhelms the capacity of mussels to filter water effectively; and an invasive Asian clam competes with native species for habitat and resources. Today, the Asian clam is found throughout much of the White River.

Mussel surveys of the West Fork of the White River (General Resources: Cummings et al. 1992) detected 65 species from the 1820s on, but only 38 were found alive in surveys from 1989-1991—a loss of 46 percent of species. Several of those lost were threatened or endangered species. Dense mussel beds were rare, with most species represented by a few individuals. The most widespread were the plain pocketbook (*Lampsilis cardium*), white heelsplitter (*Lasmigona complanata*), fragile papershell (*Leptodea fragilis*), mapleleaf (*Quadrula quadrula*), and pink papershell (*Potamilus ohioensis*). Large populations were found of the fragile papershell, mapleleaf, giant floater (*Anodonta grandis*), spike (*Elliptio dilatata*), and pink heelsplitter (*Potamilus alatus*). At the time, no species were found alive in the river in Indianapolis in 1989-1991, whereas formerly there were 18-22 species identified to be living there. An updated 2016 survey, however, found 9 living species and weathered shells of two others in the Indianapolis reach of the river, indicating that conditions for mussels have improved since the 1980s.

While dams can help improve mussel habitat by holding back sediment and increasing oxygen levels through agitation, they need to be designed in a way that allows fish passage across the dam. Without this, even as the White River recovers, mussel diversity will plateau at 10-12 species because recolonization will not be able to happen.

Mussel experts Kevin Cummings and Brant Fisher (see **Outside Conversations**) described ways to restore mussels to their important place in the White River ecosystem.

- Remove or retrofit dams to allow free passage of fish and increase mussel recolonization.
- Increase the abundance of fish that host glochidia—modify dams, reduce sediment that covers fish spawning habitat.
- Reintroduce mussels to reaches where they are missing by a) relocating adults, b) propagating them in cages in the river or at a hatchery, and c) promoting glochidia attachment to fish gills and then releasing the fish.
- Increase the density of mussels in their beds—increasing chances for successful reproduction.
- Greatly reduce the sediment in the river, which reduces mussel reproduction success.
- Preserve the natural meandering channels of White River tributaries—they are mussel refuges.



FROM A DIVERSE ARRAY OF FISH AND MUSSELS 200 YEARS AGO, THE WHITE RIVER ECOSYSTEM WAS BROUGHT LOW BY INCOMPATIBLE USES OF THE RIVER AND WATERSHED; BUT AFTER PASSAGE OF THE CLEAN WATER ACT, THE RIVER ECOSYSTEM HAS MADE A DRAMATIC RECOVERY, WITH FUTURE GAINS EXPECTED AS ECOLOGICAL THINKING BECOMES COMMONPLACE IN THE HUMAN ENTERPRISE.



- Protect a wide riparian zone and install vegetated buffers to filter runoff and maintain habitat.
- Improve habitat quality—more vegetation, more gravel and sand, less flood scouring by better control of runoff.
- Lastly, existing mussel beds need to be covered by water—this should be ensured by releasing water from dams in dry periods.

## FISH SIGNIFY A HEALTHY ECOSYSTEM

The variety, number and health of the fish in the river are signs of a healthy river ecosystem. Past pollution affected fish, but changes in laws and behavior starting in the 1970s have dramatically improved the fish community.

The White River supports a warm water fish community, meaning trout, salmon and other cold-water species cannot survive. Since 1895, 158 fish species have been found in the White River watershed (Crawford et al. 1996), with 38 new species found since 1955. Five of these were introduced by people, and the rest either migrated into the watershed or were detected using better techniques. In 1987, 134 fish species called the White River watershed home. Fifty-seven species are deemed as “common to abundant,” including familiar game fish (bass, crappie, catfish, sauger, and sunfish), big river fish (gar, shad, carp, chub, sucker, carpsucker, quillback, buffalo, redhorse, bullhead, and drum), and other

notable smaller fish (shiner, minnow, dace, stonecat, pickerel, topminnow, silverside, sculpin, darter, and logperch).

Past damages to the river ecosystem and its fish began with, in the 1800s, forest clearing and wetland drainage. This damage fed sediment to the river, disrupting both mussel beds and fish spawning habitat. Over-fishing and declining fish stocks led to the introduction of carp native to China and Russia. Carp also disturbed the river bottom by rooting, eating vegetation, and competing with native fish for resources. In the 1890s, Indianapolis excavated 15 feet of streambed. Runoff from expanding urban areas and direct discharge of chemicals and waste harmed water quality by reducing oxygen levels or through outright poisoning. This regularly resulted in large fish kills—160 were recorded from 1960 to 1992. Despite best efforts of all, they occasionally still occur. In 1994, a CSO overflow event killed 510,000 fish in the Indianapolis reach of the river, and a chemical release killed a large number of fish in 2000. Due to pollution by mercury and PCBs (polychlorinated biphenyls), the entire White River carries a fish consumption advisory for females under 50 and males under 18; everyone else is limited to 8 ounces of fish from the river per month.

People have tried to improve conditions for fish populations in the river in the past, beginning in the early 1900s when harvest

regulations and fish hatcheries helped bolster fish populations. Although small changes in water management began in the early 1900s, it was not until the 1972 Clean Water Act that water quality improved significantly. Wastewater handling improved, runoff from pavement and fields improved—including changes in crop tillage practices—and wetlands were restored. Despite periodic fish kills, a focus on cleaning up wastewater and increasing oxygen levels since 1980 has led to a significant rebound in fish populations in the Indianapolis region. Over a 20 year span, the number of fish species has increased from 9 to 63.



COMMON FISH OF THE WHITE RIVER.

## Fish Species of the White River Watershed

FISH NAME	SPECIES NAME	REPORTED BY CRAWFORD ET AL. IN WHITE RIVER (West & East Forks) (1996)	ABUNDANCE IN RIVER	STATE PROTECTED STATUS
central stoneroller	Campostoma anomalum	Yes	Abundant	
white sucker	Catostomus commersoni	Yes	Abundant	Special Concern
spotfin shiner	Cyprinella spiloptera	Yes	Abundant	
gizzard shad	Dorosoma cepedianum	Yes	Abundant	
greenside darter	Etheostoma blennioides	Yes	Abundant	
johnny darter	Etheostoma nigrum	Yes	Abundant	
green sunfish	Lepomis cyanellus	Yes	Abundant	
bluegill	Lepomis macrochirus	Yes	Abundant	
longear sunfish	Lepomis megalotis	Yes	Abundant	
striped shiner	Luxilus chrysocephalus	Yes	Abundant	
smallmouth bass	Micropterus dolomieu	Yes	Abundant	
spotted bass	Micropterus punctulatus	Yes	Abundant	
largemouth bass	Micropterus salmoides	Yes	Abundant	
golden redhorse	Moxostoma erythrum	Yes	Abundant	
emerald shiner	Ntropsis atherinoides	Yes	Abundant	
bluntnose minnow	Pimephales notatus	Yes	Abundant	
creek chub	Semotilus atromaculatus	Yes	Abundant	
rock bass	Ambloplites rupestris	Yes	Common	
black bullhead	Ameiurus melas	Yes	Common	
yellow bullhead	Ameiurus natalis	Yes	Common	
freshwater drum	Aplodinotus grunniens	Yes	Common	
goldfish	Carassus auratus	Yes	Common	
river carpsucker	Carpodes carpio	Yes	Common	
quillback	Carpodes cyprinus	Yes	Common	
river chub	Comoxis micropogon	Yes	Common	
mottled sculpin	Cottus bairdi	Yes	Common	
steelcolor shiner	Cyprinella whipplei	Yes	Common	
common carp	Cyprinus carpio	Yes	Common	
grass pickerel	Esox americanus vermicularis	Yes	Common	
rainbow darter	Etheostoma caeruleum	Yes	Common	
orangethroat darter	Etheostoma spectabile	Yes	Common	
blackstripe topminnow	Fundulus noatus	Yes	Common	
Mississippi silvery minnow	Hybognathus nuchalis	Yes	Common	
northern hog sucker	Hypentelium nigricans	Yes	Common	
channel catfish	Ictalurus punctatus	Yes	Common	
smallmouth buffalo	Ictiobus bubalus	Yes	Common	
brook silverside	Labidesthes sicculus	Yes	Common	
longnose gar	Lepisosteus osseus	Yes	Common	
redeer sunfish	Lepomis microlophus	Yes	Common	
refin shiner	Lythrurus umbratilis	Yes	Common	

## Fish Species of the White River Watershed, cont.

FISH NAME	SPECIES NAME	REPORTED BY CRAWFORD ET AL. IN WHITE RIVER (West & East Forks) (1996)	ABUNDANCE IN RIVER	STATE PROTECTED STATUS
spotted sucker	Minytrema melanops	Yes	Common	
hornyhead chub	Mocomis biguttatus	Yes	Common	
white bass	Morone chrysops	Yes	Common	
silver redhorse	Moxostoma anisurum	Yes	Common	Special Concern
black redhorse	Moxostoma duquesnei	Yes	Common	
shorthead redhorse	Moxostoma macrolepidotum	Yes	Common	
river shiner	Notropis blennius	Yes	Common	
silverjaw minnow	Notropis buccatus	Yes	Common	
rosyface shiner	Notropis rubellus	Yes	Common	
sand shiner	Notropis stramineus	Yes	Common	
stonecat	Noturus flavus	Yes	Common	
logperch	Percina caprodes	Yes	Common	
blackside darter	Percina maculata	Yes	Common	
slenderhead darter	Percina phoxacephala	Yes	Common	
suckermouth minnow	Phenacobius mirabilis	Yes	Common	
white crappie	Pomoxis annularis	Yes	Common	
black crappie	Pomoxis nigromaculatus	Yes	Common	
flathead catfish	Pylodictis olivaris	Yes	Common	
blacknose dace	Rhinichthys atratulus	Yes	Common	
sauger	Stizostedion canadense	Yes	Common	
harelip sucker	Lagochila lacera	Not Found	Extirpated/Extinct	
popeye shiner	Notropis ariommus	Not Found	Extirpated/Extinct	
skipjack herring	Alosa chrysochloris	Yes	Occasional	
brown bullhead	Ameiurus nebulosus	Yes	Occasional	
bowfin	Amia calva	Yes	Occasional	
western sand darter	Ammocrypta elara	Yes	Occasional	
eastern sand darter	Ammocrypta pellucida	Yes	Occasional	Special Concern
American eel	Anguilla rostrata	Yes	Occasional	
pirate perch	Aphredoderus sayanus	Yes	Occasional	
highfin carpsucker	Carpionodes velifer	Yes	Occasional	
grass carp	Ctenopharyngodon idella	Yes	Occasional	
blue sucker	Cycleptus elongatus	Yes	Occasional	
faintail darter	Etheostoma flabellare	Yes	Occasional	
creek chubsucker	Erimyzon oblongus	Yes	Occasional	
slough darter	Etheostoma gracile	Yes	Occasional	
mud darter	Etheostoma asprigene	Yes	Occasional	
western mosquitofish	Gambusia affinis	Yes	Occasional	
goldeye	Hiodon alosoides	Yes	Occasional	
mooneye	Hiodon tergisus	Yes	Occasional	



## Fish Species of the White River Watershed, cont.

FISH NAME	SPECIES NAME	REPORTED BY CRAWFORD ET AL. IN WHITE RIVER	ABUNDANCE IN RIVER	STATE PROTECTED STATUS
		(West & East Forks) (1996)		
chestnut lamprey	Ichthyomyzon castaneus	Yes	Occasional	
silver lamprey	Ichthyomyzon unicuspis	Yes	Occasional	
blue catfish	Ictalurus furcatus	Yes	Occasional	
bigmouth buffalo	Ictiobus cyprinellus	Yes	Occasional	
black buffalo	Ictiobus niger	Yes	Occasional	
spotted gar	Lepisosteus oculatus	Yes	Occasional	
shortnose gar	Lepisosteus platostomus	Yes	Occasional	
pumpkinseed	Lepomis gibbosus	Yes	Occasional	
warmouth	Lepomis gulosus	Yes	Occasional	
orangespotted sunfish	Lepomis humilis	Yes	Occasional	
common shiner	Luxilus cornutus	Yes	Occasional	
speckled chub	Macrhybopsis aestivalis	Yes	Occasional	
silver chub	Macrhybopsis storeriana	Yes	Occasional	
yellow bass	Morone mississippiensis	Yes	Occasional	
river redhorse	Moxostoma carinatum	Yes	Occasional	
golden shiner	Notemigonus crysaeucas	Yes	Occasional	
mimic shiner	Notrois volucellus	Yes	Occasional	
bigeye chub	Notropis amblops	Yes	Occasional	
bigeye shiner	Notropis boops	Yes	Occasional	
ghost shiner	Notropis buchanani	Yes	Occasional	
silver shiner	Notropis photagenis	Yes	Occasional	
silverband shiner	Notropis shumardi	Yes	Occasional	
mountain madtom	Noturus eleutherus	Yes	Occasional	
brindled madtom	Noturus miurus	Yes	Occasional	
dusky darter	Percina sciera	Yes	Occasional	
river darter	Percina shumardi	Not Found	Occasional	
souther redbelly dace	Phoxinus erythrogaster	Yes	Occasional	
fathead minnow	Pimephales promelas	Yes	Occasional	
bullhead minnow	Pimephales vigilax	Yes	Occasional	
paddlefish	Polyodon spathula	Yes	Occasional	
shvelnose strurgeon	Scaphirhynchus platyrhynchus	Yes	Occasional	
walleye	Stizostedion vitreum	Yes	Occasional	
lake strurgeon	Acipenser fulvescens	Yes	Rare	Endangered
northern cavefish	Amblyopsis spelaea	Yes	Rare	Endangered
white catfish	Ameiurus catus	Yes	Rare	
flier	Centrarchus macropterus	Yes	Rare	
banded sculpin	Cottus carolinae	Yes	Rare	
brook stickleback	Culaea inconstans	Not Found	Rare	
red shiner	Cyprinella lutrensis	Yes	Rare	

## Fish Species of the White River Watershed, cont.

FISH NAME	SPECIES NAME	REPORTED BY CRAWFORD ET AL. IN WHITE RIVER (West & East Forks) (1996)	ABUNDANCE IN RIVER	STATE PROTECTED STATUS
threadfin shad	Dorosoma petenense	Yes	Rare	
streamline chub	Erimystax dissimilis	Yes	Rare	
gravel chub	Erimystax x-punctatus	Yes	Rare	
bluebreast darter	Etheostoma camurum	Not Found	Rare	Endangered
bluntnose darter	Etheostoma chlorosomum	Not Found	Rare	
swamp darter	Etheostoma fusiforme	Not Found	Rare	
herlequin darter	Etheostoma histrio	Yes	Rare	Endangered
spotted darter	Etheostoma maculatum	Not Found	Rare	Endangered
least darter	Etheostoma microperca	Not Found	Rare	
Tippecanoe darter	Etheostoma tippecanoe	Not Found	Rare	Endangered
variegate darter	Etheostoma variatum	Not Found	Rare	Endangered
northern studfish	Fundulus catenatus	Yes	Rare	Special Concern
starhead topminnow	Fundulus dispar	Not Found	Rare	
blackspotted topminnow	Fundulus olivaceus	Yes	Rare	
northern brook lamprey	Ichthyomyzon fossor	Yes	Rare	
least brook lamprey	Lampetra aepyptera	Not Found	Rare	
American brook lamprey	Lampetra appendix	Yes	Rare	
alligator gar	Lepisosteus spatula	Yes	Rare	
spotted sunfish	Lepomis pumctatus	Yes	Rare	
burbot	Lota lota	Not Found	Rare	
bantam sunfish	Lpomis symmetricus	Yes	Rare	Special Concern
rosefin shiner	Lythrurus ardens	Yes	Rare	
ribbon shiner	Lythrurus fumeus	Not Found	Rare	
striped bass	Morone saxatilis	Yes	Rare	
pallid shiner	Notropis amnis	Not Found	Rare	
pugnose shiner	Notropis anogenus	Not Found	Rare	
ironcolor shiner	Notropis chalybaeus	Not Found	Rare	
blackchin shiner	Notropis heterodon	Not Found	Rare	
blacknose shiner	Notropis heterolepis	Yes	Rare	
spottail shiner	Notropis hudsonius	Yes	Rare	
weed shiner	Notropis texanus	Yes	Rare	
channel shiner	Notropis wickliffi	Yes	Rare	
slender madtom	Noturus exilis	Not Found	Rare	
tadpole madtom	Noturus gyrinus	Yes	Rare	
freckled madtom	Noturus nocutrnus	Yes	Rare	
pugnose minnow	Opsopoeodus emiliae	Yes	Rare	
yellow perch	Perca flavescens	Not Found	Rare	
channel darter	Percia copelandi	Not Found	Rare	
gilt darter	Percina evides	Not Found	Rare	Endangered
central mudminnow	Umbra limi	Not Found	Rare	

## BACTERIA IN THE WHITE RIVER

Bacterial pollution clouds the present and future use of the White River. It is a significant public health issue, with as many as 8 in 1000 people predicted to become ill from swimming in the river at the water quality threshold. Even when bacteria levels are low, the perception of the White River is of a polluted river, impeding human health and enjoyment. *Escherichia coli*, or *E. coli* bacteria, do not directly make people sick, but they are used as an indicator of other organisms that could lead to illness.

The bacteria can come from many places, and scientists do not fully understand how they reproduce and grow. Some data suggest they are able to build up populations in urban water courses, and then are flushed into larger rivers by storms. Fortunately, *E. coli* and associated bacteria are killed by sunlight—sunny streams and wetlands typically have low *E. coli* counts if there isn't a large upstream source.

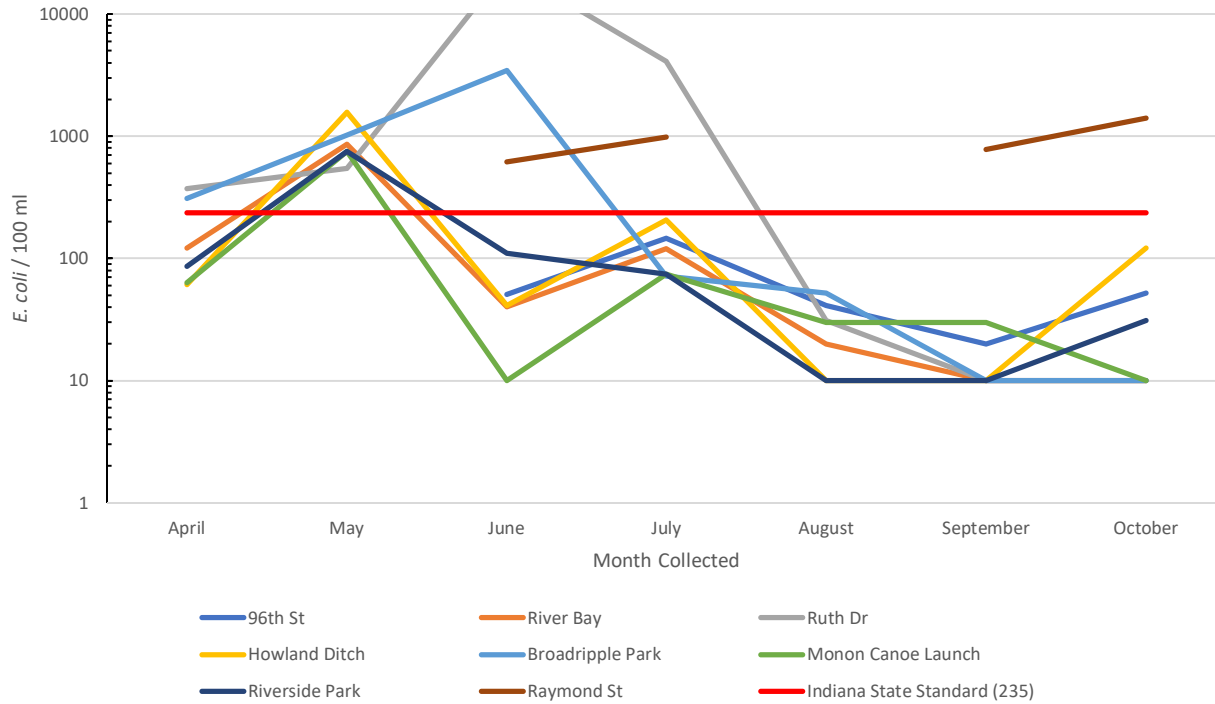
A pollution budget for *E. coli* in the White River—the pollution quantity, its sources, and ways for each source to reduce it—is called a Total Maximum Daily Load report (TMDL). The goal is to lower the TMDL amount to what the river can naturally treat. The TMDL report prepared by the Indiana Department of Environmental Management (IDEM) Office of Water Quality (CDM 2003) laid the groundwork for reducing bacterial contamination in the river. *E. coli* counts in the river were astonishingly high in the 1970s but have decreased significantly. The Indiana

State Water Quality Standard regarding *E. coli* in waters where full body contact recreation may occur is a geometric mean (based on five samples over 30 days) of 125 colony-forming units (cfu) or a single sample of 235 cfu. Despite improvements, this Water Quality Standard is still regularly exceeded in the White River.

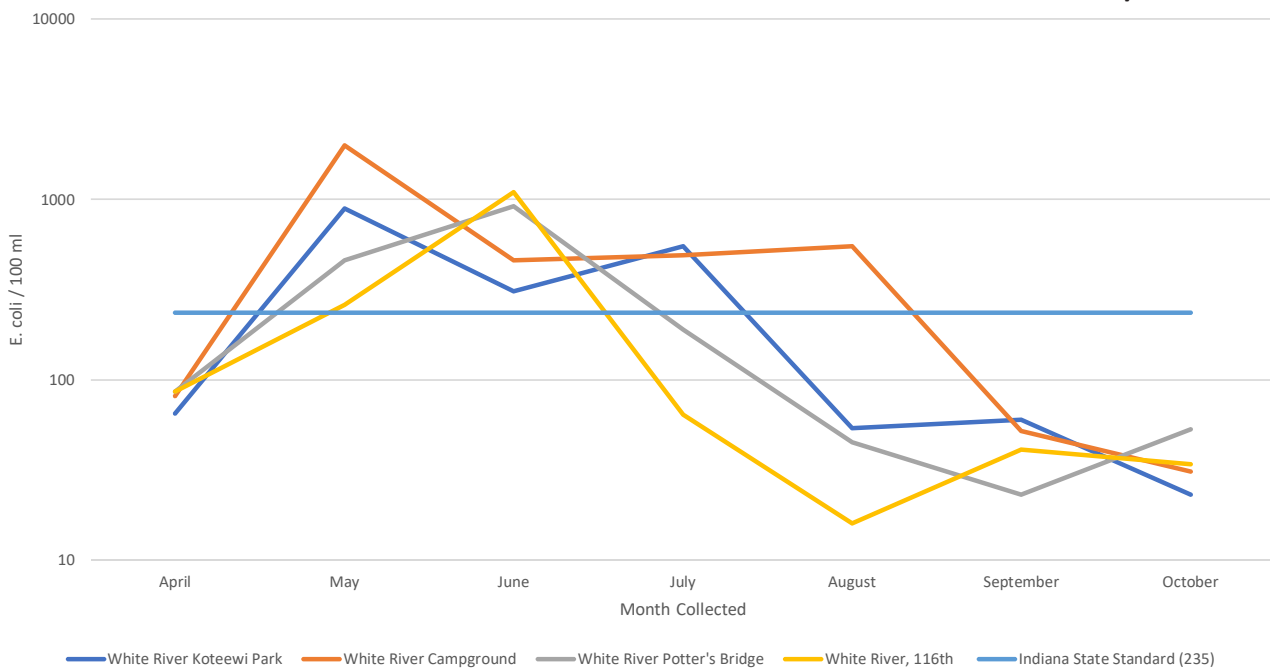
Marion County Public Health Department collects monthly samples for *E. coli* from major waterways from April through October, when many people recreate on the river. The Department uses the sample to warn people when high *E. coli* levels exist in recreational hotspots—parks, greenways, canoe launches, schools, and fishing areas. Warning signs are posted where *E. coli* levels exceed the 235 cfu/100ml State Water Quality Standard. About 60 sites are sampled across Marion County in the recreational season, often as part of other projects, and an average of 80 signs are posted each season.

There is a general pattern to the ups and downs of bacteria levels in the river: levels are higher after rain, and lower in drier periods. Still, not every sampling location follows this pattern. For instance, all May 2017 samples exceeded the state standard (above the red line on the chart) and three samples showed quite high levels of *E. coli* in June. Samples collected at Raymond Street always exceeded the state standard. Bacteria levels in other samples fell significantly in July and declined through September, then bacteria in October samples rose. In general, *E. coli* levels are

## 2017 E. coli Levels in the White River, Marion County



## 2017 E. coli Levels in the White River, Hamilton County



\*CHARTS ARE IN LOG SCALE TO SHOW ALL SAMPLES  
 \*\* JUNE RUTH DRIVE SAMPLE IS OFF CHART AT 24,000+  
 \*\*\* BREAKS IN LINES DUE TO INABILITY TO SAMPLE



expected to increase after rain because the precipitation can collect and transport bacteria from pet waste and agricultural land, or cause combined sewer overflows (CSOs, where raw sewage is released in big storms) in the city. During July, August and September, there is usually less rain, less runoff, and lower bacteria counts, as seen in the 2017 Marion County data.

The Hamilton County Health Department also performs sampling, with four sites in the study area between the Madison and Marion County lines. The results of 2017 sampling appear to be correlated with bacteria levels reported for the same time periods in Marion County; i.e. May levels were highest, and most sites had lower *E. coli* levels in July and August.

From what is known of *E. coli* behavior and observed in the sampling data, some general statements could be made about this issue for the White River:

- Higher rainfall from late April through May raised *E. coli* levels.
- Higher rainfall in September and October also raised *E. coli* levels.
- There is a potential that field-applied manures affect the Hamilton County sampling sites at Koteewi Park and the White River Campground.
- There is a good potential for CSO overflow events to raise *E. coli* levels at Marion County sites.

According to the TMDL, the main sources of *E. coli* in the White River, are CSO overflow events, storm sewer outfalls in towns and cities, and general overland runoff from developed and agricultural land. Minor amounts come from failing septic systems and wildlife. Manure applications to fields as well as confined animal feedlot operations (CAFOs) may be important contributors of bacteria in agricultural runoff, but older neighborhoods and rural septic systems connected to ditches may be involved, too. Efforts to reduce bacteria in the river must involve everybody, as everyone contributes in some way.

## **NATURAL AREAS & ECOSYSTEMS**

Climate, geology and soils—and use by people—have created the plant communities we see today along the White River. Where natural plant life exists, if large enough, we recognize them as “natural areas”—places where the natural world largely continues with less influence or segmentation by people than the farmland, cities and towns all around them.

The climate in central Indiana is called “humid, continental,” meaning the average temperature in mid-summer is in the 70s, in mid-winter the 20s, and the region expects 44 inches of precipitation fall each year. This climate is changing, however, judging from a 2018 study from Purdue University (Widhalm et al. 2018). From 1895 to 2016, the average temperature in Indiana rose about 1.2°F, especially in the winter. Annual precipitation

has also increased, primarily due to an increase in large storms. Researchers at Purdue estimate the increase has been 5.6 inches since 1895.

The ancient bedrock of limestone, dolomite, shale, and sandstone of the White River area was glaciated 13,000 years ago, forming a gently rolling landscape. The soils that developed were very fertile, enriched with calcium carbonate. The climate, geology, soils,

and historical and existing vegetation of the White River constitute an ecoregion—a land area where these factors are similar. The White River is in what is called the Loamy, High Lime Till Plains Ecoregion of central Indiana. These soils were developed from glacial deposits of Wisconsinian age and typically have better natural drainage than other local ecoregions, which is an ideal environment for livestock production.



CSOS AND ORDINARY STORM SEWER OUTFALLS LIKE THIS ONE DELIVER A LARGE AMOUNT OF THE TOTAL BACTERIAL LOAD TO THE WHITE RIVER.

## LAND COVER CHARACTER

Before 1830, the region was blanketed by several forest types: oak-hickory forest on dry ground, oak-maple-tulip and beech-maple forest on moist sites, maple-elm-cottonwood forest on floodplains, and sycamore-cottonwood forests on riverbanks. That situation has changed: forest now covers about 11 percent of the White River study area, developed lands about 52 percent, and cropland about 23 percent.

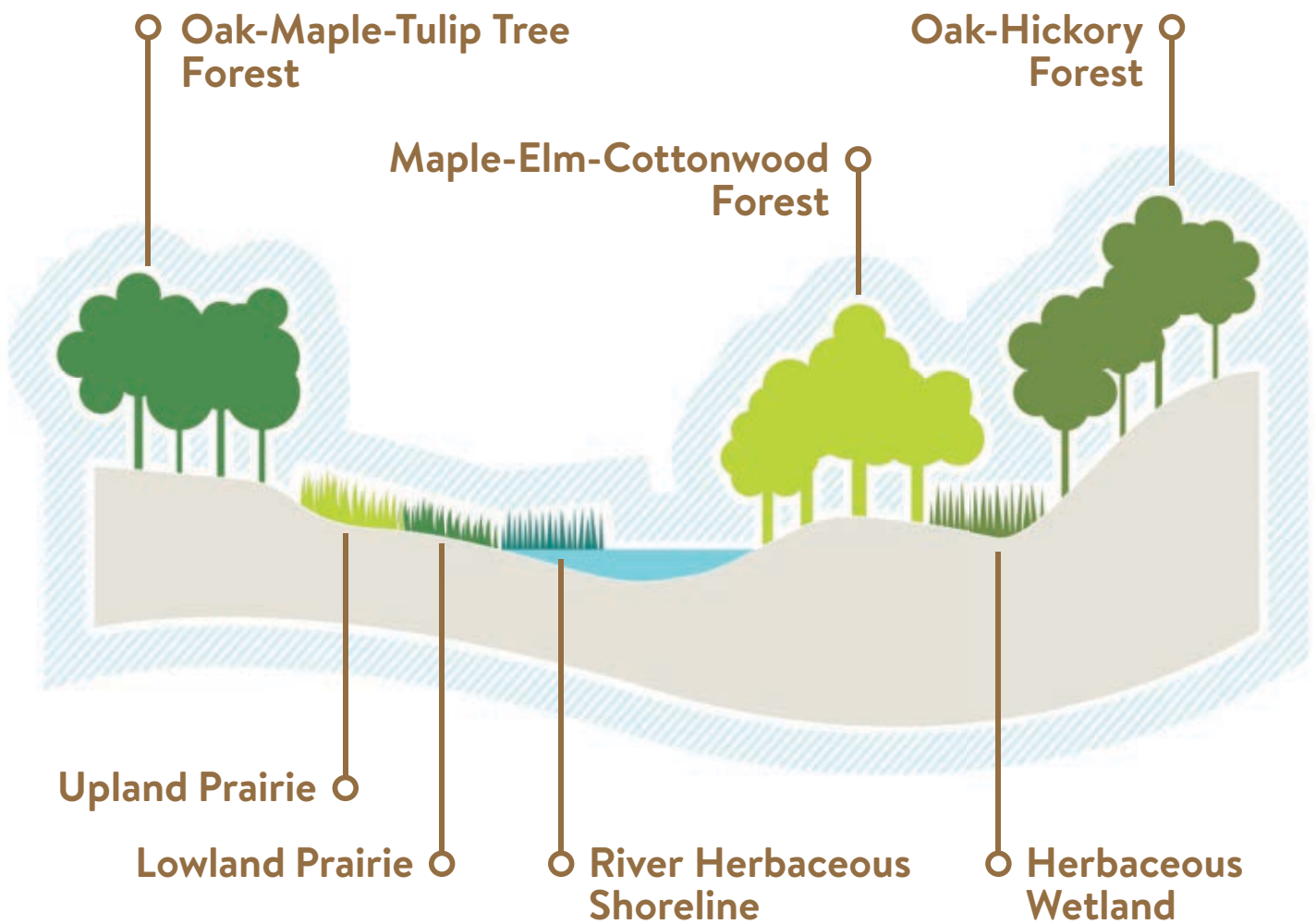
The loamy, slightly alkaline soil makes excellent farmland with its high natural drainage and fertility. With such excellent farming potential,

by 1900 early 90 percent of the forest was cleared and 90 percent of wetlands was drained. In 2011, over 75 percent of the White River corridor consisted of “cultural lands” – agriculture and urban areas. Corn-soybean-wheat cropping and livestock production occupy 23 percent of the land, while cities and towns cover 52 percent. The rest of the land cover is “natural and semi-natural land”, which consists of forest, shrubland, grassland, wetland, and open water. Natural plant life covers 17 percent of the White River corridor, with upland deciduous forest being the most common land cover type.

## Land Cover Types and Size Classes

LAND COVER	SMALL (<10 AC)	MODERATE (10-100 AC)	LARGE (>100 AC)	TOTAL ACRES	% OF TOTAL ACRES
Natural & Semi-Natural Acres	1,904	3,084	1,311	9,301	25.2
Deciduous Forest	980	2,207	797	3,984	10.8
Evergreen Forest	27	--	--	27	0.1
Shrub/Scrub	66	--	--	66	0.2
Grassland/Herbaceous	341	45	--	386	1.0
Pasture/Hay	22	518	514	1,054	2.9
Woody Wetlands	117	37	--	154	0.4
Emergent Herbaceous Wetlands	351	277	--	628	1.7
Open Water				3,002	8.1
Cultural Acres				27,638	74.8
Bare Ground				127	0.3
Cultivated Crops				8,486	23.0
Developed				19,025	51.5
Total Corridor Acres				36,939	

## Native Plant Communities







OAK-HICKORY FOREST

**Oak-Hickory Forest.** This dry forest occurs on hilltops, slopes, and some terraces that slope towards floodplains. White, black, and red oaks (*Quercus alba*, *Q. velutina*, *Q. rubra*), pignut and shagbark hickory (*Carya glabra*, *C. ovata*) were once common, but logging and expansion of maple and invasive understory plants has reduced the amount of oak and hickory. In the cut and shaded oak-hickory forest of today, oaks and hickories can still be found, but black walnut (*Juglans nigra*), butternut (*J. cinerea*), sugar maple (*Acer saccharum*), boxelder (*A. negundo*), red mulberry (*Morus rubra*), honey locust (*Gleditsia triacanthos*), American basswood (*Tilia americana*), black cherry (*Prunus serotina*), and Ohio buckeye (*Aesculus glabra*) are more common. The non-native tree of heaven (*Ailanthus altissima*) and Siberian elm (*Ulmus pumila*) may colonize in more urban areas. The shrub layer will be dense if the invasive Asian bush honeysuckle (*Lonicera maackii*) is present. Otherwise, the forest

is more open, with silky dogwood (*Cornus amomum*) and hawthorn (*Crataegus* spp.). The herbaceous groundcover can be quite diverse where not overcome by honeysuckle.



OAK-MAPLE-TULIP FOREST

**Oak-Maple-Tulip Forest.** This forest (and the related beech-maple forest) were once extensive, with a large diversity of species growing on moist, level areas. Today, it exists primarily in public parks and private residential neighborhoods. These forests often were selectively harvested for wood products until protected. In parks, the ground layer is usually mowed. Species encountered in these forests include several species of oaks already mentioned, plus scarlet oak (*Q. coccinea*), burr oak (*Q.* and chinquapin oak (*Q. muehlenbergii*) together with black walnut (*J. nigra*), hackberry (*Celtis occidentalis*), sugar maple (*A. saccharum*), white ash (*Fraxinus*



americana), redbud (*Cercis canadensis*), American beech (*Fagus grandifolia*) and black cherry (*P. serotina*). This is the only forest community in the White River corridor where tulip tree (*Liriodendron tulipifera*) is common.

negundo), red mulberry (*M. rubra*), honey locust (*G. triacanthos*), green ash (*Fraxinus pennsylvanica*), and bur oak (*Quercus macrocarpa*). Often, extremely large old-growth canopy trees are found here.



MAPLE-ELM-COTTONWOOD FLOODPLAIN FOREST.

### **Maple-Elm-Cottonwood Floodplain Forest.**

Often occurs along the White River or in bottomland sloughs inland. This forest may flood to a depth of six feet or more after spring snow melt and late spring rains. Dominant canopy species are silver maple (*Acer saccharinum*), American elm (*Ulmus americana*), eastern cottonwood (*Populus deltoides*), American sycamore (*Platanus occidentalis*), black walnut (*J. nigra*), black willow (*Salix nigra*), and hackberry (*C. occidentalis*). Other trees include sugar maple (*A. saccharum*), boxelder (*A.*



Understories are relatively clear of dense brush due to flooding. Shrubs occur where there is more light: dogwoods (*Cornus* spp.), and elderberry (*Sambucus canadensis*). On White River banks, massive American sycamores and black willows (*Salix nigra*) often grow out of the banks and overhang the water.



UPLAND PRAIRIE

**Upland Prairie.** Upland prairie is a mostly treeless herbaceous plant community that once covered large expanses of Indiana but was virtually eliminated in the 1800s by agriculture and development. Remnants of the original prairies, together with restored prairies, make up a tiny fraction of the land surface in the White River corridor. From dry hills and southerly slopes, to wet sites in lowlands, all prairies are dominated by grasses, with a large proportion of wildflowers in the aster, pea, and mint families. Big bluestem (*Andropogon gerardii*), Indian grass (*Sorghastrum nutans*), switchgrass (*Panicum virgatum*), little bluestem (*Schizachyrium scoparium*), side-oats grama (*Bouteloua curtipendula*), and panic grasses (*Panicum* spp.) are common. A large, plant-rich prairie is in flower from May into October and supports hundreds of species of insects—including many pollinators—and dozens of species of birds, small mammals, and reptiles.



WET MEADOW

**Wet Meadow.** Wet meadows of sedges, grasses, rushes, and wildflowers can be found in any low, wet place that is regularly disturbed by flooding, grazing, or burning. The feathery look of arching sedge stems interspersed with wild iris (*Iris virginica*) and the tufted heads of softstem bulrush (*Schoenoplectus tabernaemontani*) make wet meadows among the more attractive of plant communities. High-quality wet meadows support a diverse array of wildflowers, sedges, and grasses, including water plantain (*Alisma subcordata*), arrowhead (*Sagittaria latifolia*), sweetflag (*Acorus calamus*), common boneset (*Eupatorium perfoliatum*), tussock sedge (*Carex stricta*), spikerush (*Eleocharis* spp.), fowl mannagrass (*Glyceria striata*), and Virginia wild rye (*Elymus riparia*). Most wet meadows are often colonized and overtaken by introduced plants, like reed canary grass (*Phalaris arundinacea*), purple loosestrife (*Lythrum salicaria*) and narrow-leaved cattail (*Typha angustifolia*).





RIVER SHORE

**River Shore.** The littoral, or shallow water zone of the White River, supports beds of herbaceous and sometimes shrubby plants. These beds may be dominated by a single species, like lizard tail (*Saururus cernua*). Typical shrubs here include sandbar willow (*Salix interior*), elderberry (*S. canadensis*), and eastern cottonwood (*P. deltoides*) saplings. In little-disturbed areas, a surprising variety of wetland plants exist, such as American bulrush (*Schoenoplectus americanus*), spike-rushes (*Eleocharis* spp.), sedges (*Carex* spp.), and burr marigold (*Bidens* spp.). In many urban stretches of river, non-native species such as Tree-of-heaven become more common.

## OTHER WILDLIFE NEAR THE RIVER

The diversity of habitats along the White River are home to a wide array of birds and other wildlife. In towns and suburbs, wildlife includes those well-adapted to, or benefiting from, people—American robin, northern cardinal, common grackle, house sparrow, black-capped chickadee, and American goldfinch. Mammals of these areas include cottontail rabbit, gray squirrel, chipmunk, raccoon, and woodchuck.

In larger natural areas and open woodland parks, even more birds can be found—tufted titmouse, house wren, Carolina wren, indigo bunting, warbling vireo, yellow-billed cuckoo, white-throated sparrow, cedar waxwing, red-eyed vireo, eastern wood-peewee, and great crested fly catcher. The largest, intact forests support elusive interior forests birds such as northern parula warbler and wood thrush. Other wildlife of forested areas are fox squirrel, red fox, gray fox, and coyote. White-tailed deer, once extirpated, have returned. Bats are heavily dependent on woodland and forested areas.

Open grasslands and prairies host field sparrows, mourning doves, and bobwhite quail. Numerous pollinator insects use the diverse flowering plants of this community.

Along the riverfront, a diverse group of species call the river home. These include wading birds such as mallards, wood duck, other waterfowl; shorebirds such as great egret, great blue heron, green heron, and

black-crowned night heron; and species that live in and along or use the shoreline, such as red-winged blackbird, song sparrow, kingfisher, and common yellow throat. Bald eagles make their nests near large rivers such as the White River; nests occur in the study area. Several species of swallows (e.g., cliff and barn) sweep over the river, feeding on flying insects hatched from the water. Beavers, once extirpated, have returned to the White River. Mammals dependent on the White River include mink, muskrat, and river otter.

Hundreds of species—aquatic insects (the base of the food chain), frogs and toads, turtles and reptiles, mammals, and birds—use both water and land in the course of a day, a year, or a lifespan. These species depend on efforts to keep the remnants of central Indiana's natural vegetation intact next to the river. The quality of natural areas makes a difference to these animals—high quality areas provide more types of food and better places to live and raise their young.





OSPREY, GARETH RASBERRY



BEAVER, CHERYL REYNOLDS



MARSH WREN, ELIZABETH TILLER



COMMON YELLOWTHROAT, WILLIAM CHAPMAN



WHITE TAILED DEER, ELIZABETH TILLER



GREAT BLUE HERON, MIKE BAIRD

## RARE FEATURES IN AND ALONG THE RIVER

The Indiana Natural Heritage Information System reports that, since 1972, 42 rare species (state endangered or species of special concern) and five types of rare natural communities were identified within a mile of the White River. Of these, 18 are rare mussel species only known from empty shells. Two species of rare birds, two rare bats, two rare amphibians, and two species of rare plants were also documented.

The highest concentrations of rare species tend to occur in the largest, most intact, and least disturbed natural areas. Within the White River project corridor, there are three locations that have 3-5 rare features, and one location with 6 rare features. Most of the fifteen smaller areas of good habitat support 1-2 rare features each.

## The White River Infrastructure

### LOW-HEAD DAMS

A low-head dam is a man-made obstruction, typically concrete, built in the river channel that spans the entire width of the waterway. Low-head dams are designed to impound water upstream and like a spillway, allow water to flow uniformly over the entire surface of the dam. There are six low-head dams in the study area including:

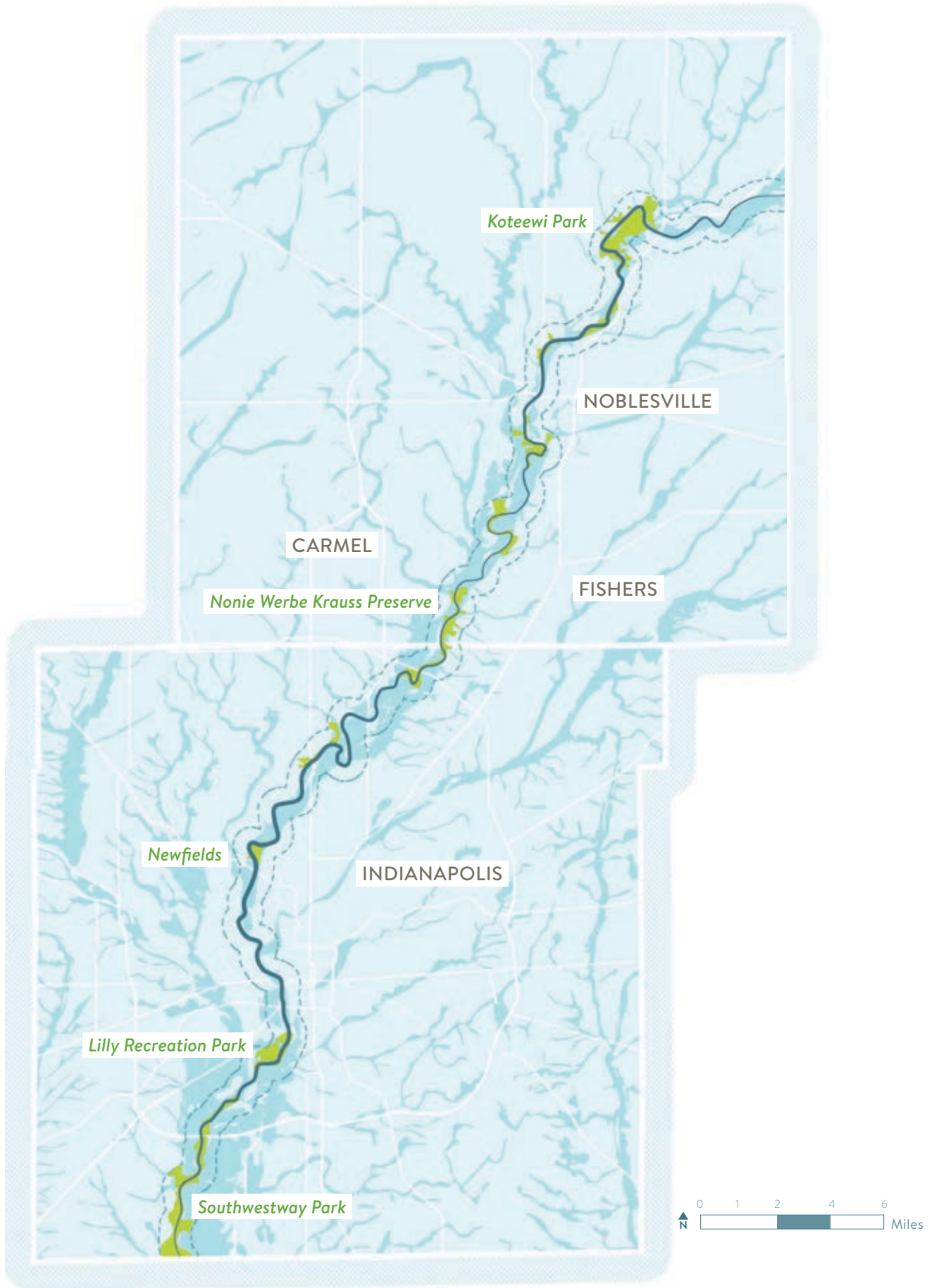
- Harding Street Dam (10') is owned and maintained by Indianapolis Power and Light Company (IPL) and used to generate electricity
- Chevy Dam (18'), Broad Ripple Dam (10'), Williams Creek Cutoff (5'), and Riverwood Power Dam (10') are owned and maintained by Citizens Energy Group (CEG) and used for water cooling, water supply, recreation, and electricity respectively
- Emerichsville Dam or 16th Street Dam (10') is owned and maintained by the City of Indianapolis and is used for recreation. The Dam is also used for Citizen's Energy Group (CEG) water supply.

## LARGE NATURAL AREAS IN THE STUDY AREA

 SFHA (SPECIAL FLOOD HAZARD AREA)

 NATURAL AREAS

 WHITE RIVER





IDNR classifies these low-head dams as low hazard risk based on their volume, height, and watershed area. Low-head dams are regulated by IDNR and any modification and improvements need to be permitted and approved through a floodway permit.

While low-head dams pond water upstream for water supply and/or recreation, their design creates a major barrier for fish and other aquatic species trying to migrate upstream, as well as limits recreational use and connectivity of the river corridor. On the downstream side, low-head dams create an extremely dangerous recirculating hydraulic that traps anyone or anything that gets too close.

There is a desire to balance the function of the low-head dams in the study area with the river ecology and public safety. Following several recent fatalities and river rescues at low-head dams in Indianapolis and elsewhere in the state, the Indiana Silver Jackets (ISJ) and IDNR have been promoting an educational campaign to raise awareness of the dangers of low-head dams. There are several examples of successful low-head dam retrofits nationwide that successfully balance the function, ecology and public safety desired.

## LEVEES

A levee is a man-made structure, usually an earthen embankment, designed to prevent areas adjacent to the river from flooding during high water. Indianapolis maintains an extensive network of 27 segments or 24 miles

of levees. Two levee segments are accredited and recognized by FEMA for reduced flood risk, five levee segments are in the process of accreditation and one has a letter of map revision filed to change its flood protection status. The remaining 19 segments are not accredited. Modification to any of these levees requires the approval of the USACE.

The levees in place reduce the flood risk for residents and businesses in the Broad Ripple area and along either side of the White River from 38<sup>th</sup> Street south to Centerton for most of the downtown area. This levee network is a critical piece of the city's flood control infrastructure and as such is heavily regulated and adjacent uses restricted. These restrictions may impact access points and desired elements to engage people along the river. The Indianapolis North Flood Damage Reduction Project is an ongoing floodwall and earthen levee construction project that will add to the city's flood infrastructure and reduce flood impacts for homeowners and other property owners. The final South Warfleigh/Butler-Tarkington section is currently underway.

## RIVER HABITATS

■ DAM

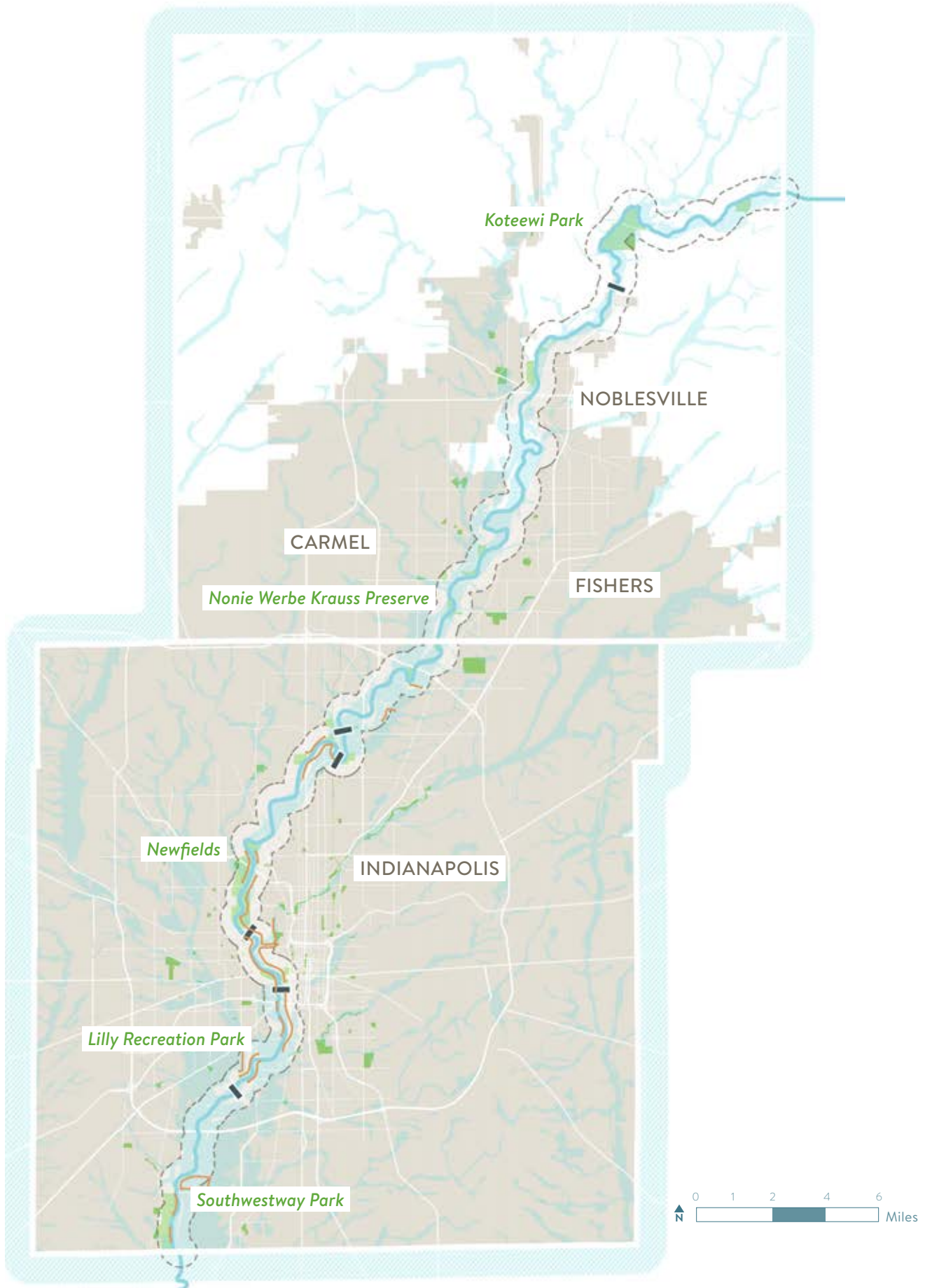
■ NATURAL AREAS

■ LEVEE

■ 1% ANNUAL  
EXCEEDANCE PROBABILITY  
(100 YR FLOODPLAIN)

⌂ 1 MILE STUDY AREA





## Flooding and Stormwater

### **STORMWATER RUNOFF, IMPERVIOUS COVER AND POLLUTANTS OF CONCERN**

Stormwater runoff happens when rain or melting snow runs off the land. In a natural setting, stormwater runoff is stored in ponds, lakes, rivers, and streams, or flows over the ground and infiltrates into the soil, which replenishes the groundwater that feeds water bodies and gives us drinking water. This cycle is a natural cleansing and balancing process.

In a developed area, however, with impervious roads, rooftops and parking lots, stormwater runoff cannot infiltrate and is not stored in natural low areas. Instead it is quickly shunted to drainage ditches, storm drains, and sewer systems and delivered in sudden, large pulses of water to the nearest water body, with damaging results.

In areas with natural groundcover, only 10-15 percent of rainfall or snowmelt runs off to low-lying areas and water bodies. The rest evaporates to the air, is taken up and transpired by plants, or infiltrates to groundwater.

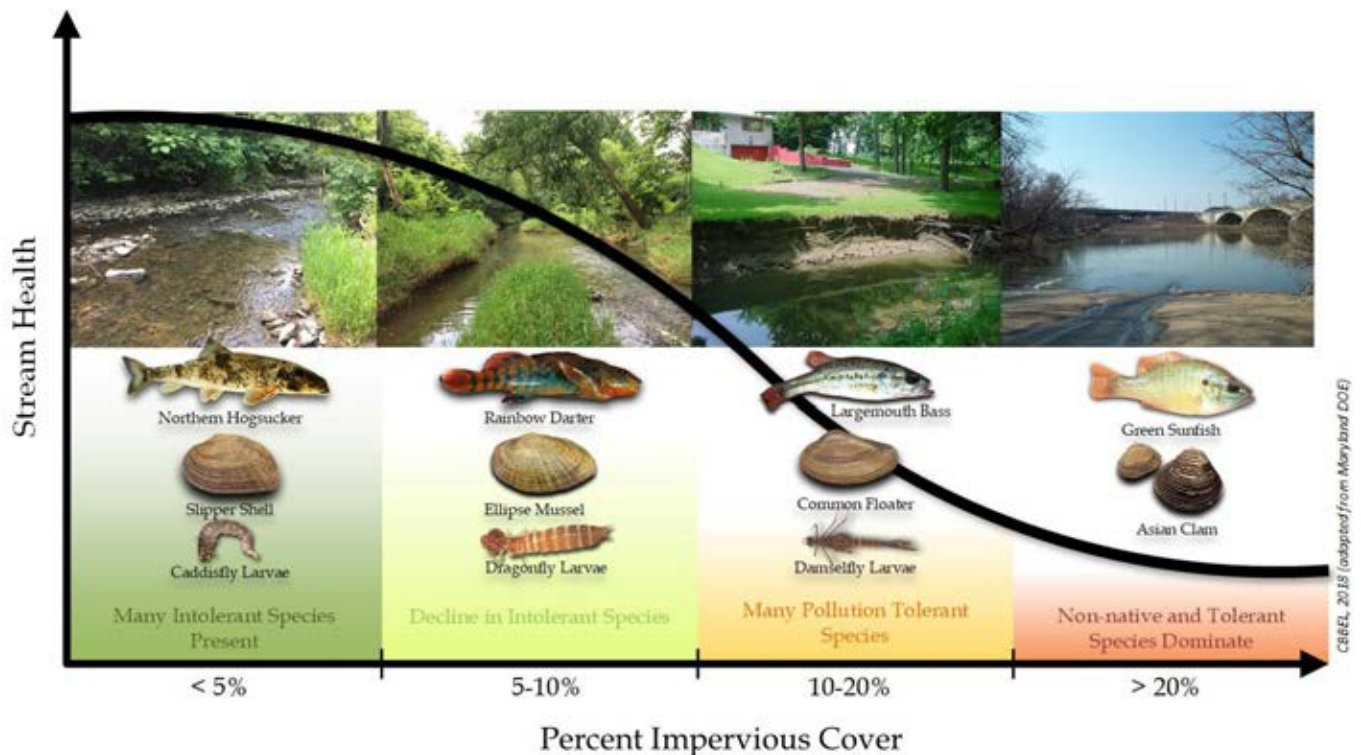
As the amount of impervious cover increases in developing areas, less precipitation infiltrates and more runs off. In very urban areas with 75-100 percent impervious cover, as much as 55 percent of the precipitation runs off. This causes floods and severely damages existing waterways. It also results in

the need for costly infrastructure, like regional detention basins, large stormwater basins, deep tunnels, and extensive storm sewer systems, which is designed to send the water out of cities and towns as fast as possible. As infiltration declines, water tables drop, affecting wetlands, rivers, lakes, streamside vegetation, and drinking water supplies. Depending on the type of farming practice, agricultural drainage also reduces infiltration and accelerates runoff from the land. No-till cropland or fields without tiles and ditches are much better at infiltrating and holding back runoff than usual farming practices.

Not surprisingly, the overall health of the White River is greatly affected by impervious cover. In general, a stream in a watershed with more than 10 percent impervious cover or more than 50 percent row crop cover will show signs of degradation:

- Stream banks and beds start to erode,
- Sediment increases, burying fish spawning areas and mussel beds,
- Water level fluctuations happens too often, damaging stream bank vegetation and allowing more bank erosion,
- Stream temperatures warm, and
- Overall aquatic habitat becomes poorer.

Stormwater runoff also picks up and carries debris, sediment, excess nutrients, and chemicals as it travels overland to water bodies. This pollution comes in two kinds: point and nonpoint. Point source pollutants



enter the water directly, usually via a pipe—sewage treatment plants or industrial outfalls. Before the 1972 Clean Water Act (CWA), point source pollutants seriously harmed the nation’s waterways, causing some to catch on fire and others to lack any signs of living things. Regulations spurred by the CWA have controlled most point sources and water quality improved dramatically starting in the 1980s.

Nonpoint source pollution is harder to deal with. Everybody contributes to nonpoint pollution because everybody works, lives, travels, and plays where runoff flows across the land. When polluted runoff prevents the normal use of a river or lake, that water body is “impaired” for those uses. It is hard to pinpoint

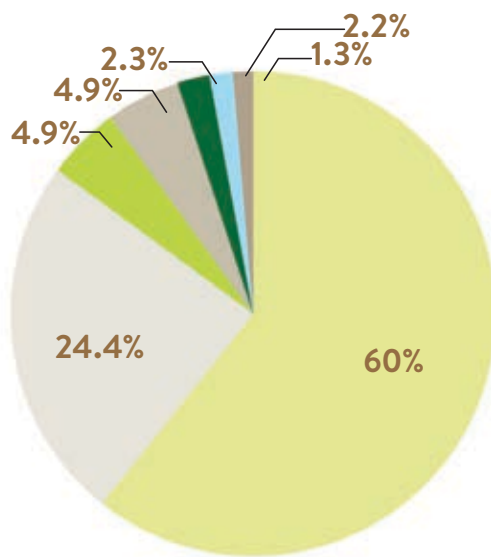
the source of nonpoint pollution because it comes from multiple places. Scientists use a form of “detective work,” however, to produce a TMDL report, which describes how much of the pollution comes from a specific source, like a storm sewer outfall. A TMDL was done for the White River in Marion County, as discussed.

The National Pollution Discharge Elimination System (NPDES) helps to clean up nonpoint pollution. Its programs, “Storm Water Phase I and II”, over the last 20 years have focused on municipal runoff in storm sewers, including CSOs. As a result, the White River is much cleaner than it was in the 1990s. Agricultural practices are also changing in ways that improve water quality. Agriculture

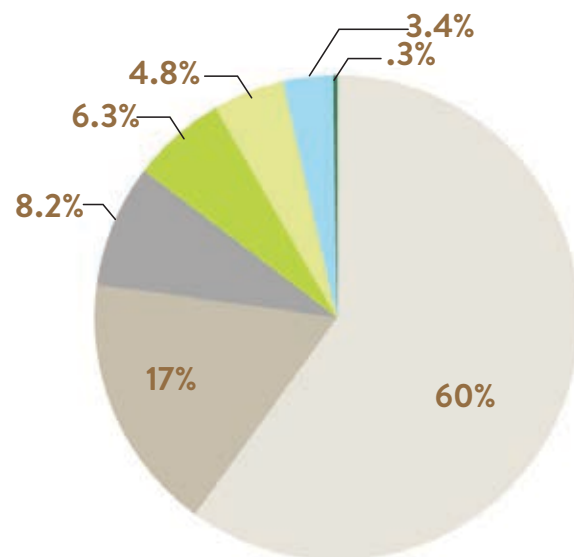
is generally exempt from the Clean Water Act so improvements are based on voluntary practices by farmers. The MS4 permit program, which every city and town uses, controls pollution in storm sewer outfalls and encourages ways to slow and clean runoff before it reaches a sewer.

The 2011 National Land Cover Dataset shows that 14 percent of the White River watershed in Hamilton County is impervious and 57 percent is in cultivated crops. By contrast, 34 percent of the watershed in Marion

County is impervious and 4 percent is in cultivated crops. Land cover alone suggests that tributaries to the White River, and the White River itself, have been damaged by land use. This damage is minimized by conservation practices that hold more water on the land and clean the rest before it reaches streams and the river.



**Hamilton County**  
258,000 Acres



**Indianapolis**  
202,000 Acres





## **FLOODING, ITS EFFECTS, AND CLIMATE CHANGE**

The flood of March 1913 stands as the flood of record for central Indiana—meaning the 1913 flood was bigger than any on record before or since. It devastated much of the region and left thousands homeless. While a flood of that scale has not happened since, more intense storm events are becoming more common as the climate changes. Researchers at the Indiana Climate Change Impact Assessment (IN CCIA) predict that, by 2050, total annual rainfall will increase eight percent statewide compared to the historical average. Rainfall is not expected to be evenly distributed; instead, 25 percent of the increase will happen in winter and 20 percent in the spring. Unfortunately, winter and spring are when much of the state is already prone to flooding because soils are frozen, snow is melting rapidly, and water bodies are full. IN CCIA predicts a 13 percent rise runoff overall, with 16 percent more in winter and 27 percent in spring.

This trend is visible in recent flood crest data for the White River at two locations: the Nora gage in Indianapolis and the Logan Street gage in Noblesville. Both minor and moderate flood stage events are becoming more frequent. In the 30 flood impact areas along the White River, it is not uncommon for streets to flood and waters to surround buildings. As this trend continues, areas in the floodplain will experience more flood events each decade.

There are many known tools in the conservation toolbox to reduce the risk of flooding which are already in use in Indiana and across the country. One important tool is to preserve and restore the natural functions of the White River's floodplain: flood storage, flow deceleration, sediment capture. Another is to build stormwater management best practices at new and existing developments. Lastly, farmers are inventing and using methods to hold more water and clean pollutants to make streams and the White River more hospitable for people, fish, mussels, and the whole aquatic ecosystem.

# Opportunities and Barriers

## Opportunities

### **PARTNER WITH EXISTING PROGRAMS**

- Greenways Master Plan – Build on opportunities to connect isolated wetlands and floodplains, restore the natural and beneficial function of the floodplain, and plant trees in greenway corridors.
- Carmel Clay Parks Plan/ Fishers Parks/ Conner Prairie/ Hamilton County Parks and Indianapolis Parks – Seek opportunities to incorporate natural resource restoration and management in plans for any new parks identified in planning efforts, updates to park master plans, and during implementation of parks for which master plans are completed.
- Indiana Forest Alliance Marion County Forest Study – There is an opportunity to orient future park selection, acquisition from willing landowners, and other conservation around the highest priority forests on private lands.
- White River Alliance and Marion and Hamilton County SWCD sediment reduction initiatives – Expand programs and work together to reduce sediment entering river.

### **GALVANIZE SUPPORT FOR NEW INITIATIVES BY BUILDING ON PAST EXAMPLES**

- Chevy Dam retrofit project – This project helped the region learn about what worked, what strategies did not work, who did the work, and how much it cost. It can help inspire and provide information about how to do an even better job of providing safe passage for fish and non-motorized watercraft in future work.
- Tree planting initiatives – These initiatives are successful and popular ventures that cities and organizations engage in already. There is an opportunity to focus on future climate adapted species and those that provide nuts and fruit for wildlife as well as to use the results of the Forest Alliance study to identify locations where tree planting will expand and connect existing forests.
- Purdue University Tippecanoe River Outreach – This work has helped the region to learn what resonates with the public for river restoration. The WRVP can borrow ideas and materials to establish similar programs in the White River area.

## Barriers

### **ENORMITY OF THE TASK AND POTENTIAL TIME HORIZON**

- Sediment and bacteria – Recovery and improvement in these areas only began after 1980, following 150 years of damaging uses. Reversing the downward

trends in ecosystem health, water quality, and species losses will take over 50 years and require participation of many, from local institutions and cities, voters, businesses and granting foundations, from farmers to private property owners.

- Invasive plants – Invasive plants cover a large amount of the study area. Future work to control invasive plants requires considerable investment and long-term attention.

### **LACK OF WIDELY ACCEPTED NATURAL RESOURCE PLANS**

- Natural areas inventory – A thorough natural areas inventory has never been done to identify the important areas that should be conserved and invested in. This is an important tool to preserve the diversity of life along the White River.
- Natural resources management plans – In the region, there is not yet a tradition of doing plans to restore and manage long term the plants and animals of public open spaces.

# Get Outdoors

Successful riverfront public spaces and destinations are well-attended, remembered and loved by the community over generations. Planning for places that evoke these emotional connections over time requires inclusive place-making that allows visitors from all neighborhoods, inside and outside the region, to find meaningful engagement throughout all seasons of the year, drawing them back over and over again.

The White River's edge has the potential to encompass a series of successful spaces that ignite stewardship among all ages, allowing for constant learning, sharing, and pride of place. The multi-generational and inclusive aspects of successful waterfronts give them the potential to live beyond all of us in the present day and embrace people and the human experience throughout time. To successfully engage with the river and "get people outdoors," the WRVP needs comprehensive solutions that connect with people's hearts and minds. The land along the White River in both Hamilton and Marion counties should be a place of timeless engagement, enabling the banks of the White River to be a place of known community, identity, and attraction.

This plan aspires to create year-round seasonal interest and activity, while being cognizant of the rich ecological character along the banks of the White River. It intends to be strategic and balanced in program placement and activation, providing different forms of engagement to the communities along the river while recognizing the need for areas of ecological refuge – places where human beings should not go regularly.



Whether catching a first fish of the season along the river banks or enjoying a quiet and contemplative hike among fall foliage or winter chill, the program implemented along the river's edge must reflect the varied perspectives held by the diversity of the region's residents.

## Relevant Planning Studies

Hamilton and Marion counties have a strong history of visionary planning efforts – with parks plans, master plans, comprehensive plans, and ecologically focused documents that can give guidance to the WRVP. While building on the past, each new proposal brings fresh ideas that are reflective of the current thinking and priorities of the time.

By understanding the collective voices of both Marion County and Hamilton County, opportunities for truly representative designs rise to the top. Individuals use and love spaces that are reflective of themselves. Celebrating differences along the White River, while promoting inclusion in the ways groups use and value public sites, is essential to design and planning decisions that encourage lasting use and diversity.

Planners, designers, and community members learn from what came before. To better recommend ideas for engagement and activation along the White River, an understanding of previous planning studies

is critical. These recommendations are achieved not only by acknowledging past strategies in the greater Indianapolis area, but by understanding a multitude of past recognized (and important) locations, topics, and backgrounds. Past studies will also inform where to focus resources – both by topic and location. Common trends between studies will provide useful insight when providing recommendations.

Several planning efforts specifically affect sites along the White River corridor and will help to inform this master planning effort. Many of these studies have concluded within the last 10-15 years, but much of the information they provide is useful in informing community priorities and perceptions with public access and programming desires along the river corridor.

*Fishers Parks Plan: Phase One*

*Noblesville Parks and Recreation Plan*

*Southwestway Park Master Plan*

*Newfields Plan*

*Conner Prairie Plan*

*Broad Ripple Park Master Plan*

*Carmel 2015–2019 Parks and Recreation Master Plan*

*Hamilton County Parks & Recreation Master Plan*

*Indy Parks and Recreation Comprehensive Master Plan*

*Riverside Regional Park Master Plan*

# Observations and Findings

## Methodology

### SOURCES AND RESEARCH APPROACH

“Human engagement” with the White River occurs in a multitude of ways – walking, running, cycling, kayaking, etc. – and at speeds that reflect each of those engagements. Although there are many ways to experience the river, not every part of the river should be able to be engaged by public use, whether because of private land ownership or ecological sensitivity. Through a balanced approach, activation along the river can be made relevant where appropriate and controlled where not appropriate. The following steps provided information to inform the assessment of existing river activation. Research was both qualitative and quantitative. Note: The river presents challenges to evaluation as the edge of the water is, in some locations, hidden by vegetation, difficult to access, or with other barriers along its length.

- Stakeholder and community meetings at three different locations within the study area offered the opportunity to connect with residents, leaders, and various field experts of Hamilton and Marion counties, and to learn from their intimate, local knowledge of the river. Information at community meetings gathered through conversations, as well as “flag” annotations and mapping on provided model/map of study area
- A variety of mapping techniques were utilized to search the length of the river and account for the existing open space destinations in the study area.
- Data collection included the review of published reports, destination websites, county websites, Google Street View, site visits, and community input/corrections.
- Gaps in existing destinations and river engagement were recorded.
- Findings were recorded graphically (i.e. images, seasonality diagram, edge condition sections, etc.)



## What We Heard

Stakeholder discussions indicated that institutions and partners believe that there are opportunities for more engagement with the river through education. They described that the White River lacks identity to the people of Indianapolis today – people do not associate the White River with the city. Bridging this gap is important to creating stewardship and activation along the river.

Over the course of the three community meetings, people highlighted their concerns about safety along the river. There is a desire for more ways to safely connect to the river, including eliminating potential accidents related to the low-head dams and power plants. They also noted that current programming is not inspiring/exciting enough to draw them to the river. The following is a list of the types of desired programming identified by the community:

- Biking/hiking
- A river walk
- Boat cruises
- Public art (potentially under bridges)
- More canoes/kayaks (and access to launch)
- Sidewalk chalk festival
- Outdoor amphitheater
- Horse riding
- More festivals/events
- Passive/non-obstructive places to allow nature to thrive
- Indy branded rafts
- Tree-top hotel
- Iconic interventions
- More fishing
- Active recreation/sports opportunities
- Increased education opportunities
- Outreach to schools/kids

# Existing Open Space Destinations

About 40 major indoor and outdoor destinations along the White River were inventoried and analyzed to examine existing amenities and programming uses. Although the study area was dispersed between Marion and Hamilton counties, there was an effort made to balance sites in both counties. Still, a majority of existing destinations that were identified are located within the city limits of Indianapolis. Historically, there has been a larger capital investment in social programming and activation along the White River closer to downtown Indianapolis, including: Lucas Oil Stadium, Victory Field, White River State Park, the Indianapolis Zoo,

and Carroll Stadium. Destinations identified in Hamilton County were generally spread further apart from each other, had greater ties to the surrounding ecology (example: canoeing and campgrounds), and were generally less intensive than their Marion County counterparts.

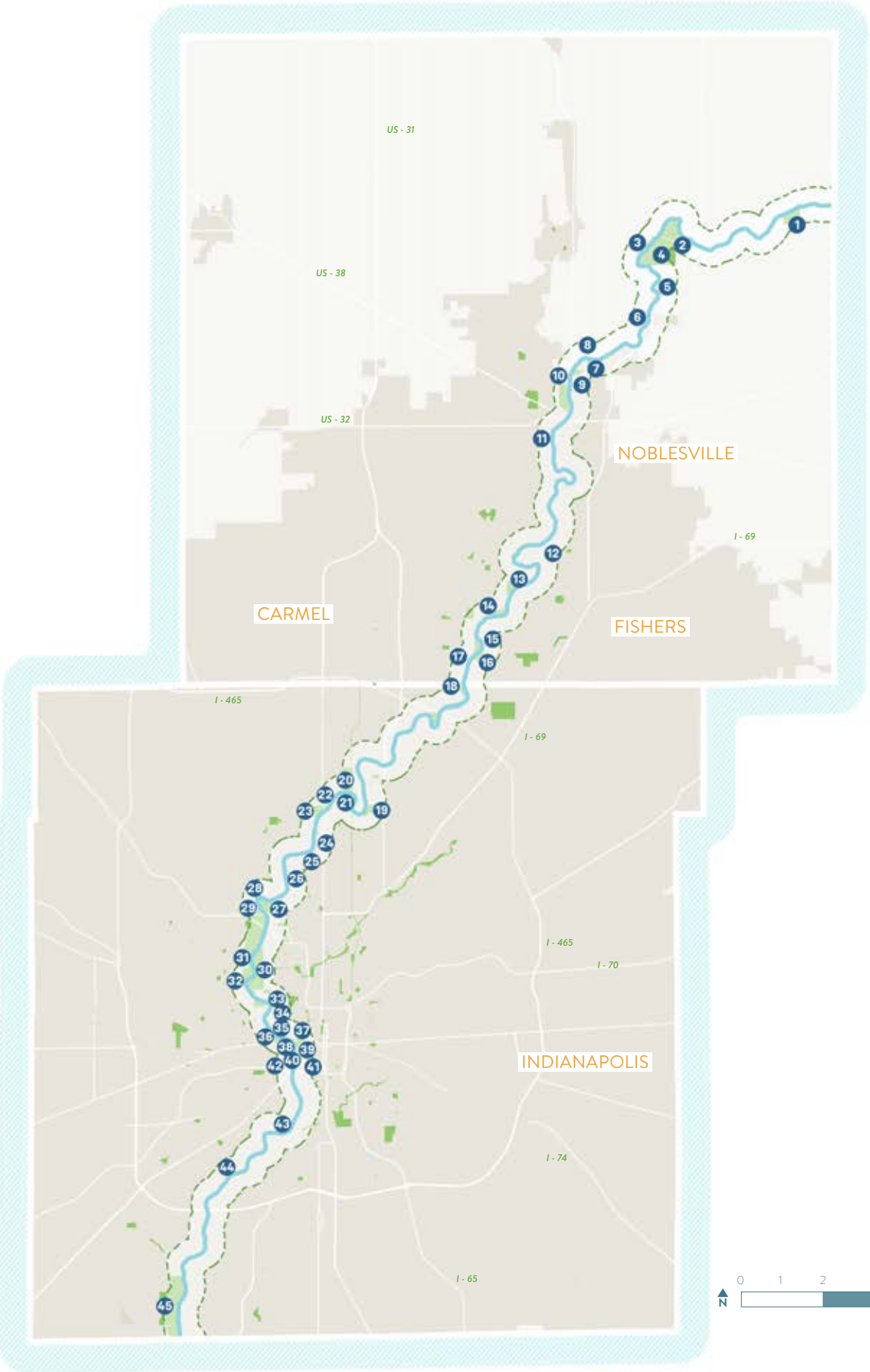
The existing destinations varied in program/ use, scale, investment, and perception. Sites identified along the White River provide additional opportunities for new destinations, linkages and connections in the future. This plan seeks to provide suggestions on how to successfully distribute social activation and investment throughout Marion and Hamilton counties based upon community interest and needs.

1	Lafayette Trace Park	19	Broad Ripple Park	37	White River State Park
2	Strawtown Koteewi Park	20	Marott Park	38	White River Gardens
3	White River Campgrounds	21	Indianapolis Art Center Grounds	39	Victory Field
4	Edge Adventure Park	22	Brickman Educational Trail Park	40	The Rock Flat at the White River
5	River Bend Campground	23	Holliday Park	41	Lucas Oil Stadium
6	Riverwood Canoe Landing	24	Friedman Park	42	Edison School of the Arts/Riley Park
7	Potter’s Bridge Park	25	Butler University and Athletic Fields	43	Lily Recreation Park
8	Blatchely Nature Study Club	26	Central Canal/Trail	44	Southside Landfill/Crossroads Greenhouse
9	White River Greenway Trail	27	Newfields	45	Southwestway Park
10	Forest Park	28	The Virginia B. Fairbanks Art and Nature Park: 100 Acres		
11	White River Canoe Company	29	Lake Sullivan/Sports Complex		
12	Conner Prairie	30	Riverside Regional Park		
13	River Road Park	31	Lake Indy Boat Ramp		
14	Heritage Park	32	Municipal Gardens Family Center		
15	Nonie Werbe Krauss Park	33	Carroll Stadium		
16	Heritage Park (Ambassador House & Heritage Gardens)	34	Indianapolis Canal/Cultural Trail		
17	Hazel Landing Park	35	NCAA Hall of Champions		
18	Town Run Trail Park	36	Indianapolis Zoo		

## DESTINATIONS

- WHITE RIVER
- MILE STUDY AREA BUFFER
- DESTINATION
- GREEN SPACE





Many of the riverfront destinations draw hundreds of thousands to millions of people annually. The most popular areas to attend events near the White River are the locations closest to downtown Indianapolis, including: Lucas Oil Stadium, White River State Park, and the Indianapolis Zoo. These existing anchors have the potential to be even more formative drivers in the experience, stewardship, and relationship to the White River for locals and visitors alike.

## **TYPES OF DESTINATIONS**

There are many uses along the river that vary in accessibility, scale, use, and cultural interpretation. Many of the existing destinations are limited to visual connections and active recreation and are generally segmented and only accessible by vehicle. The analysis categorized different destinations into a series of sub-types that synthesize the different features together. With this understanding of the overall river corridor experience, there is an opportunity to create a more robust and diverse array of destinations based on where there are gaps in accessibility, use, and significance along the White River.

### *Views/Access*

The best views of the water typically can be found at large county and city parks, and other public venues on the river. Access to the White River is predominantly available at or north of downtown Indianapolis. South of Indianapolis and areas of north Hamilton and Southwest Marion County have limited physical and visual access to the river.

### *Active/Passive*

Destinations on the river offer a variety of program options today. While there is a mix of active and passive programming along the entire 53-mile study area, passive programming generally occurs along more densely populated areas of the White River, including opportunities to attend museums, art exhibits, and sporting events. Active programming is commonly found in more natural areas, although gaps in all programming can occur in these areas due to lack of access.

### *Cultural/Historic*

Cultural and historically significant sites are clustered around downtown Indianapolis and Noblesville. These areas have more dense population centers and more access at and along the White River. Gaps of historic, cultural, and architectural significance are found in areas of less population and access to the water (including: south Hamilton County and most of Marion County).

## DESTINATIONS

		PH Physical River Access	V Visual River Access	A Active Programs	PA Passive Programs	H Historic Elements	C Cultural Significance	AA Architectural Significance
1	Lafayette Trace Park							
2	Strawtown Koteewi Park							
3	White River Campgrounds							
4	Edge Adventure Park							
5	River Bend Campground							
6	Riverwood Canoe Landing							
7	Potter's Bridge Park							
8	Blatchely Nature Study Club							
9	White River Greenway Trail							
10	Forest Park							
11	White River Canoe Company							
12	Conner Prairie							
13	River Road Park							
14	Heritage Park							
15	Nonie Werbe Krauss Park							
16	Heritage Park (Ambassador House & Heritage Gardens)							
17	Hazel Landing Park							
18	Town Run Trail Park							
19	Broad Ripple Park							
20	Indianapolis Art Center							
21	Marott Park							
22	Brickman Educational Trail Park							
23	Holliday Park							
24	Friedman Park							
25	Butler University and Athletic Fields							
26	Central Canal/Trail							
27	Newfields							
28	The Virginia B. Fairbanks Art and Nature Park							
29	Lake Sullivan/Sports Complex							
30	Riverside Regional Park							
31	Lake Indy Boat Ramp							
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33	Carroll Stadium							
34	Indianapolis Canal/Cultural Trail							
35	NCAA Hall of Champions							
36	Indianapolis Zoo							
37	White River State Park							
38	White River Gardens							
39	Victory Field							
40	The Rock Flat at the White River							
41	Lucas Oil Stadium							
42	Edison School of the Arts/Riley Park							
43	Lily Recreation Park							
44	Southside Landfill/Crossroads Greenhouse							
45	Southwestway Park							

## OVERVIEW OF SELECTED DESTINATIONS

The character and programs that currently define the community's experience of the White River can be understood by studying existing destinations along the river. Each of the destinations provides a distinct experience for locals and visitors with a variety of characteristics and programming. Many are places where the residents of Hamilton and Marion counties have some level of engagement with the White River, so understanding these places, through research as well through people's individual memories and stories, is an important part of this master plan. Understanding what already exists, the successes (what emotionally resonates with people), and the shortcomings of those places will inform proposals for future engagement opportunities. With continuous planning and growth occurring in the greater Indianapolis area, public and private investments continue to be made at or near the White River. It is important to evaluate these planning efforts when recommending future social programming recommendations in later phases of the plan.

Several significant, existing destinations help to define the current cross-section of the existing open space sites along the White River. The destinations noted below vary in location (stretching almost the entire length of the studied area, from Hamilton County to Marion County), access, program type, and usage. These different types of destinations provide background for future variables and/or program types. The destinations described

below are not comprehensive of all existing community nodes along the river, but they represent some of the most popular and notable locations. The access diagrams associated with selected destinations identifies water access in four ways - (1) limited visual access (2) unincumbered visual access and access to the water's edge; (3) access into the water.

### 1. Limited Visual Access



### 2. Visual Access/Access to the River's edge



### 3. Access into the River



### *White River Campground: Cicero, IN Physical Access, Visual Access, Active Programming, Passive Programming*

The White River Campground is located on the west bank of the river and includes 26 acres with 106 campsites (both modern and primitive). Marketed as a weekend getaway, the campground includes hiking trails, a canoe launch, fishing, a shelter, and recreation room. The White River Canoe Company also picks people up here for canoe trips on the river.



## White River Campground Cicero, IN

PH V A PA H C AA

### DESTINATION LOCATION



**26 Acres**  
**106 Campsites**  
**Connected to**  
**Strawtown Koteewi**  
**Park Via Bridge over**  
**White River**

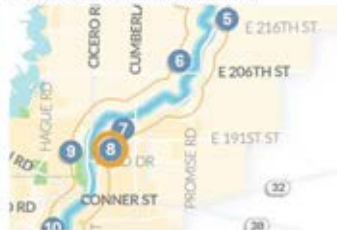
**Special Use:**  
-Campsites  
-Canoe Rental



## White River Greenway Trail Noblesville, IN

PH V A PA H C AA

### DESTINATION LOCATION



**2.8 Miles**  
**North Endpoint:**  
**Forest Park,**  
**South Endpoint:**  
**Courthouse Square**

**Special Use:**  
-Hiking  
-Walking  
-Biking  
-Rollerblading  
-Cross-Country Skiing



*White River Greenway Trail: Noblesville, IN*  
*Visual Access, Active Programming, Passive,*  
*Historic Significance, Architectural Significance*

This 2.8-mile trail, when inclusive of the Noblesville Trail, begins at the Hamilton County Courthouse and ends at Potter's Bridge, a historic covered pedestrian bridge. The trail parallels the river and includes many scenic views along the way. It also winds through many programmed areas including multiple parks, a skate park, an aquatics center, a mini golf course, and more. Traditional path uses of hiking, biking, and rollerblading are accommodated, as well as cross-country skiing in the winter.

*Conner Prairie: Fishers, IN*  
*Visual Access, Active Programming, Passive*  
*Programming, Historic Significance, Cultural*  
*Significance*

One of the largest regional attractors and most visited outdoor museums in the country, Conner Prairie is an interactive nineteenth-century history park, spanning more than 1,000-acres, that strives for innovation across the fields of science, history, art, and nature. It is the first Smithsonian affiliate in Indiana, and visitors can view pieces from the Smithsonian's National Collections throughout the year. Among Conner Prairie's assets is the William Conner home, which is listed on the National Register of Historic Places. There are many education and outreach opportunities here, as well as seasonal events

such as 'Symphony on the Prairie,' which hosts the Indianapolis Symphony Orchestra in the summer.

*Broad Ripple Park: Indianapolis, IN*  
*Physical Access, Visual Access, Active*  
*Programming, Passive Programming, Historic*  
*Significance, Cultural Significance, Architectural*  
*Significance*

A 62-acre park, Broad Ripple Park provides a wide variety of programming and activities for an estimated 150,000 visitors per year of all ages. A Family Center offers year-round classes in dance, safety, health, sports, crafts, and more. The park also includes an outdoor swimming pool, sports courts and fields, trails, picnic areas, a dog park, a viewing platform over the White River, and a boat ramp. The park was previously an amusement park and the location of the 1924 and 1952 Olympic swimming tryouts.

*Newfields: Indianapolis, IN*  
*Visual Access, Passive Programming, Historic*  
*Significance, Cultural Significance, Architectural*  
*Significance*

Previously known as the Indianapolis Museum of Art, Newfields is focusing increasingly on emphasizing engagement with art and nature. Newfields' galleries and its constellation of cultural and historic assets are inclusive of gardens, woodlands, and water features that make it a great location for a multitude of events. Year-round programming is a primary



## Conner Prairie Fishers, IN

PH V A PA H C AA

### DESTINATION LOCATION



**400 Acres**  
**90,000+ Summer**  
**Concert Attendance**  
**Special Use:**  
-Outdoor Amphitheater  
-History Park  
-Hot Air Balloon



## Broad Ripple Park Indianapolis, IN

PH V A PA H C AA

### DESTINATION LOCATION



**62 Acres**  
**Special Use:**  
-Public Pool  
-Sports Field  
-Dog Park  
**Historic Use:**  
-Amusement Park



focus of the newly finished framework plan document, and includes a summer beer garden and ‘Winterlights,’ a holiday light festival that runs from mid-November through early January. The White River is occasionally visible from paths that circulate through the Virginia B. Fairbanks Art and Nature Park: 100-Acres.

*White River State Park (East Bank):  
Indianapolis, IN*

*Physical Access, Visual Access, Passive Programming, Historic Significance, Cultural Significance, Architectural Significance*

A 250-acre park in downtown Indianapolis, White River State Park is made up of large under-programmed greenspaces, trail networks, and waterways, as well as cultural, educational, and recreational destinations. These destinations include the Indianapolis Zoo, the Indiana State Museum, the state’s largest IMAX® theater, and more. Programming and events such as concerts at The Lawn at White River State Park activate the park throughout the year. Multi-use pathways connect all areas of the park and a pedestrianized vehicular bridge, now sculpture venue, provides access to both sides of the White River.

*Southwestway Park; Indianapolis, IN*  
*Visual Access, Active Programming,*

Approximately 10 miles south of downtown Indianapolis, Southwestway Park is a 587-acre regional park with a multitude of programming and historic and cultural uses. Trails and sports fields keep the park active, and future recreational facilities – including a swimming pool, nature and recreation center, and additional athletic fields – will create more active opportunities for engagement. The park has also acquired Cottonwood Lakes which is an oxbow floodplain that will be designed and restored for passive recreation.



## Newfields Indianapolis, IN

PH V A PA H C AA

### DESTINATION LOCATION



### ACCESS

152 Acres

#### Special Use:

- Art Museum
- Historic Home & Gardens
- Art Park & Nature
- Preserve
- Amphitheater



## White River State Park (East Bank) Indianapolis, IN

PH V A PA H C AA

### DESTINATION LOCATION



### ACCESS

250 Acres,  
Designated  
Cultural District

#### Special Use:

- Museums
- Theater
- Canal
- Zoo
- Baseball Stadium



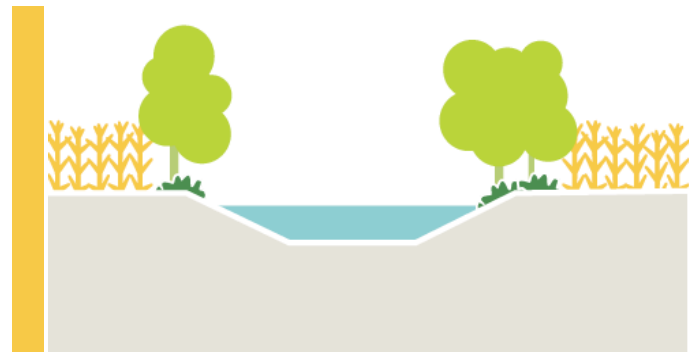
## River's Edge Conditions

The White River has a diverse gradient of conditions between environmentally natural/restored edges and high impact (or heavily modified, dredged, and channelized) edge conditions. Like many developed and modified systems, as impact along the river increases, permeability and biodiversity often decreases. The degree of human intervention along the river's edge and the existing programs that are accommodated at a specific location also tend to have a relationship. For example, while some program or amenities can be achieved at most (or every) edge condition type (i.e. canoeing or running along a trail), other activities, such as fishing, are more common and better accommodated at natural/restored edge conditions.

The four edge conditions identified (from least to most impactful) are: natural/restored, agricultural, moderate impact construction, and high impact construction. Although different edge conditions can be found along the entire two-county region, generally high impact areas were found near more populated regions of Indianapolis. Moreover, natural edge conditions were typically found further from downtown Indianapolis (Hamilton County) and in less populated areas.



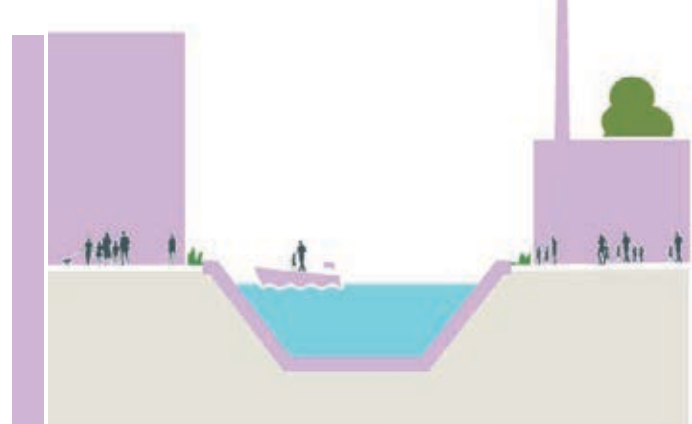
NATURAL/RESTORED



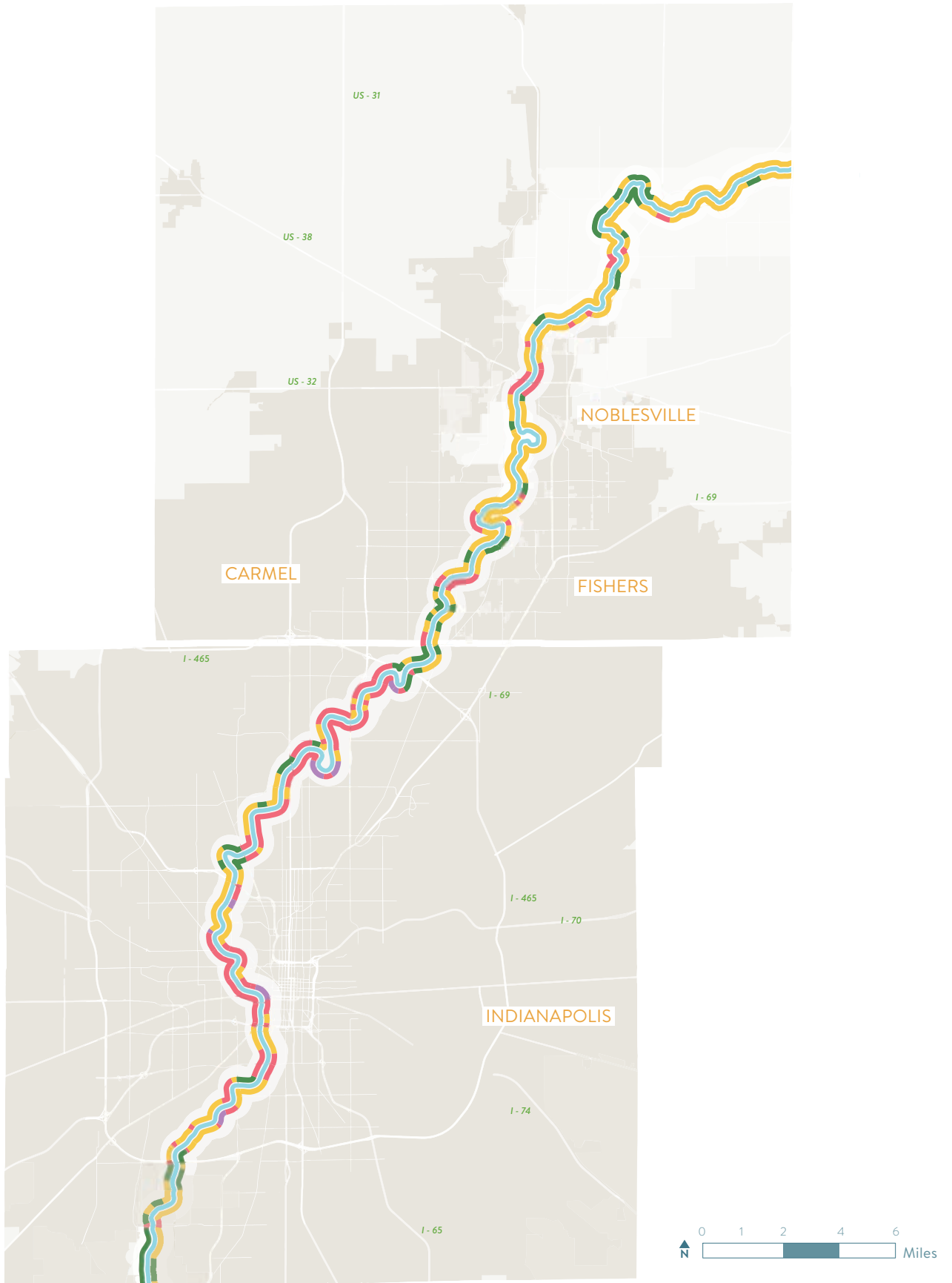
AGRICULTURE/MINIMALLY ENGINEERED



MODERATE IMPACT CONSTRUCTION



HIGH IMPACT CONSTRUCTION





## Program Use

A variety of recreational use already occurs along the White River in Hamilton and Marion counties. Although the diversity of program types is high, most of the uses are currently segmented patches or are in isolation of one another. Existing event types range from more passive to more active in use. Categorizing existing programming is advantageous when planning/designing for future program uses and locations. It is important to create a diverse array of program types that are well distributed and meet the needs of the adjacent communities along the river.

Programming that occurs on land (green), on water (blue), or both land and water (teal) informs existing social relationships along

the river. Planning for programming and activation along the river greatly depends on the constraints of the site and the types of program that are to be implemented.

The edge conditions and the program that occurs on a site have a relationship to each other and can be categorized: natural and active, natural and passive, constructed and active, and constructed and passive. Although programmatic uses tend to gravitate to a certain field of conditions, many activities along the White River can span multiple categories. For example, hiking on a trail is generally a more passive activity (though one can hike in groups or exert more energy both physically and emotionally), but where the hiking occurs can vary. It can span into





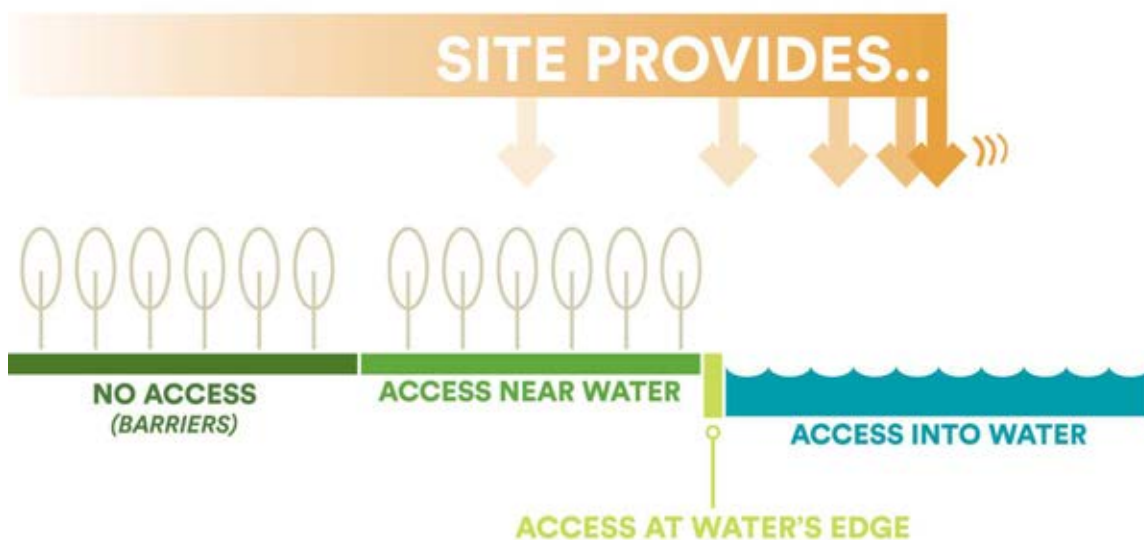
more natural settings (a densely vegetated river's edge) or in a more populated urban area (a park or constructed riverfront). While the setting and emotional response of an individual might vary depending on location, the activity generally stays consistent.

## Access to River

A site's physical relationship to the water can also be categorized into four zones: no access to the water (many times a barrier is prohibiting a connection), access near the water, access at the water's edge, and access into the water. Access to the White River can offer certain programmatic opportunities and connections for a location. Barriers that might be prohibiting a connection to the water's edge were also identified.

The term "access" is a multi-faceted term – access can be both visual (seeing the river) and physical (getting to or in to the river). Direct or indirect accessibility to the water can increase stewardship (investing in the livelihood of a place), tourism (seeing a place as a destination), connectivity (facilitating movement along the river and between strategic destinations, neighborhoods, or nodes), and program diversity (being able to interact in and near the water can allow for different opportunities of engagement).

The 40 observed destinations along the White River include opportunities and challenges in terms of physical and/or visual access. Ease of access is an important factor in creating lasting and viable program opportunities for constituents along the river. Destinations near



industrial land or away from larger population centers generally tend to be less accessible. Existing infrastructure (railways, levees, dams), private ownership, dense or wild vegetation, and steep slopes are also factors that affect a site's accessibility for public programming. Categorizing and understanding a site's barriers may lead to design strategies to overcome or mitigate shortfalls of the existing condition.

## EXISTING LAUNCHES, RAMPS/DAMS, PORTAGES

Along the White River from Hamilton County to Marion County, there are 6 existing dams. The dams serve various economic and ecological functions but also impact the experience of people on the river in kayaks, canoes, etc. While some of the dams have

portages to walk on land around the obstacle, the condition of these passages varies; at some locations there are no portages available. The dams segment the experience of those traveling the river by water and need to be thought about holistically to ensure the best experience for people, while also serving the intended functions of the dams.

Bridges and crossings for various means of transportation tie together the banks of the river. Many of these crossings are the only places where good visual access to the river is available (whether traveling on foot, bike, or by car). Much of the riverfront is bordered by dense trees and undergrowth, so residents traveling beside the river often do not have visual access or knowledge that they are parallel to the river.

### PHYSICAL



EXISTING INFRASTRUCTURE - RAIL, LEVEES, DAMS



ACCESS - ROADWAYS, TRAILS



ADJACENT ZONING - EXISTING NON-RECREATIONAL



OWNERSHIP - PRIVATE PROPERTY

### VISUAL



EXISTING INFRASTRUCTURE - BRIDGES, LEVEES, DAMS



EXISTING DEVELOPMENT



DENSE VEGETATION



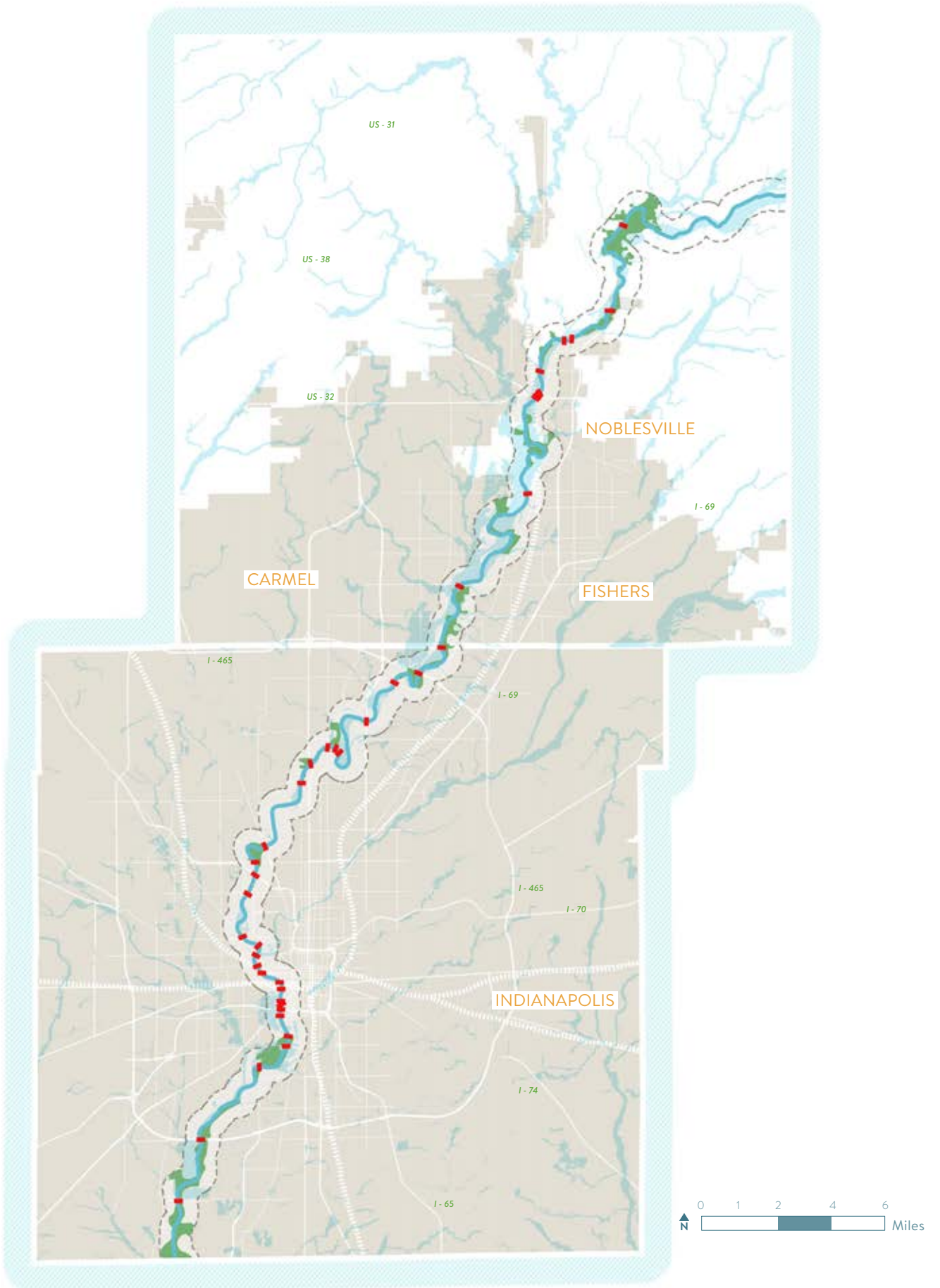
GRADE - STEEP SLOPES

## RIVER CONNECTIONS

■ NATURAL AREAS

■ BRIDGE

■ MILE STUDY AREA



## TRANSPORTATION MODES

The White River not only represents an ecological system, it also expresses a multi-modal transportation network. How a person travels informs their experience. The speed of each mode of transportation requires different approaches to planning and design. What is seen on foot (by walking) can be vastly different than what is experienced by motorized boat. The speed an individual travels and their location along/in the White River modifies their perspective and experience. Different modes of transportation also bring unique challenges for water access points and open space needs and amenities.

By defining the mode of transportation and experience based on speed, the distance it takes to travel one minute can be expressed. Utilizing this methodology, a pattern of potential destination locations is revealed.

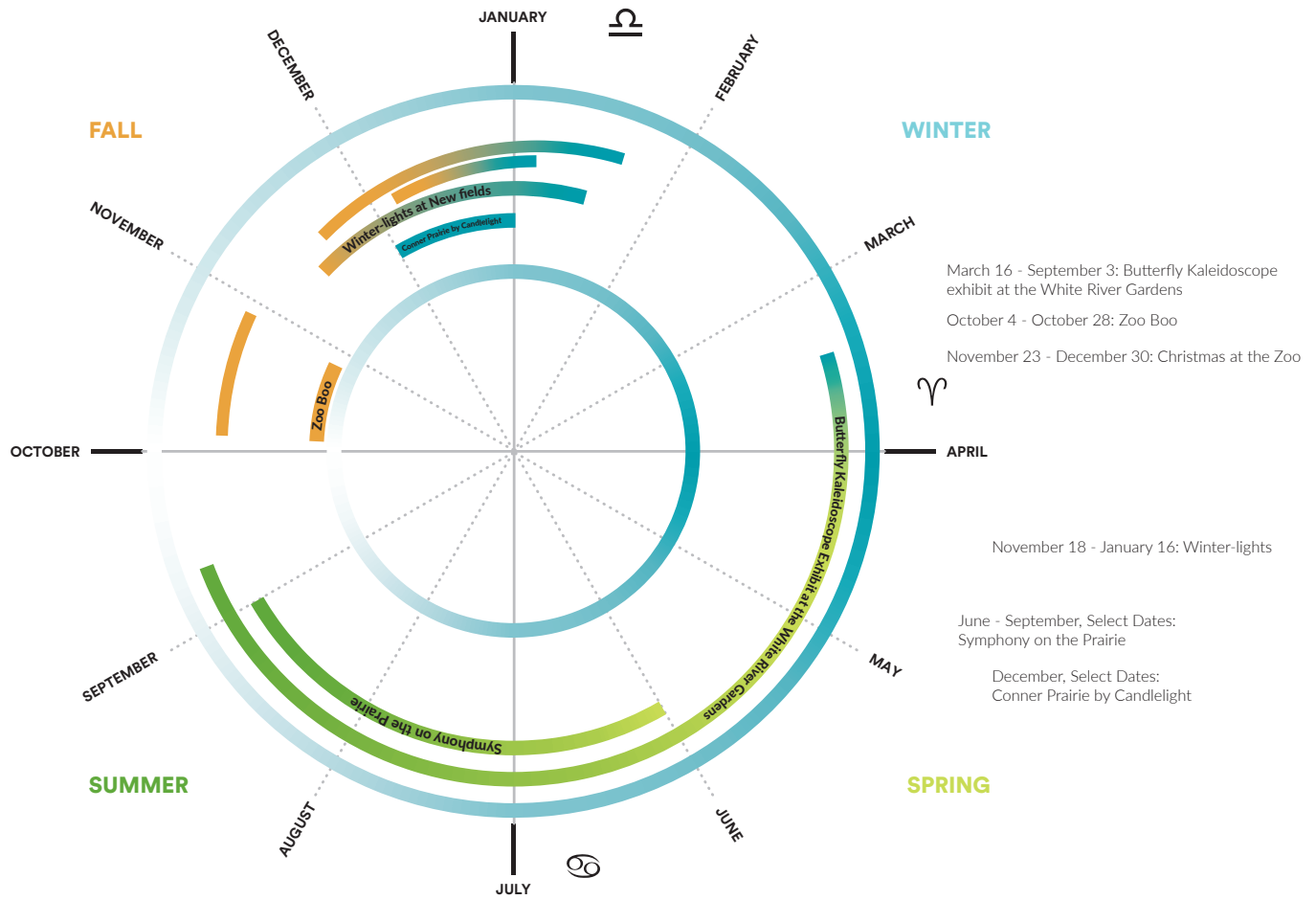
## Seasonality

The way people use the White River changes seasonally. The majority of activities and events take place in the spring and summer, while there is a lack of outdoor events across Marion and Hamilton counties in the colder months, specifically between January and February. By accommodating more opportunities for year-round engagement, a more comprehensive relationship with the White River can be created for all individuals to appreciate and enjoy. Greater seasonal expression brings with it more programming and design opportunities that can distinguish the White River from other places.

As the seasons in central Indiana change, the White River's morphology and ecological characteristics also change. Throughout the year, these characteristics cycle depending on temperature, sun exposure, rainfall, and larger climatic patterns. The expression of a frozen icy river in the winter is vastly different than







- |                               |  |   |
|-------------------------------|--|---|
| 1 Lafayette Trace Park        | 16 Heritage Park (Ambassador House & Heritage Gardens) | 31 Lake Indy Boat Ramp                      |
| 2 Strawtown Koteewi Park      | 17 Hazel Landing Park                                  | 32 Municipal Gardens Family Center          |
| 3 White River Campgrounds     | 18 Town Run Trail Park                                 | 33 Carroll Stadium                          |
| 4 Edge Adventure Park         | 19 Broad Ripple Park                                   | 34 Indianapolis Canal/Cultural Trail        |
| 5 River Bend Campground       | 20 Indianapolis Art Center                             | 35 NCAA Hall of Champions                   |
| 6 Riverwood Canoe Landing     | 21 Marott Park   | 36 Indianapolis Zoo                         |
| 7 Potter's Bridge Park        | 22 Brickman Educational Trail Park                     | 37 White River State Park                   |
| 8 Blatchely Nature Study Club | 23 Holliday Park                                       | 38 White River Gardens                      |
| 9 White River Greenway Trail  | 24 Friedman Park                                       | 39 Victory Field                            |
| 10 Forest Park                | 25 Butler University and Athletic Fields               | 40 The Rock Flat at the White River         |
| 11 White River Canoe Company  | 26 Central Canal/Trail                                 | 41 Lucas Oil Stadium                        |
| 12 Conner Prairie             | 27 Newfields   | 42 Edison School of the Arts/Riley Park     |
| 13 River Road Park            | 28 The Virginia B. Fairbanks Art and Nature Park       | 43 Lily Recreation Park                     |
| 14 Heritage Park              | 29 Lake Sullivan/Sports Complex                        | 44 Southside Landfill/Crossroads Greenhouse |
| 15 Nonie Werbe Krauss Park    | 30 Riverside Regional Park                             | 45 Southwestway Park                        |

a flooded river in the spring or a dry river in a summertime drought. As seasons change, many outdoor events also change and evolve – we do not occupy space consistently in the same fashion year-round. Celebrating the physical changes in the river and in cultural events is important when striving to provide viable and dynamic program opportunities at the water's edge.

## Lessons from Peer Cities

Many communities across the Midwest, as well as across the United States and globally, are reinvesting in their rivers, waterways, and waterfronts to create opportunities for added recreation, health, safety, and engagement. Examining how peer cities have integrated key destinations along their rivers into the fabric of the surrounding communities provides insight into the potentials of the White River Vision Plan. Each of these examples demonstrates a centerpiece of a broader river system.

- San Antonio River Improvement Project, San Antonio, TX: Thirteen miles of the San Antonio River was restored and enhanced both north and south of downtown, beyond the popular center city River Walk. The project focuses on adding to the environmental, economic, recreational, and cultural assets of the city. Water access, trail networks, and multiple cultural and historic destinations contribute to the

activation of the river.

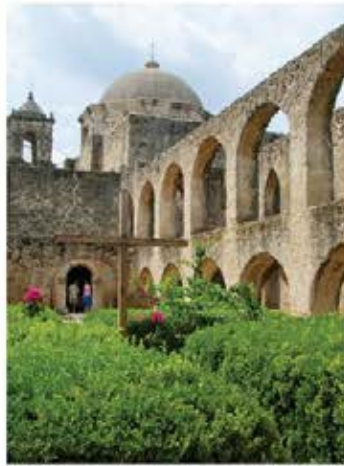
- Scioto Mile, Columbus, OH: Previously a five-lane highway, the Scioto Mile is now a focal point of Downtown Columbus. Through the removal of a dam, restoration of the river to its natural width, and the creation of adjacent greenspace, the river can now be accessed and enjoyed by the residents of Columbus. A variety of daily and seasonal programming makes the park a success year-round.
- Chicago Riverwalk, Chicago, IL: A 1.25-mile pedestrian stretch along the south bank of the Chicago River, the Chicago Riverwalk is a destination for locals and visitors alike. It is an activity hub providing food and drink, cultural destinations, recreation, ecological education and more. Water taxis and tours by boat further weave the river into the urban fabric of the city.

These precedent studies provide insight to successful solutions involving river corridors. As all river ecologies and social communities vary, there are many ways to address activation of a waterway. Although the future programming strategy of the White River may look diversely different than the previous projects mentioned, it is important to note their strategies in implementation, education, activation and stewardship. It can also be useful to draw successful physical components of each project based upon the needs of Hamilton and Marion County residents.

## San Antonio River



**Natural Water Edge  
Trail Recreation**



**Cultural Destinations**



**Active Water Engagement**

## Scioto Mile



**Flexible Event Spaces**



**Wide Trails and Promenades**



**Water Features**

## Chicago Riverwalk



**Gathering Opportunities**



**Outdoor Learning and  
Habitat Creation**



**Active Water Engagement**



# Opportunities and Barriers

There are many moments for increased investment, activation and engagement along the river's edge, specifically in areas of public land and publicly accessible private land. The diversity of experience, access, and ecological systems that occur along the White River today will inform the next steps toward a broader access and activation strategy. The White River is as ecologically varied (from untouched natural areas to highly modified urban areas) as it is socially diverse. Sensitivity to local differences allows for an increased favorable perception of the river's edge, and more successful moments of activation, diverse recreation, stewardship, and revenue.

## Opportunities

### **NATIONAL MOMENTUM AND COMPETITIVENESS**

Across the country, there are increasing social and economic reasons to invest in public open space in order to compete with other cities for talent, reputation, and quality of life. Similarly sized cities, such as St. Louis, Cincinnati, Louisville, and Minneapolis, are leading the way by investing in their riverfronts and/or public open spaces with the desire to attract top talent and the understanding that civic space is important to the quality of life of a city's residents. For central Indiana to remain competitive, attract top-talent, and retain

younger generations, the White River is a tremendous opportunity to improve and enhance regional attractiveness.

### **INCREASED ATTRACTIONS**

With added investment in the White River comes the opportunity for greater economic attraction and income. Implementing iconic and meaningful programming destinations creates interest and draw beyond the adjacent communities along the river, deepening the region's tourism interest. Social experiences can draw individuals from across the region and the nation. This plan aims to create experiences that are not only reflective of the people along the White River but ignite attraction and tourism from beyond Hamilton and Marion counties.

### **ENHANCED EDUCATION AND STEWARDSHIP**

Investment in programming and activation along the White River allows greater opportunities for multi-generational education and stewardship. Learning opportunities along the river that focus on youth and families can be tied to partnerships with schools, businesses, and other organizations. When people learn about the value of river ecology and engagement at a young age, it instills a lasting message to maintain and protect their assets and adjacent communities.

### **ALL-SEASONS PROGRAMMING**

The White River has a captivating and storied narrative. Physical characteristics and use



along the corridor continuously evolve as the seasons change. While social interaction currently occurs during all seasons, winter engagement is much more limited. Investment in community participation during all times – day/night, summer/winter, rain/shine – creates a more dynamic experience and environment. Adding a more robust collection of year-round seasonal programming also aids in added access, connectivity, and engagement along the White River.

### **LINKED MULTI-MODAL EXPERIENCES**

Existing systems throughout the river corridor give people the opportunity to move through the landscape, on land and water, at different speeds and vantage points. This aspect creates added interest for people to continuously engage in the river through different transportation modes. Whether on foot or by bike, on canoe or motor boat, interpretation of the river is dependent upon the mode of transit by which one chooses to travel. This network of multi-modal transportation experiences allows for a variety of destination types and creates hierarchy for design interventions (by distance). A multi-modal corridor allows a variety of opportunities to experience the White River. This plan will continue to build upon this idea, adding additional transportation experiences to further connect communities along the corridor and create more experiences for human engagement.

### **BUILD ON EXISTING ANCHORS**

Understanding what components make an existing destination well-loved can create an opportunity to reinterpret the positive components of a space and learn from its shortfalls. Often times, there are many lessons we can learn from existing destinations: who attends them, how are they maintained, what challenges they face, etc.

Understanding existing public spaces along the White River also establishes a starting point from which to create additional social connections and implement viable program opportunities between established anchors. Gaps in location and services are recognized so that viable activation strategies can complement and build upon the existing open spaces along the river.

### **STRENGTHEN HEALTH AND WELLNESS**

Open spaces and park systems can encourage fitness and work to reduce the rate of obesity, promote strong mental health, and encourage social interaction, leading to strong, healthier and more cohesive communities. The mix of destinations along the White River already provide a range of benefits for open space users, but there are clear opportunities to positively impact public health and physical and mental well-being.

## Barriers

While there has been an increased interest and desire to engage the White River, there are important challenges to recognize. Perception is one challenge; it may be difficult for some community members to embrace engagement with the landscape, whether public or private. It is also a challenge to describe a master plan that engages and affects a large number of people while sharing a singular, common goal. There are commonalities among people, however, that serve as a guide – aspirations for communities to be safe, prosperous, and loved. This plan aspires to do just that: establish a place of environmental sensitivity, engagement, recreation, and education, while being considerate of all people's perspectives and individual needs. The challenge in creating a universal plan, a vision loved by all, is to provide a comprehensive and complete platform for engagement at all levels and phases of the planning, design, and execution.

Beyond challenges with engagement, investment, and implementation, there are physical characteristics that might hinder the development and execution of programming along the river. Recognizing these barriers will be paramount to creating a vision that promotes universal connectivity and multi-modal engagement.

## CENTRALIZED VISION

With diverse voices and communities along the White River, it may be challenging to find consensus among programming and use. Public engagement is an important step in producing an open space design approach that is representative of the people. Adjacencies and private property sensitivities are also important to consider. The appropriate program and activation strategy near downtown Indianapolis is likely to be different from what is recommended in less densely developed parts of Hamilton County. Still, both of these differences need to be celebrated in one celebrated vision.

## COLLECTIVE STEWARDSHIP

The concept of stewardship is increasingly important as land is set aside for public use. Public open space does not belong to one person, but to everyone. Likewise, everyone holds a responsibility for the degradation of these areas, from the mountain biker burrowing a rutted trail up a steep slope, to the birder who steps off the path for a better view. Less visible is the daily damage done by atmospheric pollutants from vehicles, industry, and other energy consumption.

Stewardship of open space is a collective effort and can be difficult to implement when fundamental needs are not commonly recognized on a regional or local level. This can be a challenge when addressing the White River. A comprehensive approach should be

taken, from the education and involvement of young residents to the provision of specific outreach events for all.

## **CHALLENGING ACCESS**

Physical barriers (existing infrastructure, roadway/transit access, adjacent non-conforming zoning, and ownership) and visual barriers (existing infrastructure, zoning/development, dense vegetation, and steep grades) may be problematic when trying to plan and implement new programmed destinations along the White River. Depending upon the circumstance and location, providing access and visibility to a site may require planning an alternative route. Other design strategies might also need to be considered, including establishing better visibility, carving out view corridors in areas of high investment and/or programming, working with adjacent community members and land owners on providing access in remote or difficult areas, and rethinking existing infrastructural challenges.

The designation of a land area is another critical factor when determining accessibility for human activation. Whether an area or adjacent area is public or private, and zoned as residential or industrial, creates a different set of opportunities and constraints for activation and access. As previously mentioned, this plan aims to focus only on activating public land and private land specifically designated for public use.

## **MOBILITY PERCEPTIONS**

In addition to limited physical connections along the White River, most destinations are only accessible by vehicle. Furthermore, there is a regional perception that limits the extent to which many people feel comfortable using alternative forms of transportation (biking, walking, etc.) to get from place to place on a regular basis. Increased vehicular access and ongoing education in support of the benefits of multi-modal transit use are both important to achieve more multi-modal service.

## **SEASONAL PERCEPTIONS**








Many individuals are reluctant to actively spend time outside during the colder winter months. Offering attractive, iconic, and engaging programming (i.e. creating a fifth season of engagement), accompanied by amenities to aid in comfort during the colder winter, can provide opportunities for year-round activity and engagement.

# Connect Communities

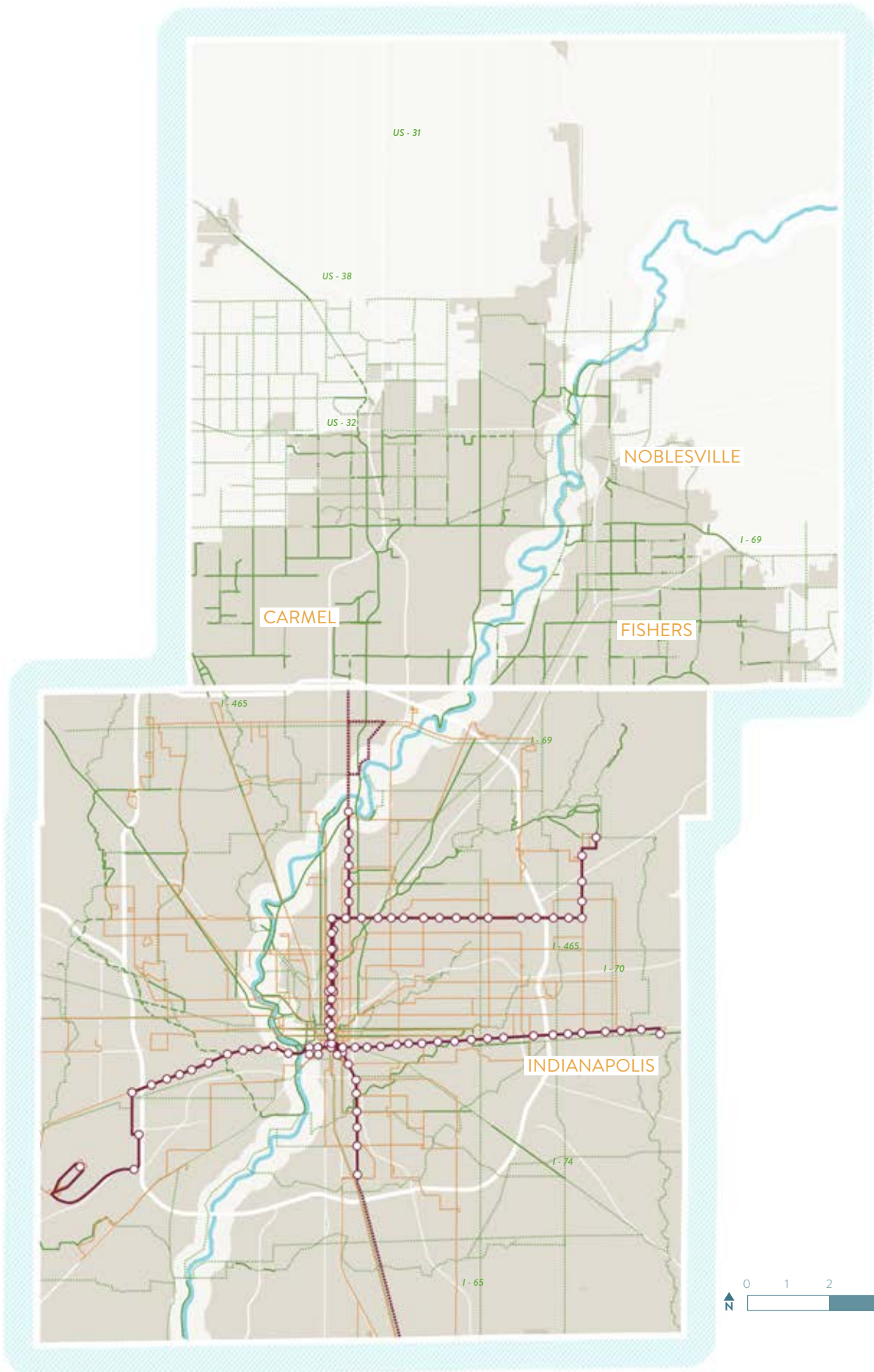
Enhancing and improving points of connection and providing options for safe and easy access are key to allowing more people to see, use and appreciate everything the White River has to offer. Development of safe, varied and meaningful connections will increase opportunities for transportation, recreation, economic viability and health and wellness while strengthening physical and social connections within and between the communities carved into this vital 58-mile stretch of the river. Ultimately, increased connectivity will lead to increased use and a deeper understanding, appreciation and knowledge for the system.

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## TRAIL AND TRANSIT CONNECTIVITY

 WHITE RIVER	 PROPOSED TRAILS/ GREENWAYS
 MILE STUDY BUFFER	 BUS LINES THAT CONNECT TO RIVER
 EXISTING TRAILS/ GREENWAYS	 PROPOSED TRANSIT CORRIDORS AND STATIONS
 PLANNED TRAILS/ GREENWAYS	





# Relevant Planning Studies

## HAMILTON COUNTY

*Carmel Clay Parks and Recreation Master Plan, 2015*

*Fishers 2040: A Comprehensive Plan for the City of Fishers, Indiana*

*Hamilton County 5-Year Parks and Recreation Master Plan, Hamilton County, Indiana, 2017*

*PLANoblesville: 2013 COMPREHENSIVE PLAN*

*Noblesville Alternative Transportation Plan 2015*

*Pleasant Street Corridor Study, Noblesville, Indiana*

*East Central Indiana Economic Development Study, East Central Region and the Indiana Economic Development Corporation Partnership*

*White River Greenway Planning initiatives for central downtown and adjacent neighborhoods in Noblesville.*

*On-going planning initiatives at Conner Prairie.*

*Nickel Plate Trail Plan: City of Fishers, City of Noblesville*

## MARION COUNTY

*Reconnecting to Our Waterways (ROW) Strategic Plan, 2017*

*Indy Parks and Recreation Comprehensive Master Plan, December 2016*

*Indy Greenways Full Circle 2014-2024 Master Plan*

*Broad Ripple Park Improvements Plan, Indy Parks*

*Pathways Over Pogues Run*

*The Indianapolis Metropolitan Planning Organization's Long Range Transportation Plan (LRTP)*

*White River Greenway Planning initiatives for central downtown and adjacent neighborhoods in Noblesville.*

*On-going planning initiatives at Conner Prairie*

*Nickel Plate Trail Plan: City of Fishers, City of Noblesville*

*Indy Moves Transportation Plan*

## Ongoing Projects

*The following are a list of relevant non-motorized and motorized connectivity and transportation projects planned, constructed and future for Hamilton and Marion County.*

## HAMILTON COUNTY

### Non-motorized

- Nickel Plate Multiuse Trail, Fishers, Indiana - Currently in the early planning phase, this trail will be paved and constructed on the former Nickel Plate railroad corridor. The trail will extend between downtown Fishers and 146th Street north approximately 4 miles where it will connect with the Noblesville segment. The proposed trail is in proximity to and parallels the White River.
- Nickel Plate Multiuse Trail, Noblesville, Indiana - The trail will extend between downtown Noblesville south to 146th Street creating an 8-mile trail between Noblesville and Fishers. Planning is scheduled to begin in 2019 for this segment.

- Conner Prairie Nature Amphitheater Stage, 134th and Allisonville Road, Fishers  
The 50-seat Nature Amphitheater Stage will be nestled in the trees near the river and feature a covered, raised stage for nature chats, performances, and storytelling. The White River Overlook at Conner Prairie (recently completed) is a place to visit nature's beauty and highlight the history and ecology of the White River with interpretive signage and interactive displays.
- Midland Trace Trail, Noblesville, Indiana -  
This multi-use trail is planned to extend 6.5 miles between the City of Westfield and downtown Noblesville. Phase II is currently under construction. The trail will eventually connect the Monon Trail in Westfield and the White River in Noblesville. Phase III is slated for completion in 2019 and will complete the final section between Willowview Road and Hague Road.
- A connector trail is planned between Potter's Bridge, Noblesville and Town of Cicero along Cumberland Road. Potters Bridge is located just north of 191st Street in Noblesville and crosses the White River. The proposed trail will head north and east from the bridge to Cumberland Road, just west of Highway 37 and north to Cicero.
- A connector trail is planned between the new bridge in Strawtown and Koteewi Park west toward the Town of Cicero along 234th St. Specific details of this project are unknown at this time.
- Logan Street Pedestrian Bridge is a joint project between Hamilton County and the City of Noblesville. The existing bridge in downtown Noblesville will be rehabilitated and widened to provide pedestrian connectivity between downtown Noblesville, the River Walk and Federal Hill Park. A pedestrian walkway will be added to the south side of the roadway and separated from vehicular traffic by bridge railing.
- Phase I of the downtown Noblesville Riverwalk was a county project and consisted of a trail connecting the county employee parking lot and the Hamilton County Judicial Center, under the Conner Street/State Road 32 Bridge. Phase Two of Riverwalk was a city project, extending the trail under the Logan Street Bridge and connects with the pedestrian bridge to Forest Park, Potter's Bridge and Field Drive. Phase Three connected the two completed portions behind the Judicial Center. It also joins with the southern extension between Maple Avenue and Division Street.



MIDLAND TRACE TRAIL



### *Motorized*

- Pleasant Street Extension, Noblesville, Indiana - Located between Washington and Walnut Streets, Pleasant Street is scheduled to be enhanced and widened to allow for a combination of separated and contiguous bicycle and pedestrian trails, medians, wayfinding, lighting, landscaping and miscellaneous amenities. The Pleasant Street improvements will occur between Highway 37 west toward southern downtown Noblesville, cross the White River and connect to Hague Road. Pedestrian access to the river at the bridge crossing will be included.
- 126th Street improvements include a connector between the east and west legs of the corridor over the White River currently scheduled for late 2019.
- 146th Street and Allisonville Road improvements include a grade separated interchange and widening and will include a pedestrian walkway. The project is

currently in the preliminary design phase so design parameters may change.

- Improvements to Allisonville Road between 126th Street and 131st Street are currently in the design phase with an anticipated start date of 2018. Project includes the widening of Allisonville Road and signalized intersections with multiple lane approaches at 126th and 131st Streets. New pedestrian walkways, lighting and landscaping will also be included.

## **MARION COUNTY**

### *Non-motorized*

- Pathways Over Pogues Run. Pogue's Run Greenway is a 5.3 mile trail corridor planned on the near northeast side of Indianapolis. The trail extends between 10th Street at the Monon Trail and the Indianapolis Cultural Trail and the Pogue's Run Art and Nature Park.
- Broad Ripple Park Improvements Plan, Indy Parks
  - Located along 62nd Street and adjacent to Broad Ripple Village the Park Master Plan was completed in the spring of 2018 and incorporated the following guiding principles and planning and design elements:
    - Sustainability
    - Connection to the White River
    - Connection to Broad Ripple Village and adjacent neighborhoods and communities



NOBLESVILLE RIVERWALK



- Active and passive forms of recreation
  - Environmental education
  - Public art
- Pedestrian and bicycle trail connection between the Town of Speedway and downtown Indianapolis. Currently the Town of Speedway has a trail in place and one planned for a segment of the B&O Rail Trail. Key will be their connection to the White River and downtown Indianapolis.
  - 10th Street White River Greenway Trail Connector, 2022 - This small trail segment will provide a new connection between the current at-grade trail, under the 10th Street Bridge at White River in downtown Indianapolis and connect to the street level across from the Veterans Administration Medical Center.
  - Riverside Marina Project, located along the west bank of the White River just north of 29th Street and proposed new home for the Indianapolis Parks Foundation offices. Slated for completion in 2019.
  - Fall Creek/ Central Avenue Bridge, 2019 - Located along Fall Creek Parkway and Central Avenue the project is currently under construction and will include a trail segment to extend the existing trail to Meridian Street.
  - Fall Creek Trail Extension Phase I extends the existing Fall Creek Trail at Meridian Street to Burdsal Parkway. Phase 2 also
- planned for 2020 will connect at Burdsal Parkway to the White River Trail at 10th Street/Indiana Avenue. These two phases will be a key link in the Indianapolis Greenway Master Plan.
- Canal Tow Path (30th Street to Burdsal Parkway) 2019 - No specific details known at this time.
  - White River Trail extension, downtown Indianapolis south to Southwestway Park is planned. Schedule for completion and details regarding this project are unknown at this time.
- Motorized*
- A new roundabout is currently under construction on 96th Street at Keystone Avenue with two roundabouts planned along 96th Street at Priority Way and just west of Allisonville Road at Hazel Dell Parkway.
  - Rehabilitation and widening the lanes of the bridge over the White River at Oliver Avenue and McCarty Street is planned for a 2019 completion.
  - A comprehensive list of long term roadway and bridge projects are identified in the 2016 update of the Indianapolis and Marion County Thoroughfare Plan as part of the Comprehensive Plan and will be considered.

# Observations and Findings

## Methodology

### TASK 1 DATA COLLECTION

Available information was collected to include planned and completed studies, reports, comprehensive plans, 5-year parks and recreation plans, trail plans, transportation studies and lists of major thoroughfare projects. The data collected included county-wide and local plans for Indianapolis, Fishers and Noblesville. All were reviewed in order to understand and integrate established and adopted community goals and objectives associated with connectivity.

### RECREATIONAL TRAILS

The Marion County Long Term Control Plan of 2013 included a plan identifying the types and concentration of recreation occurring along the river in Marion County. This information was key in lending a broader understanding of needs for future public connections. Specific forms of recreation identified included canoeing, kayaking, swimming and fishing.

Identification of existing river access typology. This included visiting known river access points and taking visual inventory of existing trail and access conditions: surface treatments, trail widths, alignments, amenities, wayfinding, slopes, vegetation and overall visual character. An extensive photo inventory of the existing conditions was also prepared and mapped

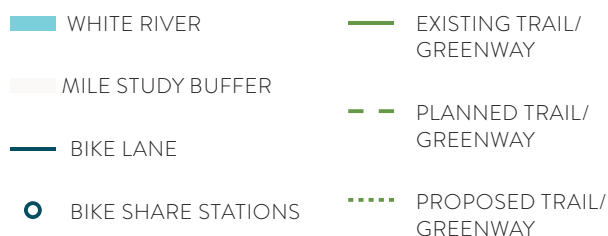
relative to the contiguous parks along the river. A variety of trail types was identified along the river's edge including dirt pathways varying in width between 1' & 4', impervious surface connections, In most cases vegetation had been cleared within a few feet. Surfaces of the dirt trails were rutted but seemed to be well drained.

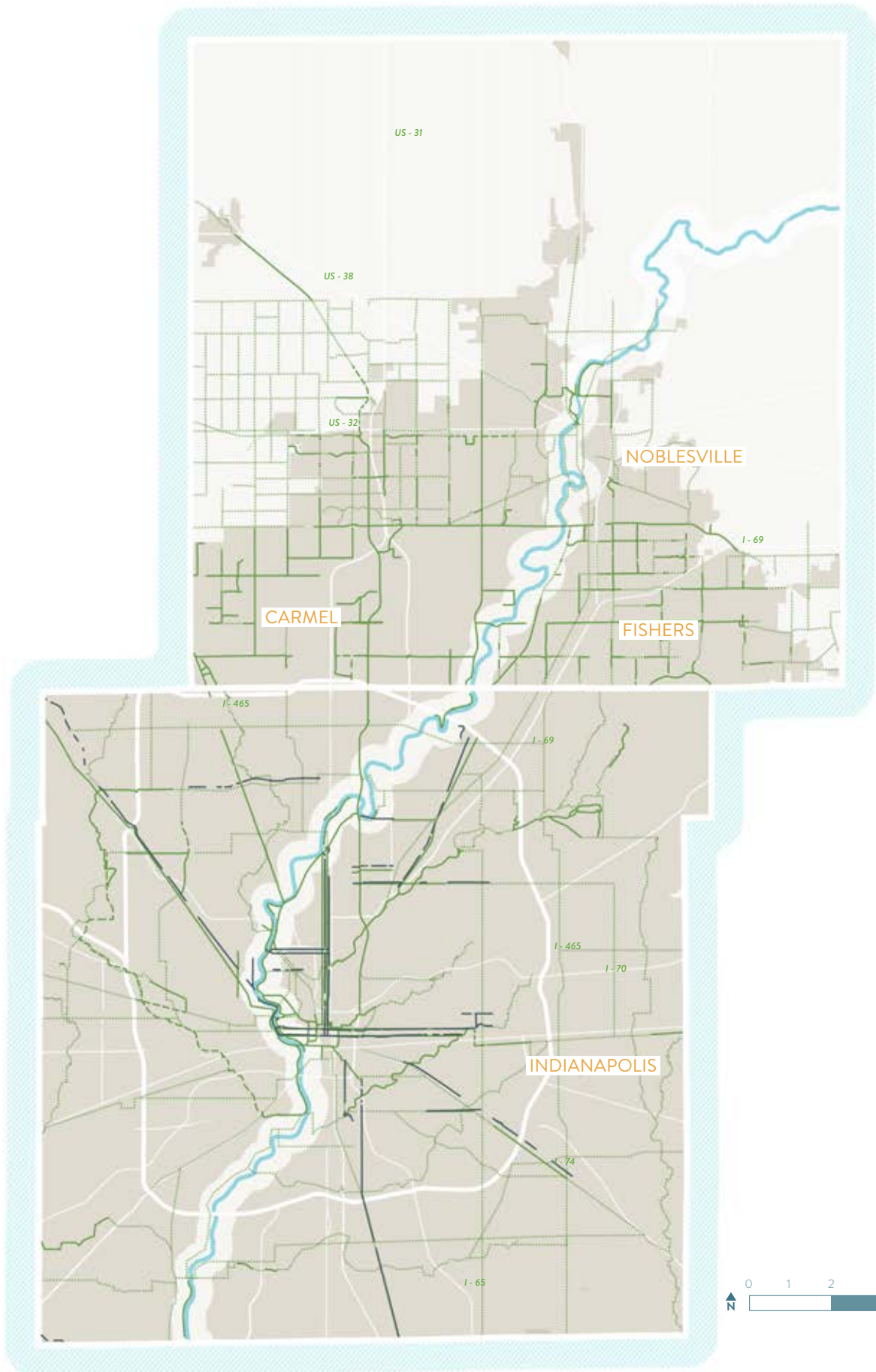
### SHARED USE MOBILITY

As urbanization continues to reach unprecedented levels and so has road congestion and all that is associated, including but not limited to safety and air pollution. One answer is the shared use mobility programs, providing viable alternatives to combat these problems as well as offering overall sustainability benefits. The Pacers Bike Share and Indy Blue vehicle share programs currently exist in downtown Indianapolis and are proving to be highly successful. The recent scooter programs while popular, however, remain under scrutiny as management, regulatory issues, liability and safety issues continue to be addressed. The City of Noblesville has recently begun their bike share and according to city officials their program is proving to be very successful.

### IDENTIFICATION OF TRAIL

#### TRAILS AND BIKE INFRASTRUCTURE





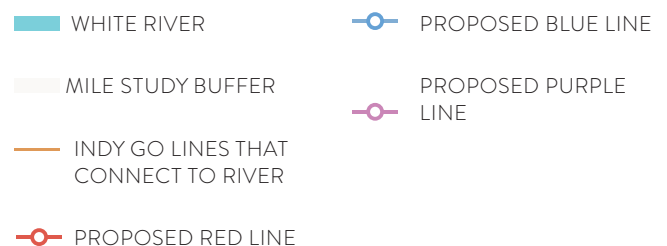
## NETWORK GAPS

Using the greenways plans for Hamilton and Marion Counties, trail network gaps have been identified related to the connectivity along and to the river. The gaps are a result of funding issues, a lack of cooperation on behalf of private landowners, protective covenants, limited public right of way available, or local jurisdictional restrictions. Concepts will address the significant gaps and identify ways for eliminating them and promote a continuous connective network where feasible.

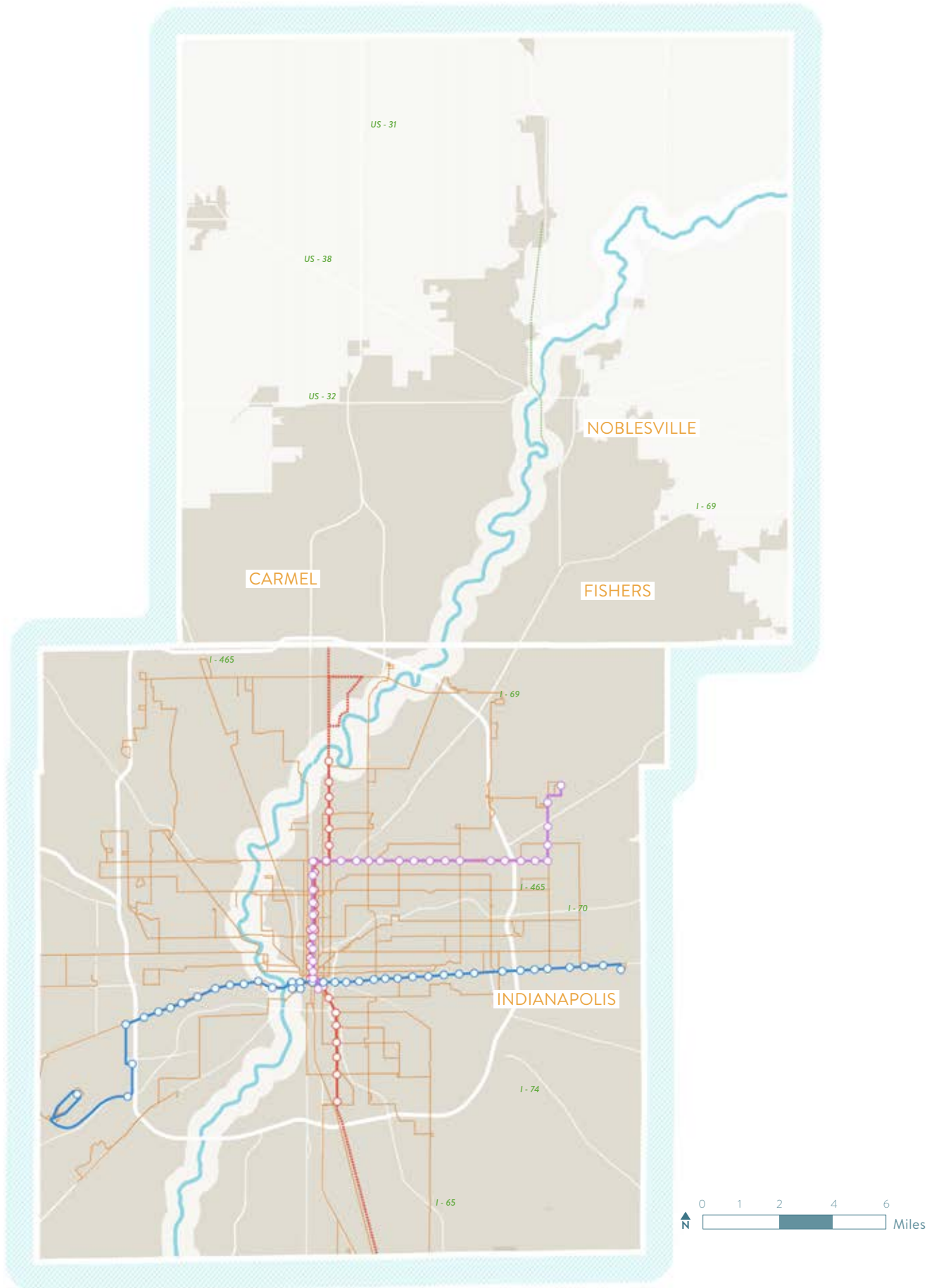
## IDENTIFICATION OF MASS TRANSIT GAPS (MARION COUNTY)

Proposed transit facilities currently planned and under construction are identified for Marion County. Gaps in access have also been noted as they relate to White River and recommendations will be included to address these gaps, mostly in the form of adding stops and ways to provide safe pedestrian passage. At this time there are no formal transit plans for Hamilton County.

## EXISTING TRANSIT AND PROPOSED BUST RAPID TRANSIT







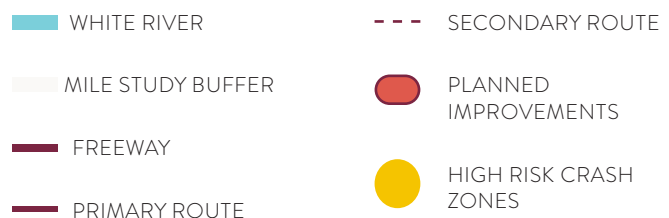
## VEHICULAR SYSTEMS

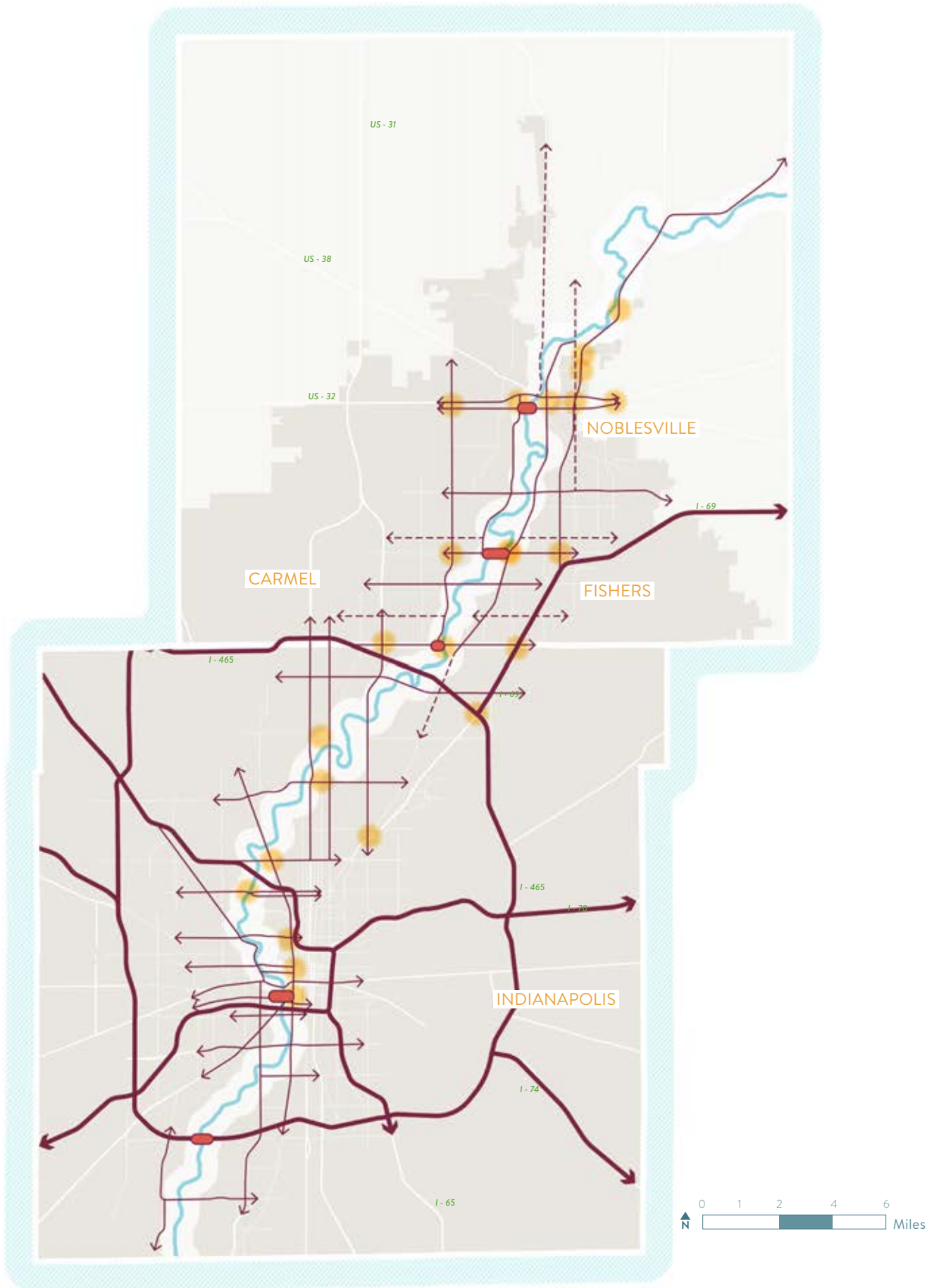
Key to connectivity to the White River is the need to address existing transportation systems. The existing primary arterial network and associated infrastructure surrounding the river in both counties must be recognized and analyzed for its multi-modal and connective potential as well as the need to find ways to improve safety and reduce accidents. Right of way widths typical of primary arterials is a starting point for integrating all modes of transportation and serve as a means to promote the river by the sheer volume of traffic, vehicular and otherwise.

Indiana Department of Transportation and the Madison County Council of Governments was the source for traffic counts for the primary arterials crossing White River directly or those serving as a collector for the arterials. The non-directional counts will be used to determine primary roadways and their potential to serve as a safe and direct connection to the river.

Crash risk information was also identified and incorporated into the arterial mapping.

### MAJOR ARTERIALS AND AREAS WITH HIGH CRASH RISK





## What We Heard

The communities provided significant feedback regarding connectivity, specific to trails and river access. There is broad support for improving physical access to the river and an identified need to tie different segments of the river together thematically, physically, and visually. A desire for furthering opportunities for kayaking and canoeing was expressed. Additional requests to improve visibility of the river from public right-of-ways and provide improved access to the river from major thoroughfares that cross the White River were made. There was concern expressed regarding the development of a continuous trail network along the river, due in part to potential impacts to adjacent private property owners with respect to safety, security, and trespassing.



## Opportunities and Barriers

### Opportunities

Strong connections are the hallmark of a successful, functional riverfront system. The central Indiana region is a collection of connected systems in urban places like Noblesville, Fishers and Indianapolis.

In the early 1900s Kessler's plan for Indianapolis left a strong imprint on the city's growth, which centered on greenways and open space as the primary land use. It was Kessler's vision the development of greenways and parks would dominate. This precedent-setting approach would guide the planning and development of everything else and establish the framework suggesting the "remaining areas" be relegated for infrastructure, commercial, residential and industrial land uses. .

Similarly, trains and automobiles have molded the grid structure of Hamilton County's urban areas. There are opportunities not only to connect between these two major systems, but to enhance an already robust system of pedestrian, bike, future transit and road connections along the river.



Key opportunities to enhance connectivity along the White River include:

### **ENHANCE AND IMPROVE EXISTING ROADWAYS**

Major arterial roadways cross and parallel White River, much to the benefit of the community and the river. Hamilton County has the benefit of over twelve east/west corridors and two major north/south corridors crossing or paralleling the river.

The width of these roadways vary, but in their existing state, their widths are sufficient to provide a separated, multi-use trail and or bikeway on at least one side. As new roads are planned, narrower drive lanes would afford more room for separated bicycle and pedestrian trails, and landscape medians and parkways in keeping with the complete streets approach.

### **IMPROVE ACCESS TO AND ALONG THE RIVERBANK**

In Hamilton County alone there are seven public parks and eleven boat ramps/canoe launches along the river with opportunities to expand and develop parallel trails to connect the myriad of destinations. These parks and those in Marion County are ideal locations for easy vehicular access and parking while providing a multitude of other recreational opportunities. A shortage exists however for smaller, more remote access areas and trails leading to the river for fishing, camping, bird watching or just strolling.

### **CREATE A REGIONAL TRAIL DESTINATION**

Fifty eight miles of river translates into a significant opportunity for the development of a continuous trail system. The framework for this concept, yet to be determined, could result in considerable economic returns for each county and communities along the river. Similarly, the Little Miami Trail has significantly improved the economic complexion of western Ohio.

### **EXPAND EDUCATIONAL OPPORTUNITIES**

Whether along the river banks, within the natural, man-made access areas, in the parks contiguous to White River or along the bike lanes, trails or arterial roadways, all are potential places for interpretive education opportunities to tell a story, whether about a long lost species of river mussel, an important person or significant historic event. Rest areas, other parks, cooperative commercial districts and public institutions along a trail, bikeway or greenway are all potential locations. Retaining walls, walk surfaces, wayfinding and signage and other amenities could be utilized to tell these stories.

### **CONNECT COMMUNITIES ACROSS THE RIVER**

The Midland Trail is currently under construction and will provide a direct trail connection between the City of Noblesville and the White River and the City of Westfield 6.5 miles west connecting to the 23-mile

Monon Trail. The Monon Trail extends between 236th Street, north in Hamilton County and 10th Street in downtown Indianapolis and the Cultural Trail which connects to the river at White River State Park. A long term vision could be to ultimately connect Indianapolis with Fishers to create a closed loop of approximately 60 miles of trail between the two counties.

## **PROMOTE COMMUNITY HEALTH AND WELLNESS**

A growing concern in the United States is the increasing levels of health diseases and injuries related to inactivity. According to a study by the Centers for Disease Control and Prevention published in 2003, the rate of obesity of adults had increased to 20.9 percent of the population from 19.8 percent in just one year (CDC). Trails and Greenways offer a protected and reliable source for residents to visit and exercise in a myriad of ways including walking, running, biking, and skiing. Some of the many health benefits to using trails and greenways include:

- Improved moods reducing depression and anxiety;
- Connection to places offering exercise while commuting or recreating;
- Supplement public health promotion initiatives;
- Aid in the prevention of heart disease;
- Help control cholesterol levels;

- Aid in regulating blood sugar levels positively benefiting those with diabetes
- Slows bone loss.

## **CONTINUITY BY DESIGN**

As the WRVP moves forward, there is an opportunity to consider developing a more consistent design language for the river corridor. This type of “theming” is key to the quality and establishment of a unique sense of place. The purpose of developing an overall theme or design character and associated vernacular for White River would be to:

- Provide visual consistency as areas and access points are developed;
- Respond directly to the surrounding context;
- Provide improved visibility from the public rights-of-way through signage, lighting, clearing for vistas.

A selected theme might be reflected in a variety of ways along the White River including amenities, site furnishings, specialty pavements, logos, color palette, plant materials, sustainable elements, bicycle racks, public art elements, railings, gates, bridge appurtenances and approaches.

The extent of multi-modal development occurring since the onset of federal funding (ISTEA) 25 years ago, has led to parks, lakes, rivers, trails and bikeways that have become major tourism destinations. To compete as tourist attractions in an ever-expanding

recreational market, the White River needs to offer more than a walking, running, kayaking, educational, canoeing or bicycling experience. Incorporating a consistent, unique design vernacular is a way to leave indelible impressions on the user through visual repetition and reinforcement.

Expectedly, the existing environments along the White River are either urban or suburban/rural in character. Narrow, manmade dirt paths surrounded by dense vegetation found in the rural areas contrast with the expansive and formalized hardscape promenades of the urban areas exemplified by downtown Noblesville and Indianapolis. If an overall vernacular or thematic approach is developed, it will be necessary to respond to each environment accordingly, while providing a seamless, visual and physical transition between.

Other thematic-related programs enhance and broaden user activities to include experiences centered on educational topics such as ecology, environmental stewardship and sustainability, public art, local history, significant people and places. Other themed program uses that could provide tourist attractions include camping and equestrian trails and large annual events such as music concerts, marathons/races, and art festivals, all proven to bring economic benefits to communities despite population, size or geographic location.

## Barriers

Less than a quarter of the river is publicly-owned or publicly accessible, and much of the publicly owned land along the north and south reaches of the river are environmentally sensitive areas or contain major utilities. Connectivity considerations will need to be sensitive to privately owned land and areas where there is regular flooding.

Limited access is an issue in certain areas where the river banks are steep, rugged and dense with vegetation with little or no clear view of the river. While these conditions exist in only certain areas along the length of the river making access difficult, they also serve to protect the delicate ecology and should be considered carefully before any access area or trail is considered.

Access to the river from major public right-of-ways is an issue through both counties and must be considered a high enough priority when it relates to the planning and programming of these facilities. While bikeways and pedestrian ways are being incorporated into some of the roadways and bridges, there are missed opportunities for allowing vehicular access down to the river's edge at these locations. Understanding the extent of vertical grade change between the surface of a bridge and the flowline of the river can be a major barrier, but not if consideration is given to the approach grade and providing for exit and entrance ramps down to the river for vehicles, pedestrians and

bicyclists. The planned bridge over the White River along Pleasant Street in Noblesville is an example of one being planned to allow for multi-modal access adjacent to the crossing.

Costs associated with planning, construction and maintenance of multi-modal facilities can prove to be a barrier. While the importance and need for complete streets incorporating appropriately-sized drive lanes, walks, trails and bikeways has been embraced by Hamilton and Marion Counties and the communities within, these facilities are expensive to build and maintain. With local and county budgets often stretched, a well-conceived development strategy is necessary to address alternative funding sources, budget adherence, maintenance and operations to assure long term sustainability.

Multi-jurisdictional requirements. Each county and community located within proximity to the White River is subject to local jurisdictional requirements regarding development, land use, layout, drainage and zoning. Collaborative efforts will involve building consensus and developing mutual agreements to maintain a well-funded, managed and successful and continuous trail and greenway network.

Public opposition, adjacent land-owner concerns and misperceptions. Specific concerns on behalf of land owners adjacent to the river have been expressed regarding privacy, noise, trespassing, litter and other unlawful activities by users of the river. As the river becomes more attractive as

a destination, the number of users will increase and so will the need for increased law enforcement. Education and community buy-in will be necessary to determine effective ways to protect the privacy and rights of private landowners and must be considered as trail alignments are identified. Opportunities to shift trail alignments to avoid private properties will also be considered.





# Permitting Review

Depending on the scope of each project or development occurring on or near the White River various permits will need to be acquired, including Federal and State permits. Federal and State permits relate to potential impacts within the White River floodway. Local permits will apply to all projects and primarily relate to planning, zoning and building requirements. Additionally, local planning and zoning restrictions complement Federal and State permits relating to development in floodway areas. Any project considered in the study area will need to include standard due diligence to verify existing conditions, utilities, permitting requirements, and special zoning considerations.

Permits discussed in this section apply to tributaries of the White River as well as the White River itself. Projects that impact water quality will require mitigation. Mitigation requirements vary widely depending on the water resource impacted. The type and extent of mitigation required is dependent on the type and extent of the water quality impact. For instance, certain wetland impacts require compensatory mitigation at a 4:1 ratio or greater. A summary of potential permits that one may expect to encounter as part of the development and building process follows:

## Federal

The U.S. Army Corps of Engineers (USACE) is responsible for administering the U.S. Environmental Protection Agency (EPA) Clean Water Act. This includes regulation of 'Waters of the U.S' and aquatic resources. Along the White River corridor, wetlands or sensitive wildlife habitat also need to be considered for Federal permits. The USACE Section 404 permit regulates dredging and filling in Waters of the U.S. essentially restricting dredging or the placement of any fills that have the potential to degrade the waterway. For Marion and Hamilton County, Indiana the Louisville District office of the USACE is the authorizing agency. Section 404 permit requirements are coordinated with companion requirements of the Indiana Department of Environmental Management (IDEM) Section 401, Water Quality Permits discussed later in this section. There is a memorandum of agreement in place between the USACE and IDEM covering projects with minimal impacts on water quality or aquatic resources; these are known as Regional General Permits (RGP). Projects with higher impacts will require more extensive Individual Permits.

## Section 404

Areas of the waterway that need to be considered as part of a Section 404 permit include the channel area and banks on either side. Maximum thresholds for Section 404 RGP's include the following (Federal Register, December 15, 2014, US Army Corps of Engineers, Louisville, Detroit and Chicago Districts, "Indiana Regional General Permit No. 001"):

- Less than 1-acre of impact to Waters of the U.S including wetlands.
- Less than 1,500-lineal feet of impact of stream channel.
- Less than 10,000 cubic yards of dredging in navigable waters.
- Structures and fills for docking and mooring are limited to similar permitted structures and fills in the area.
- Phasing or "piecemealing" of projects is not allowed to meet threshold limits.

Mitigation requirements for projects with minimal impacts is up to the discretion of the permitting agency. For projects with stream impacts below the thresholds above a Section 404, RGP permit submittal is acceptable.

Early coordination with the USACE is encouraged with submittal of Section 404 permits. This commences with a letter accompanied with project details requesting a review of the project prior to permit submission. Often a joint on-site early

coordination meeting is helpful with IDEM officials. For RGP's a permitting timeline of approximately three to four months should be allocated in the project schedule. If an Individual nationwide permit is required upwards of a year can be expected for permit approval.

## State

Three permits will likely need to be received from Indiana for projects on or near the White River affecting the stream channels and filling in floodway areas. The Section 401 Water Quality permit and a Rule 5 Erosion Control Permit are obtained from IDEM. A Construction in a Floodway (CIF) permit, obtained from the Indiana Department of Natural Resources (IDNR), Division of Water, will also be required for projects in the White River floodway and its tributaries. A discussion of each permit follows.

### **IDEM, SECTION 401 WATER QUALITY CERTIFICATION**

The basic intent of Section 401 permits is the same as for USACE Section 404 permits: to regulate water quality associated with Waters of the U.S and related aquatic resources. It is a required component of the USACE Section 404 permit and needs to be issued prior to the federal Section 404 permit. The basic premise for the Section 401 permit is that dredged or fill material cannot be released into waters of the U.S. that will degrade the water quality if a less damaging alternative exists.

Applicants for a Section 401 permit are encouraged to initially coordinate with the USACE for the federal Section 404 permit. Due to their varying jurisdictions, both the

USACE and IDEM need to be contacted regarding the need for either permit. One example is isolated wetlands which may not be regulated by Federal authorities but are regulated by IDEM. Section 401 RGP permits should be applied for at least four-months prior to the anticipated start of construction. For projects that have significant potential impacts, permits should be applied for eight to ten-months in advance of construction.

Permit applicants need to be aware of the following Section 401 permit requirements:

- Discharges of pollutants into Waters of the U.S. is prohibited including stormwater sediment runoff.
- Impacts to critical wetlands or critical aquatic sites are prohibited.
- Projects permanently impacting less than .1-acre of Waters of the U.S. are permitted without mitigation required.
- Projects with less than 300 linear feet of channel disturbance are allowed.
- Activities that do not change the stream such as velocity, channel alignment or cross sectional area below the Ordinary High Water Mark (OHWM).



The OHWM is defined as an area above normal pool water elevations and below which vegetation generally does not grow. An acceptable restoration or stream stabilization plan needs to accompany permits that have water quality permits. Impacts above the thresholds identified above need to provide mitigation measures. Depending on the type of and extent of the impact and resource; these measures vary widely. For instance, some wetland impacts require mitigation at ratios of 4: 1 or greater. In some cases, the project corrects stream instability that is already in place such as bank instability by opening up closed drain pipes and culverts or removal of invasive vegetation. Projects that correct these conditions are looked favorably on by IDEM. Stream encapsulation such as culverts and underground drain pipes are strongly discouraged.

For Section 401 permits, additional environmental reviews and coordination are required by other agencies such as the U.S. Fish and Wildlife Service; IDNR, Division of Water, Forestry Division and State Historic Preservation Office.

## Erosion Control Permits

### *Rule 5 (IDEM, Construction / Land Disturbance Permit, (327 IAC 15-5)*

Rule 5 Erosion Control permits are administered by IDEM. IDEM requires all projects exceeding 1-acre of land disturbance to have appropriate erosion control measures incorporated in the project to minimize

soil erosion and to ensure water quality is maintained in Waters of the U.S. Indianapolis has a more restrictive .5-acre threshold at which a Rule 5 permit is required. The Indiana Stormwater Quality Manual (SWQM) provides specific guidance regarding erosion control practices and their applicability to various projects. These include, but are not limited to, features such as silt fence, erosion control blankets, turf reinforcement products, check dams, diversion channels and other features. The most critical item is to provide cover on disturbed areas of the site as quickly as possible following land disturbance.

For projects requiring a Rule 5 Erosion Control permit a Notice of Intent (NOI) needs to be submitted following local review before submittal to IDEM for final approval. Documentation that needs to be provided with the NOI includes the Storm Water Pollution Prevention Plan (SWPPP) and a copy of the proof of publication from a local newspaper for the project. The SWPPP needs to identify the extent of land disturbance for the project including existing and proposed grading information, information describing existing and proposed drainage conditions and erosion control features and elements consistent with SWQM requirements appropriate for anticipated erosion control conditions. Tree clearing and protection of sensitive environmental areas such as wetlands also needs to be considered in the SWPPP. Generally, IDEM will review the SWPPP within 30 days of receipt of the NOI. Prior to

submittal to IDEM projects are reviewed at the local level by the Marion or Hamilton County soil and water conservation department or the MS4 coordinator. If comments are not received within 30 days, construction on the project may proceed.

*Rule 13 (IDEM, Municipal Separate Storm Sewer Systems, 327 IAC 15-13 (Rule 13))*

Marion and Hamilton County are both in the Indianapolis urbanized area and subject to Rule 13 requirements. Tributaries and stormwater outfalls of the White River in urbanized areas are subject to requirements of Municipal Separate Storm Sewer Systems (MS4) regulations. MS4s have the greatest potential for stormwater runoff and pollution for tributaries and stormwater outfalls to the White River.

A list of MS4 jurisdictions in Hamilton County near the White River which are part of the Phase 2 Rule 13 requirements include the following:

- City of Fishers
- Co-Permittees: Hamilton County, Town of Cicero, City of Carmel
- City of Noblesville

For Marion County, listed MS4 jurisdictions near the White River included with Phase One, Rule 13 requirements include:

- Crows Nest
- Rocky Ripple
- Spring Hill
- Williams Creek
- Indiana University Purdue University Indianapolis (IUPUI)
- Marian College
- Ivy Tech
- Butler University

*IDNR, Construction in a Floodway Assessment User Guide*

Construction In A Floodway (CIF) permits are required for any project taking place inside the floodway: areas with a 1-percent chance of occurring on an annual basis (100 year flood). Individual worksheets need to be prepared to determine potential impacts as part of the permit submittal and do not require detailed hydraulic modeling of the stream channel including:

- No Change in Effective Cross-Sectional Area Non-modeling – projects such as stream bank restoration, excavation and fills of 6-inches or less.
- Change in Effective Cross-Sectional Flow Area Non-modeling With Worksheet A – projects with negligible loss to effective cross sectional flow area that demonstrate

minimal surcharge such as stream bank armoring, minor fills and berms.

- Ineffective Area of the Contraction or Expansion Reach of a Stream Crossing - projects in areas of ineffective flow created by a bridge, where bridge is not overtopped and with no road overflow during base flood, such as fill, excavation, buildings.
- Bridge Replacement-in-Kind Non-Modeling – used for bridge replacement projects in which the waterway opening of the proposed structure is equal to or larger and the low chord of the structure is equal to or higher than the existing conditions; with an unchanged flow.

The approximate timeline for approval of these non-modeled projects with minor impacts is approximately 30 days unless additional information is requested.

For projects causing an increase of 0.14-feet in the 100-year base flood elevation, hydrologic and hydraulic computer modeling of existing and proposed base flood conditions is required. Typically, this includes new bridges, certain bridge replacements and other projects with fills such as structures, levees, dams, or new development. For these projects, mitigation is required and will include compensatory storage or creation of additional excavation in the watershed area near the project to compensate for the loss of water carrying capacity. Approximately four to six months need to be allocated for permit review and approval for these projects.

### *Building Project Review*

In addition to projects involving work on or near the White River, most projects involving construction of new structures or modifications of existing structures will require Indiana State Fire Marshall through the Department of Homeland Security. Permits for structure construction or rehabilitation are not discussed here, but need to be considered by developers.

## Local

For projects in Indianapolis and Hamilton County jurisdictions, local permits are generally focused on elements related to zoning, such as land use, lot coverage, signs, landscaping, parking and other development requirements. Land uses considered in each zoning ordinance include residential, commercial, industrial, special uses, greenways and conservation areas. For projects within flood prone areas identified by the Federal Emergency Management Administration separate zoning classifications, limiting development such as greenway, floodplain, recreation or similar classifications are common. These classifications refer to Federal and State water quality requirements guiding development in these zoning areas.

The rezoning process is similar for each jurisdiction and provides guidance for development and design information that needs to be submitted with applications, fees, timelines and procedures for appealing zoning decisions. Additional zoning considerations apply to larger Planned Unit Developments. Overlay zoning districts contain additional design guidelines for appropriate development. Prior to commencing construction Improvement Location Permits will need to be secured. The jurisdictions identified below have adopted the Indiana Building Code for building development in their communities.

Following are brief descriptions of zoning ordinances with jurisdictions with zoning ordinances in the White River study area.

### *City of Indianapolis, Department of Metropolitan Development, Department of Business and Neighborhood Services:*

In Indianapolis, planning and zoning is regulated through the Department of Metropolitan Development. Inspections of buildings and development are approved through the Department of Business and Neighborhood Services including issuance of Improvement Location Permits. A complete revision of Indianapolis zoning ordinances was completed and approved in April, 2016 and called Indy Rezone. Notable considerations in the Indy Rezone ordinance is consideration of community gardens and conservation of “heritage trees”. This ordinance revision emphasized sustainability and flexibility in the zoning and planning process.

Portions of the Regional Center overlay district cover the study area and have additional design guidelines that apply to development in the Regional Center. Marion County’s Comprehensive Plan vision and values component, the Plan 2020 Bicentennial Agenda, was adopted in 2016 and includes updates to its land use, transportation, and sustainability and residences elements are scheduled for adoption in late 2018.

### *City of Noblesville:*

In Noblesville, planning and zoning is regulated through the Department of Planning and



Development, including issuance of building permits. The Unified Development Ordinance provides information for zoning and land use in Noblesville. The 2013 PLANoblesville Comprehensive Plan was adopted in January, 2014.

The Riverwalk District is a zoning overlay district with design guidelines. Development in the Riverwalk District is restricted to cultural and recreational use and permanent structures are limited. The issuance of building permits is administered through the Building Division in the Department of Planning and Development.

*City of Carmel, Department of Community Services, Division of Planning and Zoning:*

Divisions within the Department of Community Services includes: planning and zoning, building and code services, code enforcement and urban forestry. The Unified Development Ordinance includes requirements for zoning and planning in Carmel. Carmel has a separate ordinance covering development of flood hazard areas. This ordinance restricts development in flood prone areas, requires additional protections to development from inundations and controls the alteration of lands in flood prone areas.

*City of Fishers:*

Permitting for planning and zoning in Fishers are handled through the Department of Planning and Zoning including economic development, development reviews and

long-range planning. Building permits and inspection are administered through the Permitting and Inspections Department. The Permitting and Inspections Department also provides utility locates for utilities owned by the City of Fishers.

*Hamilton County:*

In outlying areas of Hamilton County permits for buildings and zoning and planning are administered and issued through the Plan Commission. There are nine different planning jurisdictions in the county, aligning generally with township boundaries. Most land adjacent to the White River is zoned agricultural. Municipal planning and zoning requirements supersede county zoning requirements in areas within municipal planning boundaries.

## Utility Review

The Indiana 811 database was reviewed for various utility providers in the jurisdictions in Indianapolis and Hamilton County which abut the White River study area. Due to the 58-mile reach of the study area individual utilities were not contacted. As design is initiated for individual implementation projects, additional early coordination should be conducted with affected utilities. Important utility considerations include available utility capacities, the project's utility demands, and potential utility relocations. Indiana 811 serves as a clearinghouse and database for all utilities in Indiana and provides contact information for utilities in various jurisdictions.

In the study area the primary electric power utility providers is Indianapolis Power and Light Company. Duke Energy provides service to some areas of Carmel. For gas distribution and service, Citizens Energy Group and Vectren are the primary providers. Water service is predominantly provided by Citizens Energy Group. Sanitary sewer utilities include Citizens Energy Group and Carmel-Clay Township Regional Waste District. There are a wide variety of utilities that provide telephone and communications service in the study area. Duke Energy operates a small power plant north of Noblesville along SR 37.

The tables on the following pages provide a detailed list of utility providers available from the Indiana 811 database for jurisdictions in the study area. Below is a summary of notable utility information by jurisdiction along with a description of major facilities in the study area.

CITY OF INDIANAPOLIS

Indianapolis Power and Light Company (IPL) is the sole electricity provider in Indianapolis. Several locations show overhead transmission line crossings. In addition, IPL operates the Harding Street Power Plant along Harding Street north of I-465 on the south side of Indianapolis. IPL also operates the Warfleigh Pumping Station near the Meridian Street bridge over the White River.

Citizens Energy Group (CEG), is the sole provider of gas service in Indianapolis. In addition to gas service CEG operates and manages the water and sanitary sewer utilities in Indianapolis. The Belmont and Southport Water Treatment Plants are along the White River in the southern third of Marion County. There are numerous storm and sanitary outfalls along the White River through Indianapolis. Extensive efforts have taken place in the last 10 years as part of Indianapolis Consent Decree with the U.S. Environmental Protection Agency to eliminate sanitary sewer discharges to the White River with construction of deep-rock tunnels to store overflows until they can be treated prior to release, as well as green infrastructure projects to slow peak discharges at the “top of the hill.”

City of Indianapolis	
Utility Type	Utility Provider
Communications	AT&T - DISTRIBUTION
	BRIGHT HOUSE NETWORKS INDIANAPOLIS
	BUTLER UNIVERSITY
	COMCAST CABLE (INDIANAPOLIS)
	INDIANA UNIVERSITY FIBER
	IUPUI
	LEVEL 3 COMMUNICATIONS
	PURDUE UNIV I LIGHT FIBER (ZAYO)
Water	CITIZENS ENERGY GROUP
Wastewater	CITIZENS ENERGY GROUP
Gas	CITIZENS ENERGY GROUP
	ENTERPRISE PRODUCTS OPERATING, LLC (IND)
Electric	INDIANAPOLIS POWER & LIGHT COMPANY

## CITY OF NOBLESVILLE

Duke Energy is the electric utility for the City of Noblesville. CEG provides water service. Indiana 811 identifies Carmel Clay Township Regional Sanitary District as the sanitary utility. Vectren is the gas provider and various utilities provide telephone and communications service. The Noblesville Wastewater Treatment Plant outfall is near the plant on the west end of Pleasant Street.

City of Noblesville	
Utility Type	Utility Provider
Telecom	AT&T - DISTRIBUTION
	BRIGHT HOUSE NETWORKS INDIANAPOLIS
	COMCAST CABLE (INDIANAPOLIS)
	INDIANA FIBER NETWORK, LLC
	LEVEL 3 COMMUNICATIONS
	WINDSTREAM
Sanitary	ZAYO BANDWIDTH
	CARMEL UTILITIES
Water	CLAY TOWNSHIP REGIONAL WASTE DISTRICT
	CITIZENS ENERGY GROUP
Electric	DUKE ENERGY
Gas	VECTREN (NOBLESVILLE #1)

## CITY OF FISHERS

CEG provides many utilities for the City of Fishers including gas, water and sanitary services. The City of Fishers website identifies Duke Energy and Nine Star Power as electric utility providers. The Fishers Wastewater Treatment Plant has an outfall to the White River south of 106th Street.

City of Fishers	
Utility Type	Utility Provider
Telecom	AT&T - DISTRIBUTION
	BRIGHT HOUSE NETWORKS INDIANAPOLIS
	COMCAST CABLE (INDIANAPOLIS)
	ZAYO BANDWIDTH
Water	CITIZENS ENERGY GROUP
Wastewater	CITIZENS ENERGY GROUP
Gas	CITIZENS ENERGY GROUP
Storm Utilities	FISHERS, TOWN OF
Sanitary	HAMILTON SOUTHEASTERN UTILITIES
Electric	DUKE ENERGY
	NINE STAR POWER

## CITY OF CARMEL

Carmel has a greater variety of utility providers than other jurisdictions along the White River. In Carmel, additional due diligence will need to take place for utility early coordination to determine utility service areas for specific projects. Duke Energy is the primary electric power provider in Carmel. IPL provides electric service to some areas of Carmel adjacent to Indianapolis. Gas service is provided by CEG and Vectren depending on the project location. Sanitary sewer services are provided by Carmel Clay Township Sanitary District and CEG. Carmel Clay Township Sanitary District operates on outfall on the White River south of 106th Street. There is also a CEG intake from the White River along River Road.

City of Carmel	
Utility Type	Utility Provider
Telecom	AT&T - TRANSMISSION
	BRIGHT HOUSE NETWORKS INDIANAPOLIS
	CARMEL CLAY COMMUNICATIONS CENTER
	CARMEL STREET DEPARTMENT, CITY OF
	COMCAST CABLE (INDIANAPOLIS)
	FIBERTECH
	INFINITY FIBER ROUTE
	LEVEL 3 COMMUNICATIONS
	METRO FIBERNET, LLC
	NOBLESVILLE, CITY OF
	PURDUE UNIV I LIGHT FIBER (ZAYO)
	ZAYO BANDWIDTH
Water	CARMEL UTILITIES
	IN AMERICAN WATER
Sanitary	HAMILTON SOUTHEASTERN UTILITIES
	CLAY TOWNSHIP REGIONAL WASTE DISTRICT
	CITIZENS ENERGY GROUP
Water	CITIZENS ENERGY GROUP
Electric	DUKE ENERGY
	INDIANAPOLIS POWER & LIGHT COMPANY
Gas	MARATHON PIPE LINE CO. (CLERMONT)
	CITIZENS ENERGY GROUP
	VECTREN (NOBLESVILLE #1)

# Review of Past Planning Efforts

The following planning efforts both provide baseline information for the White River Vision Plan and inform the observations and opportunities outlined in this report. Each plan or study is summarized below and is referenced in each of the theme chapters.

## Regional Plans

### **ACCELERATE INDY PLAN**

The plan, also known as the Comprehensive Economic Development Strategy (CEDS) is the result of a partnership between the City of Indianapolis, the Central Indiana Council of Elected Officials (CICEO) and other regional partners, both public and private. The plan highlights the challenges Indianapolis faces to promote a strong positive identity, enhance transportation access and options and improve livability.

### **CARMEL CLAY 2020 COMPREHENSIVE PLAN**

The comprehensive plan, which was updated in 2016, analyzes existing land uses, development trends, suitability, and natural resources and guides future development through a robust

public process. The plan outlines objectives for future development and describes policies for the development of public places, public land and utilities. Objective 2.1 recognizes the strength of a connected regional trail like the White River Greenway, which is identified by the plan as a critical corridor. Objective 7.1 states that the riparian corridor and floodplain on the White River need to be protected from encroachment. The plan consolidates several past planning efforts including the Carmel 2020 Vision Plan (adopted in 1996), 96th Street Corridor Study, Old Meridian Task Force Report, Integrated Economic Development Plan, and Amended Redevelopment Plan, among others.

### **2016 CENTRAL INDIANA RDA REGIONAL DEVELOPMENT PLAN**

The Regional Development Plan focuses on key projects happening or planned for greater Indianapolis. 16Tech, bikeway and trail infrastructure improvements and the red line bus rapid transit route were all highlighted as key projects helping to attract and retain talent.



### **EAST CENTRAL INDIANA ECONOMIC DEVELOPMENT STUDY, EAST CENTRAL REGION AND THE INDIANA ECONOMIC DEVELOPMENT CORPORATION PARTNERSHIP (IN PROGRESS)**

A six-county economic development study for an area north and east of Hamilton County addressing trail network opportunities including along the White River as it extends north beyond Hamilton County. Counties included Jay, Delaware, Blackford, Henry, Madison and Randolph.

### **HAMILTON COUNTY TOURISM VISION 2025 PLAN**

The ten year vision for Hamilton County tourism was adopted in 2016. The vision plan is both aspirational and action-oriented to ensure recommendations are cost effective and produce a high return on investment. The plan identifies six focus areas, all of which overlay with opportunities for the White River to contribute to Hamilton County's growth and diverse mix experiences and for the county to ensure long term sustainability for the region.

### **INDIANA'S CULTURAL RESOURCES MANAGEMENT PLAN FOR 2013 TO 2019.**

The statewide preservation plan for Indiana is current and provides a picture of historic preservation and its overall direction in Indiana. Goal 2 of that plan is especially pertinent to the White River [plan]:

**GOAL 2: Broaden the preservation and archaeology communities:** After increasing public awareness, understanding, and support for preservation, the next logical step is to draw new people and groups into the preservation and archaeology communities by helping them identify as stakeholders in our state's long and rich cultural heritage.

Far more people than just preservationists and archaeologists have a stake in Indiana's heritage and cultural resources. Heritage tourists seek experiences that can't be duplicated in other places, while many businesspeople and hospitality workers depend on the dollars these visitors bring to their communities. Nature advocates, environmentalists, and outdoor enthusiasts share a conservation ethic with preservationists. Historians, genealogists, and researchers rely on historic records and documents, but they also learn from the buildings, structures, and sites that tell us about the past. Many developers, realtors, and contractors derive some portion of their livelihoods from the historic buildings in their communities. All across Indiana, people reside in historic housing and neighborhoods, children attend historic schools, and employees work in historic buildings. The preservation movement needs to be as broad and inclusive as possible if preservation is to become a mainstream Hoosier value.

## COMPREHENSIVE PLAN FOR INDIANAPOLIS AND MARION COUNTY

The comprehensive plan for Indiana includes over 100 plans, adopted by the city over time. The comprehensive plan is organized into seven elements with the Primary System Plan serving as the master plan representing the master plan for the element. The elements of the comprehensive plan are as follows:

### *Vision and Values Element*

This element is supported by the Plan 2020 Bicentennial Agenda as its primary system plan. The Bicentennial Agenda is a community-wide and community-driven vision. The vision precedes and aligns policy implications and ensures recommendations align with community needs and desires.

### *Land Use Element*

The Marion County Land Use Pattern Book is the primary system plan for the Land Use element. The book establishes Land Use classifications that will be applied geographically to the Marion County Land Use Plan map which is currently underway as part of the Plan 2020 process.

### *Transportation Element*

The transportation plans within the Transportation Element of the plan are used to determine system expansion needs related to development or redevelopment activities and to guide public investment in the network. They include bike infrastructure and policy

improvements, greenway plans, and pedestrian plans and recommendations. This also includes the Indy Moves Transportation Integration Plan efforts.

### *Parks and Recreation Element*

The Indy Parks Comprehensive Master Plan identifies current community access, barriers and programming opportunities, many of which align with opportunities for open space, programming and recreation investments.

### *Neighborhood and Housing Strategy Element*

This element encourages investments to neighborhoods that align with community needs and diverse demographics. The Neighborhood Investment Strategy makes recommendations about community development based on neighborhood strength.

### *Resiliency Element*

The Thrive Indianapolis Sustainability and Resilience Action Plan and the Multi-Hazard Mitigation Plan are central to ensuring the long-term safety of residents and businesses within the city. The WRVP process has identified relevant strategies to issues of water quality and floodplain management/infrastructure.

### *Specific Area Plans*

Specific Area Plans detail strategic opportunities for neighborhoods, districts, commercial and infrastructural corridors.

## **INDY REGIONAL TOURISM MASTER PLAN 2.1**

The Indy TMP 2.1 is an update to the original 2015 long range tourism plan. The plan highlights recent trends in tourism and economic development across the city and is optimistic that the economy will continue to grow. The plan also identifies seven core tourism drivers that attract people to the greater Indianapolis region: conventions and meetings, sports, big events, the city's cultural offerings, outdoor recreational experiences, businesses and universities, and families and friends. The plan envisions that these drivers will continue to guide the upward trajectory of tourism to the region and increase the city's visibility nationally and internationally.

## **Community Plans**

### **2016 FISHERS 2040 COMPREHENSIVE PLAN**

This 25-year comprehensive plan was developed to consider future growth opportunities and the long-term sustainability of the city. Specific opportunity areas highlighted by this plan include 116<sup>th</sup> Street and White River and river access investments in waterfront parks and along trails.

### **2003 NOBLESVILLE COMPREHENSIVE PLAN**

The comprehensive plan is a framework for decision-making related to land uses, public infrastructure, and city priorities for future investments. The land uses identified by the city have been incorporated into the White River Vision Plan land use evaluation.

## **2012 NOBLESVILLE STRATEGIC PLAN**

This document is an update to the 2002 Noblesville Economic Development Strategic Plan which identified a framework for future business attraction, expansion and development. The strategic plan is timely, between 2000 and 2010 Noblesville grew by 82%, reflecting the focus of growth in the state on Hamilton County. Goals within the plan include creating and implementing a riverfront enhancement program, creating a riverfront master plan and addressing areas with underutilized opportunities or growing recreational needs. The Noblesville Riverwalk was also identified as a priority project along the White River, of which phases one and two have now complete. Plans for phase three include connecting the two completed sections of the walk behind the Judicial Center.

## **District Plans**

### **2004 CENTRAL INDIANA WATERFRONT PLAN- UNITED STATES ARMY CORPS OF ENGINEERS**

### **2011 NORTH MIDTOWN ECONOMIC DEVELOPMENT PLAN**

The study area of this plan Birchwood Avenue commercial corridor and neighborhoods between the White River and Holliday Park to the north and Fall Creek to the south. The plan, during its development impacted 40,000 people and 23,134 homes and includes the following neighborhoods: Meridian Kessler,

Butler Tarkington, Mapleton – Fall Creek, Broad Ripple Village, and College/Monon Corridor. North Midtown grew substantially during the early 20<sup>th</sup> century when the street car was installed along Birchwood Avenue. This street car “suburb” thrived as a compact, walkable community until cars replaced public transportation throughout Indianapolis as the primary mode of transportation. The plan identifies opportunities for reinvestment in the commercial corridor and existing, vacant housing stock.

### **2011 WEST WASHINGTON ECONOMIC DEVELOPMENT PLAN**

The West Washington neighborhood was also once a thriving streetcar community that suffered a degree of disinvestment when private automobiles became a primary method of transportation. Stretching from I-465 to the rail line west of the Indianapolis Zoo, the communities along the West Washington Street corridor have fallen into varying levels of disrepair or abandonment. Seventeen percent of the housing units within a ten-minute walk of West Washington Street are vacant and 33 percent of all parcels within the ten-minute impact area require remediation or infrastructure improvements. The plan outlines opportunities for streetscape improvements and redevelopment incentives that create affordable housing and support job growth.

## **Environment, Water and Natural Resources Plans/ Reports/Studies**

### **COMBINED SEWER OVERFLOW (CSO) LONG-TERM CONTROL PLAN (LTCP)**

A CSO is the direct discharge of untreated stormwater and wastewater from a combined sewer system (CSS) into a receiving body of water. A CSS is a single pipe designed to collect rainfall, domestic sewage and industrial wastewater. Under normal conditions, the CSS can transport its contents to the sewage treatment plant, however, heavy rainfall events (or snowmelt) can cause the CSS to exceed its capacity resulting in a CSO event.

Reducing CSO events is a priority water pollution concern nationwide and the US EPA enforces compliance through the CSO Control Policy. Both Noblesville and Indianapolis (via Citizens Energy Group) have prepared Long-Term Control Plans (LTCPs) and are actively implementing major capital improvement projects to reduce CSO events according to their individual consent decrees with US EPA by 2022 (Noblesville) and 2025 (Indianapolis).

Eliminating CSOs will improve the water quality and recreational opportunities in and along the White River. Noblesville plans to reduce CSO events to 4 times per year through a series of wastewater treatment plant improvements, partial separation of CSS,



and increased sewer conveyance and storage. Indianapolis (via Citizens Energy Group) anticipates a 95% reduction (4 times per year) of CSOs in the White River through primarily a network of deep tunnel storage facilities and wastewater treatment plant enhancements.

It is important to note that even with the number of CSO events significantly reduced, the White River will continue to violate water quality standards due to untreated stormwater runoff, leaching septic systems, illicit connections to storm sewers, wildlife and domestic animal waste throughout the larger watershed.

### **FISH CONSUMPTION ADVISORY**

Fish consumption recommendations are set by the Indiana State Department of Health and based on species of fish, location, size, and age and gender of the person consuming the fish caught in a local waterbody. FCA are divided into two categories; 1) general population: males over 18 and females over 50; and 2) sensitive population: females under 50 and males below 18. The entire West Fork White River throughout study area is under a FCA for mercury and Polychlorinated Biphenyls (PCBs) for sensitive populations and should be limited to 1 meal/month for general population. Toxins such as mercury and PCBs accumulate in fish tissue and may then cause harmful effects to humans or other animals that eat those fish.

FCA provides insight into the legacy water quality of the area and helps to guide the type of recreation that may or may not be

suggested for the area. While the White River in entirety is under an FCA, it would not be wise to suggest fishing options outside of the catch-and-release scenario.

### **FISHES OF THE WHITE RIVER BASIN, INDIANA**

In 1996 Crawford and colleagues published a review of fish species that once existed and currently exist in the White River and its tributaries.

### **FLOOD IMPACT AREAS (FIA) FROM FLOOD RESPONSE PLANS (FRP)**

As part of the development of FRPs for both Noblesville (2017) and Indianapolis (2018), FIA were developed to show roads and buildings impacted by flooding during the 10, 50, 100, and 500-year flood frequencies. Emergency managers use these maps to identify road closures, flood-safe routes, areas for evacuations, and shelter locations.

In the White River corridor there are 2 FIAs in Hamilton County (north of Noblesville), 11 FIAs in Noblesville, 3 FIAs in Carmel, 1 FIA in Fishers, and 13 FIAs in Indianapolis. All total there are approximately 75 commercial/ industrial and 2500 residential buildings in high potential flood risk areas. These areas will likely be inundated by flood waters to the extent that structures will be flooded, and human life and safety will be at risk. Most of these buildings impacted are in Indianapolis. Any enhancements to these areas to improve access or connection with the river should take flood risk into account.

## **FLOOD INSURANCE STUDIES (FIS) AND FLOOD INSURANCE RATE MAPS (FIRM)**

A FIS is a compilation and presentation of flood risk data of lakes, rivers, and streams for the Federal Emergency Management Agency's (FEMA) National Flood Insurance Program (NFIP). Hamilton County's FIS and FIRM is from 2014 and Marion County from 2016. The study includes detailed flood profiles, data tables and floodplain maps or FIRM. The FIRM is the official map that defines base flood elevations, flood zones, and floodplain boundaries. This map is used by communities for floodplain management, mitigation, and insurance purposes.

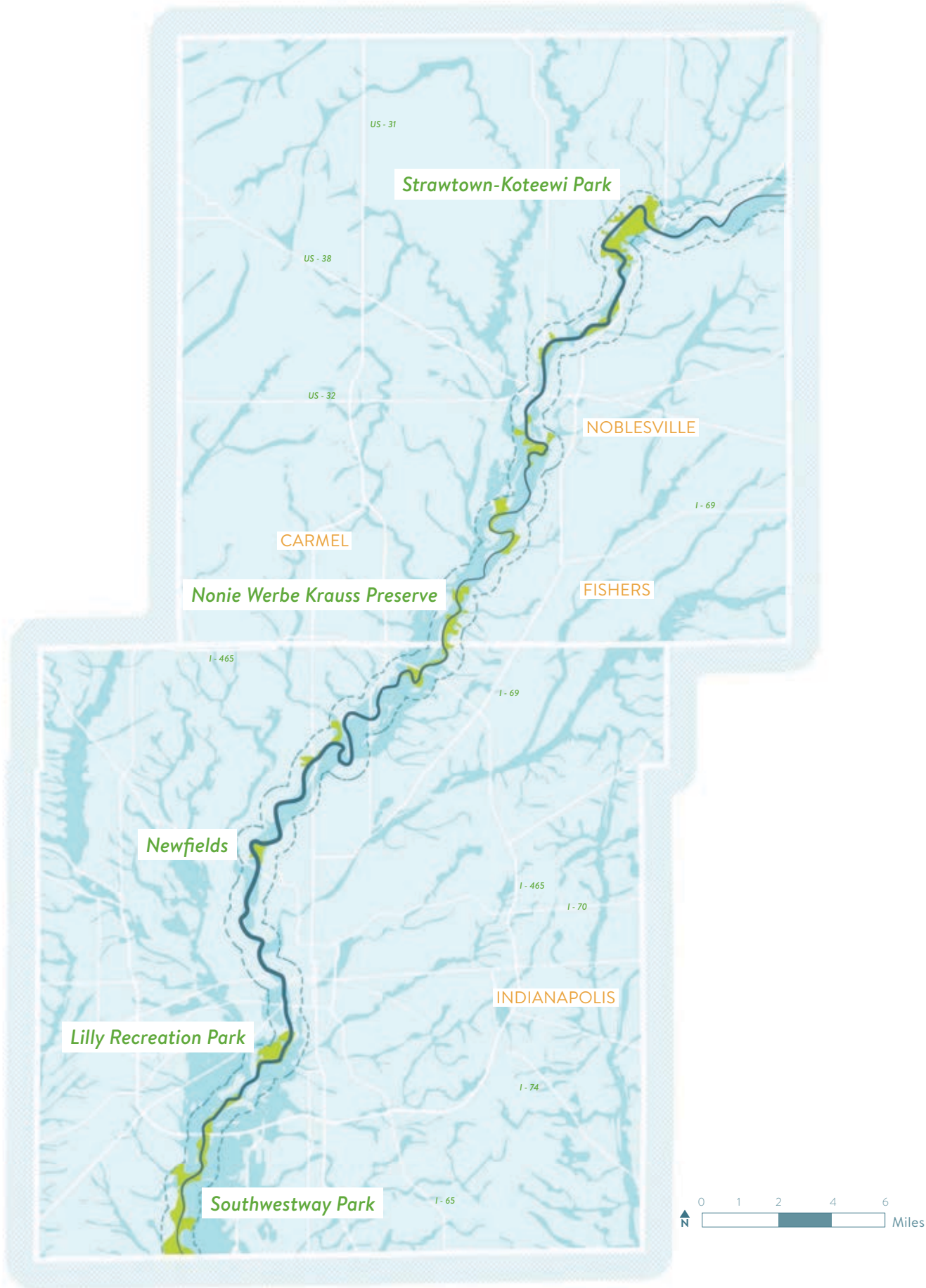
The floodplain is defined as the channel and the area adjoining any wetland, lake, or watercourse which may be covered by the regulatory flood (1% Annual Exceedance Probability (AEP) or 100-year floodplain). In Indianapolis, the FIRM includes an additional category for areas with reduced flood risk due to levees. For flood insurance purposes, each of these areas has a flood risk premium associated with it.

Floodplains are subject to periodic inundation which may result in loss of life and property, health and safety hazards, disruption of business and government services, and public expenditures for flood protection, response and recovery, all of which adversely affect the public health, safety, and general welfare.

Flood losses are caused by the cumulative effect of obstructions in floodplains causing increases in flood heights and velocities, and by the occupancy in flood hazard areas by uses vulnerable to floods or hazardous to other lands which are inadequately elevated, inadequately flood-proofed, or otherwise unprotected from flood damages. Development and/or land alteration in the floodplain that contributes to additional flood heights and velocities should be discouraged. The communities in the study area have adopted compensatory storage requirements in their flood ordinances to maintain the natural and beneficial function of the floodplain.

## **FLUVIAL EROSION HAZARD (FEH) STUDY**

FEH is the area within which the river needs to move to maintain physical and geomorphic equilibrium. How quickly the river moves within the FEH is determined by local geology, sediment load, slope, vegetation, and land use. In 2017, IUPUI's Center for Earth and Environmental Services (CEES), Polis Center and Indiana Department of Natural Resources (IDNR) have defined the FEH boundary for many of the rivers in Indiana. The intent of this work is for communities to adopt FEH avoidance strategies such as setbacks and no-disturbance policies to avoid FEH-related risks. The FEH area is especially important during a flood event since this is where the stream is most powerful, and the greatest damage will occur to property, utilities, and infrastructure.



The White River, as it flows through Hamilton and Marion Counties, is considered to be relatively stationary. The FEH corridor width was calculated using three times the river's bankfull width or 100 feet, whichever is greater, on either side. Within this defined FEH there are buildings, utilities, and critical infrastructure. It should be noted that this area has only recently been defined because of advancements in stream morphology and flood risk reduction strategies. Moving forward, the FEH and floodway should be protected by setbacks and no-disturbance policies including fill, excavation, buildings, utilities and infrastructure.

### **ILLICIT DISCHARGE AND ELIMINATION (IDDE) OUTFALLS**

Municipal Separate Storm Sewers (MS4) entities, including Carmel, Fishers, Noblesville, Hamilton County, and Indianapolis, are required to map and sample effluent from their MS4 outfalls through the IDDE requirement within the stormwater permit. This allows MS4 entities to locate and then work to eliminate polluted effluent such as illegal connections to the storm sewers, as well as drive education and outreach efforts within the community to change behavior of residents to also reduce pollutant loading from the storm sewers. Pollutants from these outfalls may include *E. coli*, nutrients, sediment, metals, and petroleum products.

Concentrations of MS4 outfalls may indicate areas of higher potential for pollutants to enter into the river system over time.

Further, MS4 Coordinators may have insight regarding areas of concern over time, illegal dump sites, and other potential problem areas within their relevant areas. This information may lead to recognition of unhealthy areas (polluted water/*E. coli*), as well as aesthetically displeasing areas (dump sites).

### **INDIANA'S SECTION 303(D) LIST OF IMPAIRED WATERS**

The 303(d) list is part of the Integrated Water Monitoring and Assessment Report (IR), which is submitted to the United States Environmental Protection Agency (US EPA), by the Indiana Department of Environmental Management (IDEM) Office of Water Quality, every two years in accordance with Sections 305(b) and 303(d) of the Clean Water Act (CWA). The current list was approved by US EPA in 2016. CWA Section 305(b) requires states to make water quality assessments and provide water quality reports to the US EPA, and CWA Section 303(d) requires states to identify waters through their water quality assessments, that do not or are not expected to meet applicable state water quality standards with federal technology-based standards alone. Under CWA Section 303(d), states are also required to develop a priority ranking for these waters considering the severity of the pollution and the designated uses of the waters. Once this listing and ranking of impaired waters is completed, states are required to develop Total Maximum Daily Loads (TMDLs) for these waters in order to achieve compliance with the water quality standards.



The entire mainstem of White River and most of the tributaries are listed on the 303(d) list due to *E. coli* and PCBs (in fish tissue) with several smaller reaches listed for nutrients and Impaired Biotic Communities (IBCs). This information assists watershed groups and municipalities to develop efficient actions regarding water quality. Having so many waterbodies on the 303(d) list, and a TMDL, highlights the abundance of *E. coli* present in the White River and tributary streams.

## **INDUSTRIAL FACILITIES LISTING**

The Indiana Chamber of Commerce maintains a list and location of facilities classified into categories indicating a potential need for an industrial stormwater permit through IDEM. These facilities have a higher potential for stormwater pollution based on the type of activities performed at their location or within that business such as metal work, milling, automotive work, or textiles. MS4 entities are encouraged to utilize this data to develop potential hot spots within their systems and develop their outreach and education programs including these facilities. Concentrations of such facilities may indicate areas of higher potential for pollutants to enter into the river system over time. Pollutants may range from petroleum products to other industrial chemicals produced or utilized at facilities. In the White River study area there are 272 industrial facilities.

## **NATIONAL WETLANDS INVENTORY (NWI)**

The NWI, assembled by the US Fish and Wildlife Service (FWS), provides information on the types and distribution of wetlands nationwide. The most recent data is from May 2018. The intent is to promote the understanding, conservation, and restoration of wetlands. There are roughly 20,000 acres of wetlands within a half mile of the White River in Hamilton and Marion Counties including freshwater emergent wetland (1%), freshwater forested/shrub wetland (6%), freshwater pond (3%), lake (8%), and riverine (82%).

Wetlands have social, economic, and ecological benefits. They provide valuable habitat for fish, wildlife, and plants, clean drinking water and recharge the groundwater, reduce flooding, and support recreational activities. While nearly 85% of Indiana's natural wetlands have been lost to development and agricultural practices, IDEM, DNR, and NRCS administer programs to protect and restore this valuable resource.

Freshwater forested/shrub wetland and emergent wetlands can be found along the lower reaches of rivers and around freshwater lakes that are inundated permanently or seasonally with freshwater. These areas provide value as a food source for wildlife, storage during flood events, and recreational opportunities. In the project study area, these types of wetlands can be found throughout



most of Hamilton County, and the northern and southern reach of the White River in Marion County.

### **RAPID WATERSHED ASSESSMENT (RWA) UPPER WHITE WATERSHED**

A RWA provides initial estimates of where conservation investments would best address the concerns of land owners, conservation districts, and community organizations and stakeholders. These assessments help land owners and local leaders set priorities and determine the best actions to achieve their goals. The RWA includes a watershed wide summary of geology, physical description, assessment of waters, soils, drainage, hydric soils, highly erodible land, land capability, surface and ground water quality, and census and relevant social data.

### **RECONNECTING TO OUR WATERWAYS (ROW) STRATEGIC PLAN, 2017**

Funded by the Central Indiana Community Foundation, ROW is an initiative focused on six major waterways in Marion County including the White River. The strategic plan included connectivity elements for improving access to the six waterways, surrounding amenities and ROW destination locations. Their metric for success was to “create a connectivity network between ROW focus waterways, destination locations and communities.” Their goal is to increase and improve the pedestrian and bicycle network by 600 blocks within 3 miles of ROW focus waterways by 2020.

### **SURVEY OF THE FRESHWATER MUSSELS OF THE WABASH RIVER DRAINAGE**

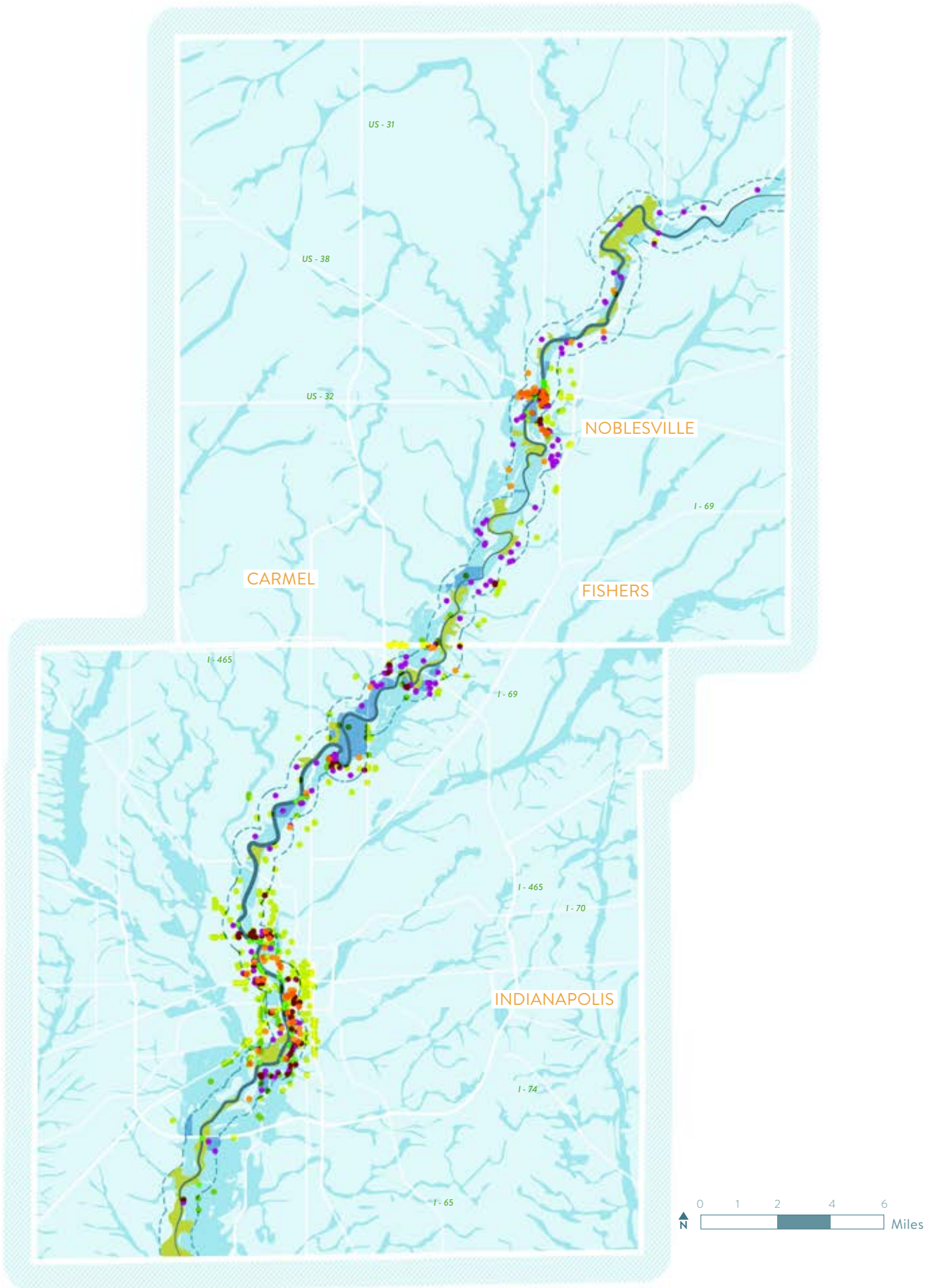
This study by Cummings and colleagues, published in, 1992, documents the decline of freshwater mussels—a formerly dominant form of life in the West Fork of the White River—from the 1820s to 1990.

### **TIER II FACILITIES**

Hamilton County Emergency Management Agency (EMA) and Indianapolis Department of Homeland Security (DHS) maintain a list of facilities with hazardous chemicals of a certain nature or quantity. These facilities must comply with federal regulations and provide information related to the chemicals and quantities on site, along with facility maps to local emergency response agencies. These chemicals may be especially harmful if not deadly to aquatic and human life if released into the environment. It is important to know and understand the location of these facilities in relation to existing and proposed recreation sites such that if an event were to occur evacuations may need to be completed

### **WATER QUALITY**

- |   |   |
|---|---|
|  WHITE RIVER/WETLANDS      |  TIER II FACILITIES          |
|  MILE STUDY BUFFER         |  INDUSTRIAL NPDES FACILITIES |
|  UNDERGROUND STORAGE TANKS |  ACTIVE CSO                  |



or areas may need to be shut down until the event has passed. In the White River study area there are 82 tier II facilities.

## **TOTAL MAXIMUM DAILY LOAD (TMDL) REPORT**

TMDL reports are assessments of water quality in rivers, lakes, and streams in a given watershed where impairments exist. The report contains an overview of the water bodies, the sources of pollutants, the methods used to analyze data. Two TMDLs, both for *E. coli*, were prepared in 2003, the West Fork White River-Muncie to Hamilton/Marion County Line and the West Fork White River. These two reports cover nearly the entire White River within the study area and site sources such as agriculture and pastures, land application of manure and urban and rural runoff, as well as point sources from straight pipe discharges, home sewage treatment system disposal and combined sewer overflow outlets. The TMDL provides a framework for local watershed groups and municipalities when considering water quality and potential actions to efficiently reduce pollutant loading.

TMDLs outline the potential sources of *E. coli* along with an estimation of to what degree each source is loading the pollutant into the water body. Both TMDLs cite non-point source stormwater or “Other” as a high contributor along with failing septic systems in Hamilton County and Combined Sewer Overflows (CSOs) in Marion County.

West Fork White River (Muncie to Hamilton/Marion County Line):

- To develop this TMDL, point sources were meeting their permitted discharge limits and loads from CSOs were set to zero; presumably to indicate levels achieved if/when facilities are meeting permitted standards.
- Two of the four TMDL assessment points are within or very near to, the Hamilton County area; the Perkinsville point and the Hamilton-Marion County Line point.
- At the Hamilton-Marion County Line, the primary sources of *E. coli* are “other” nonpoint sources (approximately 67%) and septic systems (approximately 22%).
- At the Perkinsville point, essentially the Madison-Hamilton county line, the primary sources of *E. coli* are “other” at 76% and septic systems at 21%.
- At the Perkinsville point the needed *E. coli* reduction is 88% to meet the TMDL.
- At the Hamilton-Marion county line, the needed *E. coli* reduction is 98% to meet the TMDL.
- Best management practices (BMPs) suggested are septic system outreach program and maintenance; livestock exclusion; and structural urban BMPs.

West Fork White River (Marion County to Waverly):

- Overall, CSOs and stormwater runoff contribute the largest loads to the White River.

- In upper reaches (Marion County line to Lake Indy), the primary sources of E. coli are non-point source stormwater (75%) and upstream (Hamilton County) sources (15%) such as agriculture and septic systems, permitted stormwater discharges (7%) are the largest point source contributor.
- In middle (CSO segment) and lower (Tibbs/Banta Landfill to Waverly) reaches, the primary source of E. coli is CSO outputs at approximately 98% for both reaches, an additional 1.5% from permitted stormwater discharges and under 1% from all other considered sources.
- Overall sources include: septic systems, illicit connections, Advanced Wastewater treatment plants, wildlife, stormwater runoff, CSO, and upstream sources.

### **UNDERGROUND STORAGE TANKS (UST / LEAKING UST (LUST))**

All USTs that store petroleum or certain hazardous substances must register with IDEM Office of Land Quality. Any USTs found to be leaking, therefore a LUST, must begin investigative actions such as sampling of soils and groundwater and reporting to IDEM throughout the process. IDEM maintains the listing to track responsible parties in case of leaks, pollutant migration. Training is required for someone at each site. In the study area, there are 452 USTs and 200 LUSTs.

Concentrations may indicate areas of higher potential for pollutants (petroleum or hazardous substances) to enter into the river system over time or areas where legacy

pollutants may already exist. USTs located near a large river system may also be located within the floodplain, near to the water table, or other areas making them more susceptible to decay or breakdown of protective structures creating a more direct route for pollutants to enter the waterbody.

### **UPPER WHITE RIVER WATERSHED RESTORATION ACTION STRATEGY (WRAS)**

A WRAS is a large-scale coordination plan for eight-digit hydrologic unit watersheds that are most in need of restoration. It is an overall strategy and is not intended to dictate management and activities; but, to assemble projects and monitoring that have been completed or on-going in the watershed. In 2001, IDEM prepared a two-part WRAS for the Upper White River Watershed. Part I provides a reference point and map to assist local residents with improving water quality and Part II discusses water quality concerns and recommended management strategies. Priority issues and recommended management strategies include: planning process and plan development, data/information and targeting, failing septic systems and straight pipe discharges, water quality, fish consumption advisories, nonpoint source pollution, and point source pollution.



## UPPER WHITE RIVER WATERSHED REGIONAL ASSESSMENT AND PLANNING REPORT

In 2011, IUPUI Center for Earth and Environmental Science (CEES) and the Upper White River Watershed Alliance (UWRWA) – currently the White River Alliance (WRA) completed a regional assessment and planning report for the Upper White River Watershed. This report provides a holistic and comprehensive review of water resources in the Upper White Watershed that is organized into 1) the level of water quality degradation from a spatial and temporal water quality basis; 2) the level of vulnerability to impact to water resources from a perspective of existing uses and stresses related to indicators of changing intensity or type of use; and 3) the availability and utilization of social infrastructure to support water resource enhancements and improvements.

This report lists two key findings: 1) that the relative water quality throughout the Upper White River Basin is very poor overall when compared to benchmarks related to ecosystem health and water quality standards; and 2) there is a very large discrepancy in social infrastructure and human resources dedicated to conservation across the watershed.

## WATER AND QUALITY OF LIFE IN INDIANA

This report, prepared by The Conservation Law Center and INTERA, Inc., is a case for action

for Indiana to make a new investment in the state's waters. The report outlines how the state's water resource is at risk – both surface and groundwater sources – for recreation, economic development, and quality of life. It is based on three principles: 1) active stewardship of our water resources is essential for this and future generations, 2) we all care about clean water, and 3) water is life. The report outlines recommendations for each of these principles to be implemented at the state, regional, and local level.

## WATERSHED MANAGEMENT PLANS (WMP)

A WMP is a guide for watershed coordinators, resource managers, policy makers, and community organizations to restore and protect the quality of lakes, rivers, streams, and wetlands in a given watershed. It is intended to be a practical tool with specific recommendations on practices to improve and sustain water quality. A key component to the WMP is identifying critical areas. The following summarizes the critical areas for the WMPs in the White River corridor study area.

### *Hamilton County*

- Cool Creek WMP (2003, updated 2005): critical areas based on stream bank erosion, sedimentation, bacterial problems, flooding problems
- Duck Creek WMP (2008): critical areas based on total suspended solids, E. coli, total nitrogen, total phosphorus



- Morse Reservoir-Cicero Creek WMP (2011): critical areas based on *E. coli*, Nitrate+Nitrite, Phosphorus and total suspended solids
- Stony Creek WMP (2007): critical areas based on unbuffered stream reaches, agricultural tillage practices, flooding and stream bank erosion, failing septic systems, and livestock operations

### Marion County

- Eagle Creek WMP (2005): critical areas based on level of water quality degradation, vulnerable land uses, and feasibility of remediation
- Fall Creek (Lower) WMP (2009): critical areas based on sedimentation, agricultural tillage practices, potential nutrient loading, and unsewered areas
- Pleasant Run WMP (2011): critical areas based on poorly buffered streams and tributaries, residential areas/schools/parks and golf courses/churches, stormwater ponds, greenspace overlapping with hydric soils, and areas upstream of CSOs
- While only small portions of these areas are within the study area, the watershed contributes to the overall water quality of the White River. Several studies have determined that the same issues are problematic throughout the watersheds (sediment, *E. coli*, and nutrients), once again indicating the regional impacts. As work is completed within these watersheds, it is assumed overall water quality will improve within the larger White River watershed and within the White River mainstem.

### WATER QUALITY SAMPLING SITES

Ambient water quality samples are collected regularly for various parameters (metals, sediments, nutrients, *E. coli*, and others) as well as monitoring of fish, macro-invertebrates, and habitat using the Qualitative Habitat Evaluation Index (QHEI).

The Indiana Water Monitoring Inventory is a clearinghouse for water quality data. Many groups who provide their data to this platform collect on-going sampling to establish trend data and provide a long-term view of the quality of the water. The water monitoring inventory includes as many as 138 water quality sampling sites in the study area and many more located throughout the Upper White River Watershed. In addition to the water monitoring inventory, the Marion County Health Department samples water quality at eight sites per month and the Hamilton County Health Department at four sites per month. Both health departments collect *E. coli* samples at contact-recreation sites to determine if it is safe for people to be in contact with the water.

Many samples appear to be below detection limits for metals sampling; *E. coli* levels are exceeding the Indiana State Standard more than half of the time in Hamilton County and routinely in Marion County; nutrient levels sampled by the Marion County Health Department (the most consistent effort) appear to be below State benchmarks for phosphorus and nitrogen.

## Parks, Trails and Open Space Planning

### **BROAD RIPPLE PARK MASTER PLAN**

#### **CARMEL 2015–2019 PARKS AND RECREATION MASTER PLAN**

The Carmel 2015–2019 Parks and Recreation Master Plan identifies the current and future needs of the Carmel community, assesses capital and financial strength of current allocated resources, and provides a 5-year strategic plan that focuses on implementation goals and objectives. In addition, this plan looks at new strategies for population growth, evolving recreation trends, development of new parks and facilities, and the success of thousands of programs that have modified the demand for parks and recreation services.

Parts of the plan specifically discuss the White River. A few key recommendations of the Carmel 2015–2019 Parks and Recreation Master Plan include: expanding the White River Greenway to engage with neighbors and provide connections to communities; acquiring parkland in northwest Carmel (where limited resources are noted); exploring partnerships (with Hamilton County Parks and Recreation, Nature Conservancy, Central Indiana Land Trust, etc.); and expanding trail networks to create enhanced opportunities for exercise and engagement with nature.

Furthermore, much of the recreation recommendations align with the WVRP's overall narrative – to provide inclusive, innovative, and distinctive recreation

programs “aligned with core competencies.” (7). These could include: developing outdoor recreation and environmental education programs into core services; increasing program offerings in underserved population groups; and exploring partnership opportunities to provide signature community events that highlight open space amenities.

#### **INDY GREENWAYS FULL CIRCLE 2014-2024 MASTER PLAN**

The Indy Greenways Master Plan addressed community connectivity, public access and service, integration with other initiatives, economic benefits and collaboration with stakeholders & agencies to establish a vision with the goal of creating a world-class trail and greenway system for the City of Indianapolis.

The plan focused on connectivity and ease of access for residents and visitors, connected to public transit. Little mention was made of natural resources, although many greenway segments are planned through existing naturally vegetated areas and along creeks and the White River itself. See <https://indygreenwaysmasterplan.wordpress.com>.

#### **INDY PARKS AND RECREATION COMPREHENSIVE MASTER PLAN**

Indianapolis Parks and Recreation Department completed a plan in 2017 that looks out to 2024 for improving and expanding the park and trail system. The plan advocates for quality parks, recreation facilities, and program services across Marion County. Besides looking at a variety of data sources, analyzing project standards across the region, and evaluating financial and operational logistics

to help implement their recommendations, the plan included a comprehensive public participation process.

Key goals of the plan were to advance the trail system, as outlined in the Greenway Master Plan, by building 18 miles of trail per year; to update ten neighborhood parks each year; and to advance natural resource conservation, restoration and management by creating ten significant new parks by 2024. Like other plans, the Indy Parks and Recreation Comprehensive Master Plan advocates for promoting education about historic, cultural, and natural resources in parks, as well as creating equitable program partnerships across greater Indianapolis.

The plan established a goal for programming: the creation of 10 core program areas to service the recreation needs of Indianapolis residents. With this recommendation, the plan identified the need to engage active adults 55+ and to expand adult sports, outdoor adventure programming, fitness and wellness, urban youth programs, and outdoor education programs (12).

To the extent these parks can be located on or near the White River, that would improve the quality of the river and its adjacent lands. New park master plans called for offer the chance to have a natural resource restoration and management section—to guide the improvement of ecosystem health in each park. The plan called for implementing master plans recently completed for Eagle Creek Park, Sports Fields Business Plans, and Garfield Park, but natural resource restoration and

management could probably be considered as implementation proceeds. Each park's master plan can be viewed at <http://www.indy.gov/eGov/City/DPR/Admin/Planning/Pages/IndyParksMasterPlans.aspx>.

## **NOBLESVILLE PARKS AND RECREATION PLAN**

The Noblesville Parks and Recreation Plan focuses on increasing the recreational and ecological use of the city's floodplains, specifically noting that Noblesville should purchase all private land within the floodplain, so the city can monitor and maintain the land for public use and safety. Noblesville could then determine the areas appropriate for public recreation, education, and research use, as well as areas that should be protected and/or restored. The plan also evaluated several past (and future) parks projects and provided recommendations for improvement; these sites include Eastside Park and Hague Road Nature Haven. It is important to note these specific design recommendations when looking at larger programmatic opportunities along the White River (specifically near Noblesville).

This plan also stresses the importance of partnering with schools to provide education and outreach on playground perception and use. This recommendation concludes that sharing school and park resources can provide financial benefits to both groups local residents and schools. This recommendation may be applied to the White River Plan when considering complementary, adjacent, and existing programs/amenities along the corridor.

## HAMILTON COUNTY PARKS & RECREATION MASTER PLAN

The Hamilton County 5-Year Comprehensive Plan (2017–2021) provides recommendations for programmatic and recreational opportunities in public parks and cities around Hamilton County. The broad-reaching plan (extensively covering a variety of topics, data, and factors) discusses many goals, most focusing on facility maintenance and partnerships. The plan illustrates specific programming events that occur in 13 prioritized destinations in Hamilton County (including sites along the White River, mentioned above). Insights on exact programming provide additional accuracy to this master planning effort and offer potential methods of categorization to consider in our own effort.

The goals of this plan were to maintain and improve parks and programs as the department celebrates its 50th Anniversary, to continue offering innovative resources for the community while continuing its record of success. The following parks are located either adjacent or in proximity of the White River in Hamilton County:

1. Cool Creek Park is a 90- acre park located on 151st Street, east of US 31 with over three miles of wooded trails, picnic shelters, and playground, a large pavilion for warm weather events and a nature center.
2. Potter's Bridge Park is located on Allisonville Road east of SR 19. The 30- acre park consists of a picnic shelter and playground, a canoe launch and bank fishing opportunities. An existing park trail connects to the White River Greenway Trail.
3. The 63-acre River Road Park, in Clay Township Hamilton County is located along and contiguous to the White River where 126th Street T's into River Road. Facilities include trails, bike trails, softball, soccer, and rugby fields, a canoe launch, restroom facility and considerable open space.
4. Strawtown Koteewi Park is an 800-acre site in the northeast area of Hamilton County along the White River. The Taylor Center for Natural History is located in the park. There are over 6 miles of multi-use trails and a canoe launch. Unique are several miles of equestrian trails and a parking lot for horse trailers. An archery range, an archaeological display and an aerial adventure course complete the offerings. New activities include a lake and a sledding/tubing hill.
5. White River Campground is a 25 acre park with 106 modern and primitive campsites along the White River with a boat launch, a large picnic shelter, shower and laundry facilities, restrooms, a camp store with recreation room, and playground. There are also plenty of fishing and canoeing opportunities. This site is across the White River from Strawtown Koteewi Park. In 2016 the installation of historic bridge spans provides a crossing and pedestrian access between the campground and the park.



## CONNER PRAIRIE PLAN

The Conner Prairie Master Plan plans for the next 20 years and spans the site's entire 1,052-acres. The plan focuses on the 3.3-miles of the White River that runs through the Connor Prairie property. Twenty-five projects were identified through the plan, and many of them are about engaging with or accessing the river. A river ecology center has been considered, as well as aspirations for kayaking and canoeing in the river this fall. The recently opened White River Overlook allows visitors to view the river as it bends around the prairie, but further access is desired. The community, stakeholders, and guests provided input to the plan, although it has not been shared publicly.

## FISHERS PARKS PLAN: PHASE ONE

With planning efforts spanning between 2005 and 2015, the Fishers Park Plan addressed the historic background of the Fishers area, existing park conditions (with metrics), and demographic projections in an effort to create a vision for the Fishers Park System. In addition, this plan looked extensively at community components in the Fishers area – specifically public facilities, including schools, parks, and undeveloped land. Ultimately, the goal of this plan was to act as a blueprint for future park development and other land use decisions. This plan used public input throughout the process.

This plan concluded with several key points that are applicable to the White River Vision Plan: notably, the connection to water as an important feature to park visitors. Whether manufactured elements of water play or naturalistic conditions involving a stream or

river, many individuals acknowledged water as a priority for engagement while outside.

Successful management practices were also identified as a priority. The design and implementation of sustainable open space solutions will be important when considering the longevity of use (and future stewardship opportunities) along the river. A lack of accessible outdoor public space was another finding of this study. Specifically, the Fishers Park Plan noted that many inventoried areas had a lack of compliance with current ADA standards. When further developing the White River Vision Plan, it will be important to plan accessible routes for all physical abilities.

## NEWFIELDS PLAN

The 2017 Framework Plan addresses the “constellation of assets” that exist at Newfields and reconsiders the rich landscapes that surround them to connect and engage visitors in experiences of both art and nature. The traditional “four-season” calendar is expanded to an enhanced “five-season” calendar that includes a “Holiday” season.

The Virginia B. Fairbanks Art & Nature Park: 100-Acres is embraced in an oxbow portion of the White River. The plan lists options for how to work with the natural forces of the river, as its ever-changing character requires much upkeep and erosion mitigation by Newfields. The options include: building up the weakest edges of the river/lake interface; allowing the river to breach the weak edges and take its natural course; filling the lake to decrease its footprint and make wider edge conditions between the river; and filling the lake as previously mentioned while also constructing

a new walkway to allow for consistent circulation around the lake even if the river bank shifts (154-155).

## **RIVERSIDE REGIONAL PARK MASTER PLAN**

This Master Plan was a yearlong process (January 2017–December 2017) that included a series of community engagement events and public input sessions, including steering committees and public meetings, informing the process. The plan will guide the phased development of the 861-acre park over the next 20 years.

Specifically related to the White River, the park’s “backbone,” the plan calls for increased access to the river “through boat rental facilities and activation of existing riverside venues like the Marina, Lake Indy Boat Launch, and the Municipal Gardens” (6). To re-connect people to the waterway, the design includes potential for paddleboat, canoe, and kayak rentals, as well as fishing piers and pedestrian trails to connect locations along the waterfront and create opportunities for passive activities like bird watching and quiet contemplation (66). The existing Riverside Golf Course, adjacent to the White River, is re-envisioned as Sullivan Ecology Park, an “ecologically-oriented adventure park that floods periodically” (54). Programming includes a nature center, tree stand, clubhouse, canopy walk, zip line, nature-playground, and off-leash dog park.

There are many bridges and dams that affect the plan and cross over or through the river. Some of the bridges have historic mention and

the plan calls for the addition of a pedestrian bridge to better connect the east and west banks of the river (68). Increased winter programming is also discussed as a specific goal of the plan.

## **SOUTHWESTWAY PARK MASTER PLAN**

The Southwestway Park Plan will be important when delineating programmatic opportunities along the southern extents of Marion County and the White River Vision Plan study. This plan describes Southwestway Park as a regional hub for public use and recreation, a term seldom designated along the White River. The only other applicable hub (along the White River and within Marion County) noted was White River State Park. This will be of value when prioritizing program and activation strategies in coming phases.

This plan further examines an abundance of factors that inform Southwestway Park investment and usage, including: the history, existing site environment, ecology, and adjacent population characteristics and demographics. Ultimately, the plan provided several proposals, including: expansion of the golf course, development of a community building on the northern portion of the park, and reinvestment/expansion in recreational fields. Although community engagement was not mentioned in the plan, these recommendations should be reevaluated when determining program refinements in the southern region of Marion County.

## Transportation Plans

### **INDY MOVES TRANSPORTATION PLAN**

#### **ON-GOING PLANNING ALONG FALL CREEK, CITY OF INDIANAPOLIS INDIANAPOLIS METROPOLITAN PLANNING ORGANIZATION'S LONG- RANGE TRANSPORTATION PLAN (IN PROGRESS)**

The LRTP guides the area's metropolitan transportation systems over the next 20 years. With the help of transportation planners, engineers, elected officials and the public, the plan ensures facilities and services required to support the mobility needs of the regional community and its future growth are anticipated and available.

#### **NICKEL PLATE TRAIL PLAN: CITY OF FISHERS, CITY OF NOBLESVILLE (IN PROGRESS)**

#### **NOBLESVILLE ALTERNATIVE TRANSPORTATION PLAN 2015**

A section of the transportation plan identifies opportunities for furthering the existing trail network and planning for potential trail segments and pathway loops throughout the community.

#### **PATHWAYS OVER POGUES RUN (IN PROGRESS)**

Pogue's Run Greenway is a 5.3-mile trail corridor planned on the near northeast side of Indianapolis. The trail extends between 10th

Street at the Monon Trail and the Indianapolis Cultural Trail and the Pogue's Run Art and Nature Park.

#### **PEDESTRIAN AND BICYCLE TRAIL CONNECTION BETWEEN THE TOWN OF SPEEDWAY AND DOWNTOWN INDIANAPOLIS (IN PROGRESS)**

Currently the Town of Speedway has a trail in place and one planned for a segment of the B&O Rail Trail. Key will be their connection to the White River and downtown Indianapolis.

#### **PLEASANT STREET CORRIDOR STUDY, NOBLESVILLE, INDIANA (IN PROGRESS)**

3.5 miles of corridor extending between I-69 and White River slated to be widened, hardscape, trails, landscaping, lighting, wayfinding. A new section near downtown Noblesville will include a new bridge and trail crossing the White River.

#### **WHITE RIVER GREENWAY PLANNING INITIATIVES FOR CENTRAL DOWNTOWN AND ADJACENT NEIGHBORHOODS IN NOBLESVILLE (IN PROGRESS)**

# Inventory of Partners, Organizations, and Initiatives

The following organizations and initiatives are working to improve and activate the White River. In many cases, their work spans decades, and has instrumentally informed the White River Vision Plan process, values and goals. Those organizations are identified and described in the following pages.

## Organizations

Other organizations received funding for continued advocacy and research along the White River, made possible through a \$5 million grant from the Nina Mason Pulliam Charitable Trust. Known collectively as the Partners for the White River, the funding recipients are the following:

- Central Indiana Land Trust, Inc.
- The daVinci Pursuit

- Friends of the White River
- Hoosier Environmental Council
- Indiana Wildlife Federation
- Keep Indianapolis Beautiful
- Reconnecting to Our Waterways
- The Nature Conservancy, Indiana Chapter
- White River Alliance
- The Nina Mason Pulliam Charitable Trust

The White River Vision Plan is working with many of these organizations to share research and align goals and desired outcomes that collectively support healthy, vibrant future for the White River and the people who live, work, and play along it.

## Key Partners

Several of the organizations working along the White River are also key planning partners. The following organizations are actively engaged in the White River Vision Plan process through committee involvement and sharing of resources.

### **NINA MASON PULLIAM CHARITABLE TRUST**

The Nina Mason Pulliam Charitable Trust's mission is built on three core tenets - to help people in need, to protect animals and nature, and to enrich community life in the metropolitan areas of Indianapolis and Phoenix. The trust is providing financial support to the White River Vision Plan process.

### **WHITE RIVER ALLIANCE**

White River Alliance (WRA) is a 16-county consortium of local governments, industry, utilities, universities, agriculture and the regional community that exists to improve and protect water quality on a watershed basis in the larger Upper White River Region.

### **FRIENDS OF THE WHITE RIVER**

Established in 1985, Friends of the White River is a non-profit organization to promote the continued improvement of the quality of the river's water, and to maintain and restore habitat and wildlife in the river and along its adjacent greenway.

## **RECONNECTING TO OUR WATERWAYS (ROW)**

Reconnecting to Our Waterways (ROW) is a collective impact initiative that has worked purposefully since 2012 to change the quality of life and ecology along Indianapolis waterways and surrounding neighborhoods.

### **ADDITIONAL PARTNER AGENCIES & ORGANIZATIONS**

Broad Ripple Village Association

Carmel Parks

Central Indiana Community Foundation (CICF)

Citizens Energy Group

City of Carmel

City of Fishers

City of Indianapolis

City of Noblesville

Conner Prairie

Eli Lilly & Co

Eskenazi Health

Greater Indianapolis Progress Committee

Hamilton County Surveyor's Office

Hoosier Environmental Council

Indiana Department of Environmental Management



Indiana Department of Natural Resources

Indiana Humanities

Indiana State House of Representatives

Indiana State Senate/White River Caucus

Indiana State Museum

Indianapolis Art Center

Indianapolis City-County Council

Indianapolis Parks Foundation

Indianapolis Zoo

Indianapolis/Marion County Capital  
Improvement Board

Indy Community Outreach

Indy Parks

Keep Indianapolis Beautiful

Legacy Fund

Marian University

Metropolitan Indianapolis Board of  
REALTORS (MIBOR)

The Nature Conservancy

Newfields

SustainIndy

Visit Indy

## Client Group

### **DEPARTMENT OF METROPOLITAN DEVELOPMENT**

From planning Indianapolis' future to creating affordable homeownership, the Department of Metropolitan Development (DMD) works in partnership with other local city departments to build a world-class city for nearly 950,000 residents, neighborhood by neighborhood. The organization's support of job and investment growth has made Indianapolis the 12 largest city nationwide.

### **HAMILTON COUNTY TOURISM, INC.**

Hamilton County Tourism, Inc. is the authority in tourism marketing and supports community asset developments for Hamilton County, north of Indianapolis. The group partners with cities and the county to develop quality investments for Carmel, Fishers, Noblesville, Westfield, and its northern communities. Like its residents, the team cherishes the historical heritage of the White River, which flows directly through the middle of Hamilton County, passing through eight nature areas and parks.

### **VISIT INDY**

Since 1923, Visit Indy has proudly served as the city's official sales and marketing organization, charged with driving tourism and enhancing the perception of Indy. More than 28 million people from around the globe visit Indy annually, generating more than \$5.2 billion in economic impact, while supporting more than

80,000 tourism jobs. The nonprofit's Tourism Master Plan is a roadmap for where Indy tourism should be by 2025, including better activation of the White River.

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Note: All National Register listings noted in this document were consulted directly by the researchers. Wikipedia provided supplementary information on the Gas Boom to confirm its short-lived history.

## Outreach:

Hamilton County: Brenda Myers, tourism director; David Heighway, county historian (touring)

Indianapolis/Marion County: Tiffany Brown, HistoricIndianapolis.com (interview)

White River State Park: Clay McKinley, ranger (touring)

# Express Identity

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## Outside Conversations

1. Interview with Kevin Cummings. Illinois Natural History Survey, Champaign, IL. Kevin led the 1989-1991 survey for freshwater mussels in the White River. He recommended four actions to improve the White River ecosystem for mussels, and for fish and people, too.

- Don’t dredge the channels that form naturally after 20 years in tributaries of the White River. It costs farmers money and doesn’t drain fields faster. Many remnant mussel populations are in the tributaries, from which they colonize the river. Bruce Rhodes in Urban Regional Planning at the University of Illinois
- Remove or retrofit the dams to allow free passage of fish, which would help mussels recolonize reaches where they have disappeared. Removing dams eliminates the risk of people dying at the dams and eliminates maintenance and reauthorization costs. Turning them into long rapids greatly reduces the risk of death and creates interesting places on the river. It will take some years for dam retrofitting and removal to have a noticeable effect on mussels. Steve Pescatelli, Fisheries Biologist at the Illinois DNR has experience with this.
- Protect a wide riparian zone on the White River and install vegetated buffers between the river’s tributaries and cropland, streets or parking lots. This prevents bank erosion and filters dirty runoff before the water reaches the river and its tributaries.

- Reintroduce mussels from reaches where they are missing. Scott Gritter with the Iowa DNR has successfully colonized fish gills with glochidia (baby mussels), then released the fish to restore mussels in a reach where they disappeared. The Freshwater Mussel Conservation Society has a lot of expertise in different ways to reintroduce mussels to rivers where they used to be.

2. Interview with Brant Fisher. Brant is the non-game aquatic biologist for the Indiana DNR. He helped to sample the mussels and fish in the White River after the 2000 fish kill. Periodically, he's sampled the river for mussels in Marion County, the latest in 2016. His observations on mussels in the river follow:

- As far as mussels are concerned, the West Fork of the White is really two different rivers—a larger river from Marion County and downstream, and smaller river from Hamilton County and upstream. Upstream before 1850 there were 35 species of mussels, and downstream 50 species. Today there are 10-12 species on average living in the river. The only way to get back the former diversity is to reintroduce the mussels artificially.
- The West Fork has improved dramatically since 1980. Below Chevy Dam there were no mussels then; in 2016 Brant and his colleagues found 9 living mussel species and weathered shells of two others.
- The freshwater drum is a formerly plentiful fish that is a common host of mussel glochidia. Catfish is another host. The drum was reintroduced above Chevy Dam after the fish kill in hopes that it would help move the mussels into waters where they are missing.
- Brant laid out in priority order how to restore the former abundance of mussels, so they again act as important filters of the water, improving water clarity below their extensive beds.
  - Increase the density of mussels in their beds—this raises the chance of fertilization and glochidia production, which is lower when mussels are spread out.
  - Greatly reduce the sediment in the river. Sediment also reduces mussel reproduction rates.
  - Increase the abundance of the fish that host glochidia. Fish movement is constrained by dams and sediment covers areas of the river bottom that could be used for reproduction.



- Improve the quality of river habitat—more vegetation, less ditching, more gravel and sand (less sediment), less flood scouring by better controlling runoff coming from impervious cover and cropland.

3. Interview with Bill Weeks. Bill is Director of the Conservation Law Center. His organization is conducting a study of sewage inputs to Indiana waters from pipes. Bacterial contamination is a statewide problem—12,000 river miles are affected. Sources include, among others:

- Storm sewers and other discharge pipes
- Failing septic systems
- Older neighborhoods with leaking and broken sewage drains
- Agricultural communities and residences connecting septic systems to ditches

## Get Outdoors

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