CARPENTER NATURE PRESERVE

Master Plan

ZIONSVILLE
PARKS & RECREATION

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View From Northwest Corner Looking Southeast

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INSPIRE • ATTRACT • PRESERVE

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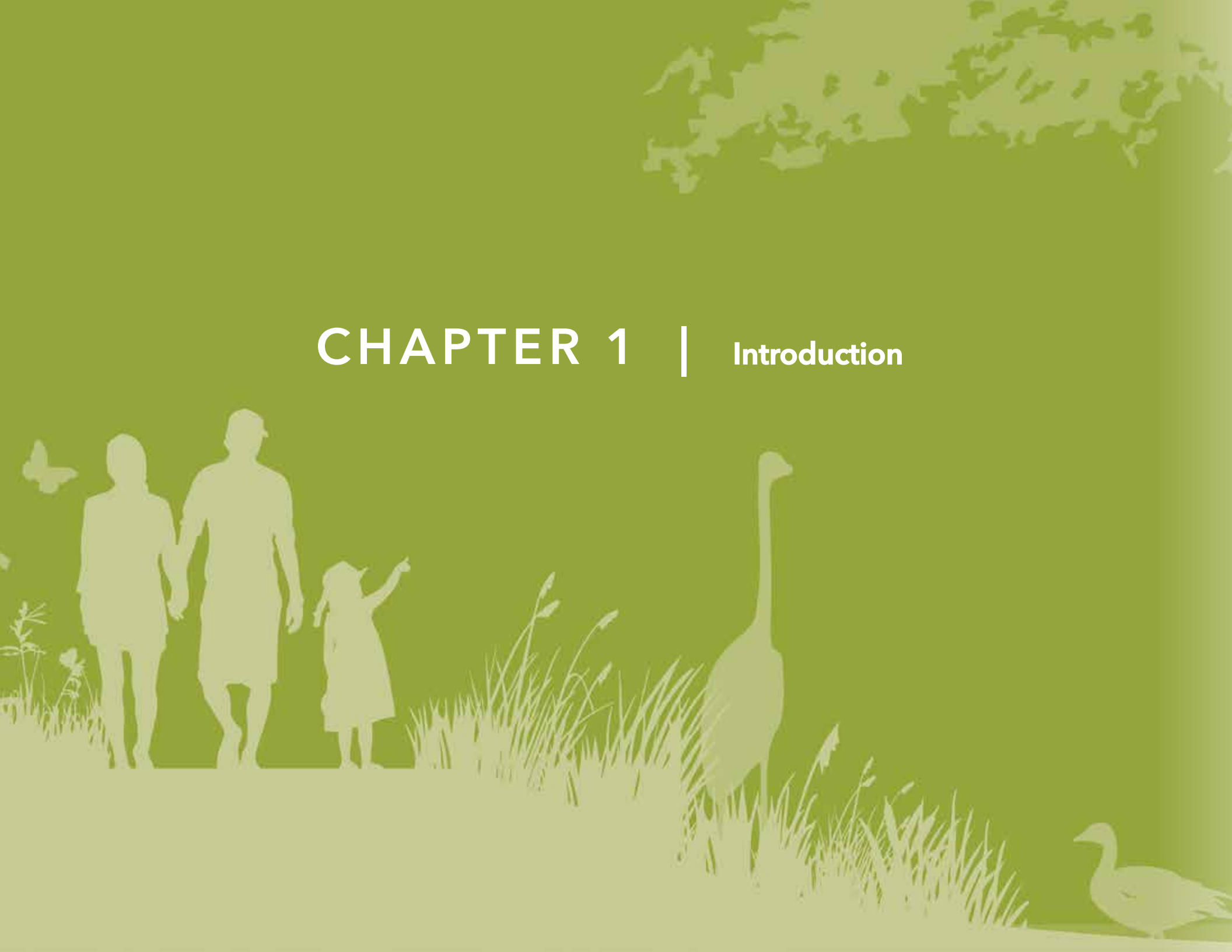
INSPIRE • ATTRACT • PRESERVE

CHAPTER 1 | Introduction



Introduction

OVERVIEW AND PURPOSE

The Carpenter Nature Preserve is a 215-acre nature preserve proposed by the Zionsville Park and Recreation Board as a town and regional destination for a future Nature Center building, walking trails, boardwalks, nature inspired playground, outdoor classrooms, Eagle Creek overlooks, enhanced wetlands, woodlands, and prairies. The nature preserve will enhance existing wildlife habitats while teaching visitors of all ages about the natural environment.

The address for the site is 601 S. County Road 900 East, Zionsville, IN, and is located at the intersection of U.S. Hwy. 421 (Michigan Road) and S.R. 32 in Union Township. The site was a former golf course which was abandoned in 2017. The defining feature of the property is approximately 4,000 linear feet of Eagle Creek. The property is characterized by varying terrain created during the park's previous use as a golf course and the natural topography of the Eagle Creek corridor. There are areas of established woodland, ponds, and overgrowth which includes both natives and some invasive plant material. A portion of the site lies within the floodplain of Eagle Creek.

The vision for the proposed Carpenter Nature Preserve is to inspire, attract, and preserve. The park will inspire people to protect native plant communities and wildlife habitats; attract nature lovers while inspiring new nature lovers; and preserve the habitat and ecosystems of the Eagle Creek corridor which are quickly disappearing in the north central part of the state. This property holds great promise as a recreational and natural asset for this rapidly developing area of Boone County. The varied terrain and soils will allow restoration and creation of a wide variety of habitats that will benefit native organisms and provide educational and recreational resources for the people of Boone County and all of Indiana.

PRESERVE & EDUCATE

The design of the park focused on creating a sanctuary for the public to enjoy wildlife and nature. As the proposed location for the future Zionsville Nature Center, the park will provide a regional amenity known for its beauty and wildlife habitat while creating exceptional educational opportunities in a newly constructed

building designed specifically for the context of the site and the needs of the Nature Center. The Carpenter Nature Preserve will focus on education, preservation, and enhancement of the natural environment and will include future phases to continue to develop the site as a nature preserve. Efforts to manage and control invasive species will also be included in all future phases of park development.

PUBLIC AMENITY

The Carpenter Nature Preserve has been planned to provide the needed balance between creating a beloved natural area for the public to enjoy and preserving areas for habitat and wildlife. Many programmed uses were considered in the master plan design for the nature preserve with a mixture of active and passive uses. Areas of the site will be dedicated to preservation of wildlife habitat with limited public access. To create this balance between providing areas for people to explore and observe, and the need to preserve wildlife habitat, the site has been designed to transition from more active uses near the entrance and surrounding the future nature center to quieter, more passive uses closer to the Eagle Creek corridor. Educational activities will include programming to teach the public about native habitats in central Indiana and the environments that wildlife need to survive and flourish including the need to limit human impacts in certain areas or during different times of the year.

PROMOTE PUBLIC HEALTH & INCREASED QUALITY OF LIFE

The Carpenter Nature Preserve will promote public health efforts including providing various opportunities for recreational activities for both mental and physical well-being. Activities which assist in mental and physical health promoted in the park include fishing, walking/hiking, jogging, bird watching, playgrounds, and educational programs. Having a regional destination like the Carpenter Nature Preserve will create a park with many amenities that will be enjoyed by Zionsville residents. There are many great parks in Zionsville but none the size of the Carpenter Nature Preserve or with the same mix of habitats and experiences that will be available at this one location. Once the Nature Center building is complete, and the Parks and Recreation Department can fully realize their recreational programming potential, the Carpenter Nature Preserve will be a regional destination for field trips, nature lovers, and outdoor fitness enthusiasts.

REGIONAL DESTINATION

While the Carpenter Nature Preserve will be a Zionsville park, it has been designed to be a regional destination. The location of the park along S.R. 32 and Michigan Road create easy access to the site from all regions of the state. The nature preserve is intended to serve all ages and abilities. Accessible pathways will be created to accommodate access to different areas of the site for those with varying abilities. A nature play space and outdoor classrooms will accommodate young children. The natural habitat will attract all ages. The restroom/ shelter (and eventually the future nature center) will allow families and individuals to spend extended amounts of time in the park exploring different habitats and activities.

SHOVEL READY PROJECT

The Park and Recreation Board understands the potential of the Carpenter Nature Preserve as a regional draw for its natural surroundings and preservation of a variety of wildlife habitat. With that in mind, the Board engaged in a master plan process for the property prior to the Town acquiring the land. Because of this early work, the Carpenter Nature Preserve is a shovel-ready project with plans to implement the infrastructure needed for public access in 2023.

The first step in the development of this plan will be for the Town to acquire the property from private owners who have pledged to partner with the Town by providing a significant donation through a bargain sale of the property. The next phase of the park will involve design and implementation of the park infrastructure to allow people access to the site. Phase 1 construction will include rehabilitation of the existing entrance road and parking area. Paved trails will be established throughout the site. Outdoor classrooms, wildlife viewing blinds, additional native reforestation and plantings, and a restroom building will also be included in the first phase.

Future phases of development for the site will include the construction of a new nature center for the Town of Zionsville. Future phases will also include boardwalks, tree canopy walk, outdoor classrooms, additional nature play, more reforestation and natural plantings.

Additional information regarding the existing property, environmental assessment, and the master plan process are included in the following pages.

MASTER PLAN PROCESS

Process

The Zionsville Parks and Recreation Department partnered with the property owners to conduct a master planning process for the site. This process included an extensive inventory and analysis phase which included an ecological assessment of the property along with a preliminary structural analysis of the buildings on site. The owners had previously obtained structural analysis for the existing bridges. The full existing conditions analysis can be viewed in the Existing Conditions and Ecological Assessment Chapters.

Project Design Charrette

The inventory and analysis data was utilized during a 3-day design charrette to create multiple conceptual layouts for the property. The charrette process also included several focus group meetings with town officials and staff. After review of the 3 concept layouts with a steering committee comprised of the property owners, parks staff, and leadership, a preferred concept was developed. The preferred concept combined several features from each of the concept layouts to create the desired master plan layout.

Project Website

As a part of the master planning process, a project website was developed and shared with the public. The project website included a public input survey and was available online from March 1 to April 1. The input received from the project website was incorporated into the master plan and included wide support for the development of the nature preserve. The adjacent page illustrates nearly 8,000 visits to the website with 170 responses to the survey. Responses to the survey questions included with the project website presentation are included in Appendix F.

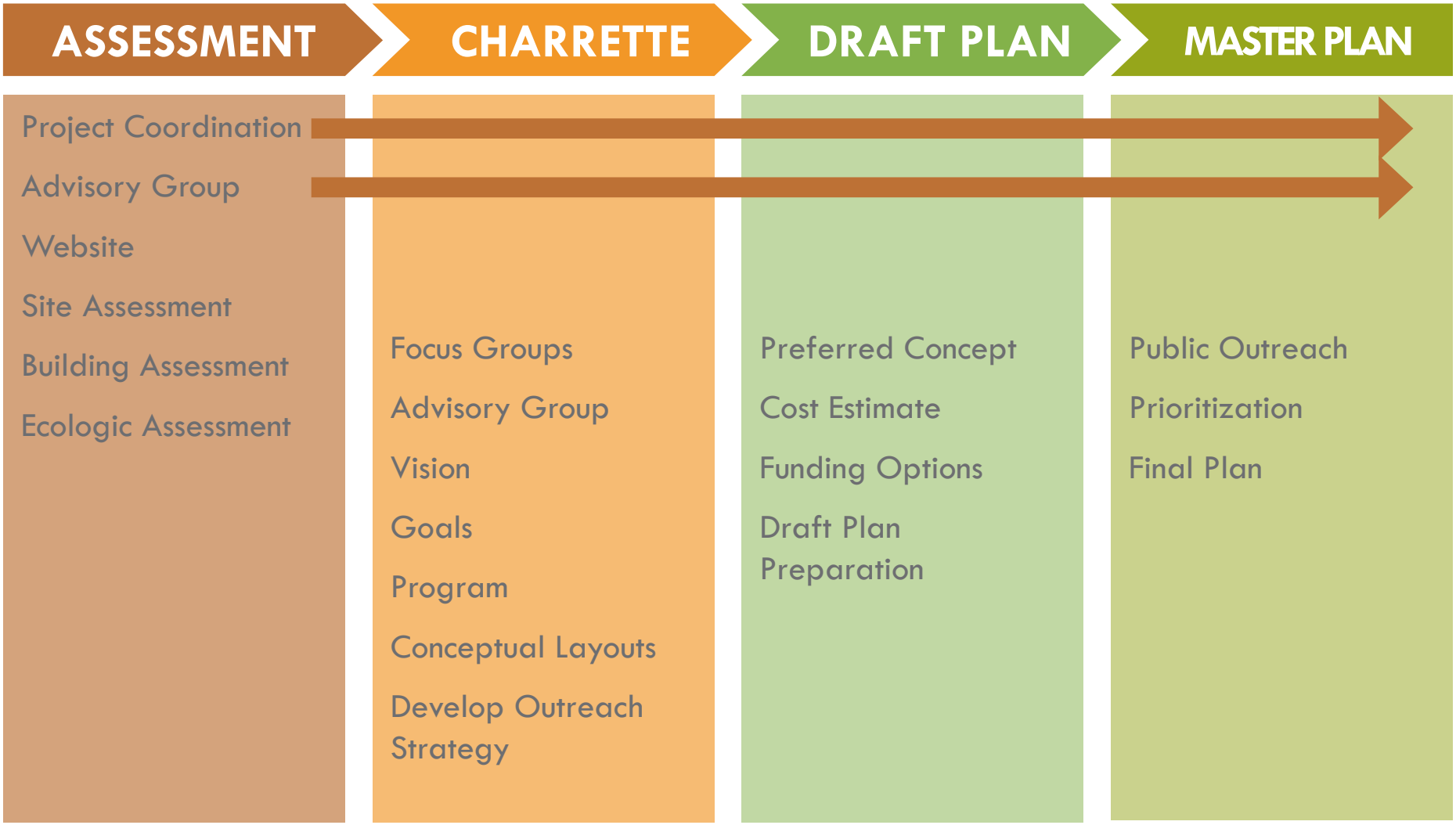
Park and Recreation Board Meeting

The master plan design was presented at a Park and Recreation Board meeting on May 11, 2022. The agenda, notice, and meeting minutes are attached in Appendix D. Presentation at the Board meeting on May 11th included an overview of the master plan process (including existing site conditions and the floodplain of Eagle Creek), the public input received from the project website, discussion of site features and future development, and funding options for the site. The LWCF Grant was discussed as a potential funding source and the Park & Recreation Department Superintendent stated the Department's intent to apply for this grant.

Town Council Meeting

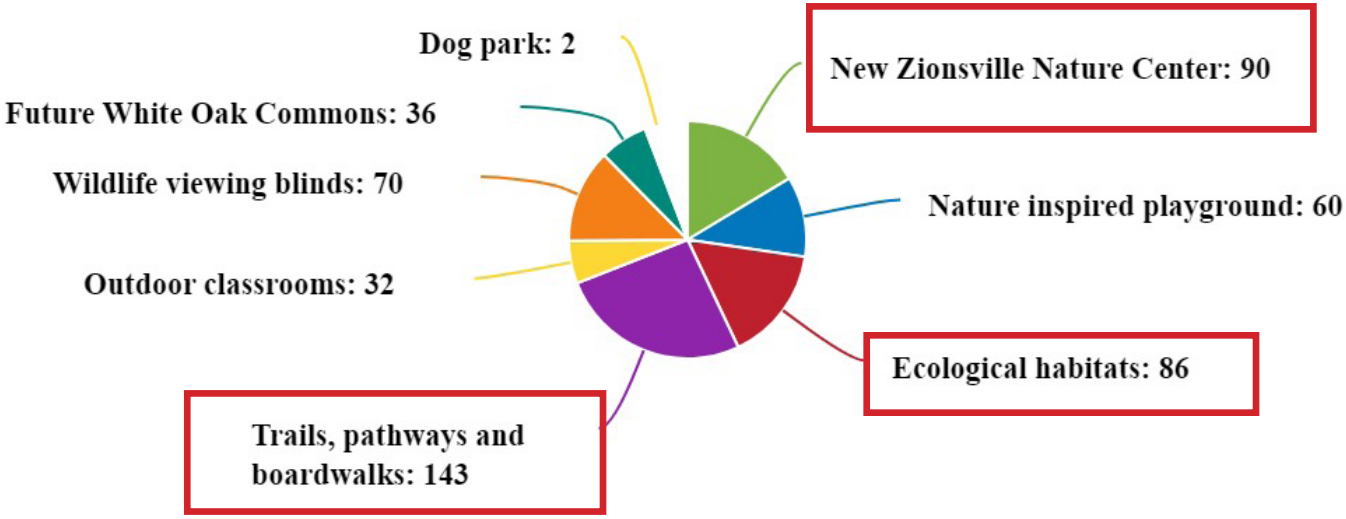
The master plan for the Carpenter Nature Preserve was presented at the Zionsville Town Council meeting on May 16, 2022 at 8:00 a.m. The agenda, notice, and minutes are attached in Appendix E. Presentation at the Town Council meeting on May 16th included an overview of the master plan process (including existing site conditions and the floodplain of Eagle Creek), the public input received from the project website, discussion of site features and future development, and funding options for the site. The LWCF Grant was discussed as a potential funding source and the Park & Recreation Department Superintendent stated the Department's intent to apply for this grant.

PROCESS


ASSESSMENT
CHARRETTE
DRAFT PLAN
MASTER PLAN
Project Coordination
Advisory Group
Website
Site Assessment
Building Assessment
Ecologic Assessment
Focus Groups
Advisory Group
Vision
Goals
Program
Conceptual Layouts
Develop Outreach Strategy
Preferred Concept
Cost Estimate
Funding Options
Draft Plan Preparation
Public Outreach
Prioritization
Final Plan

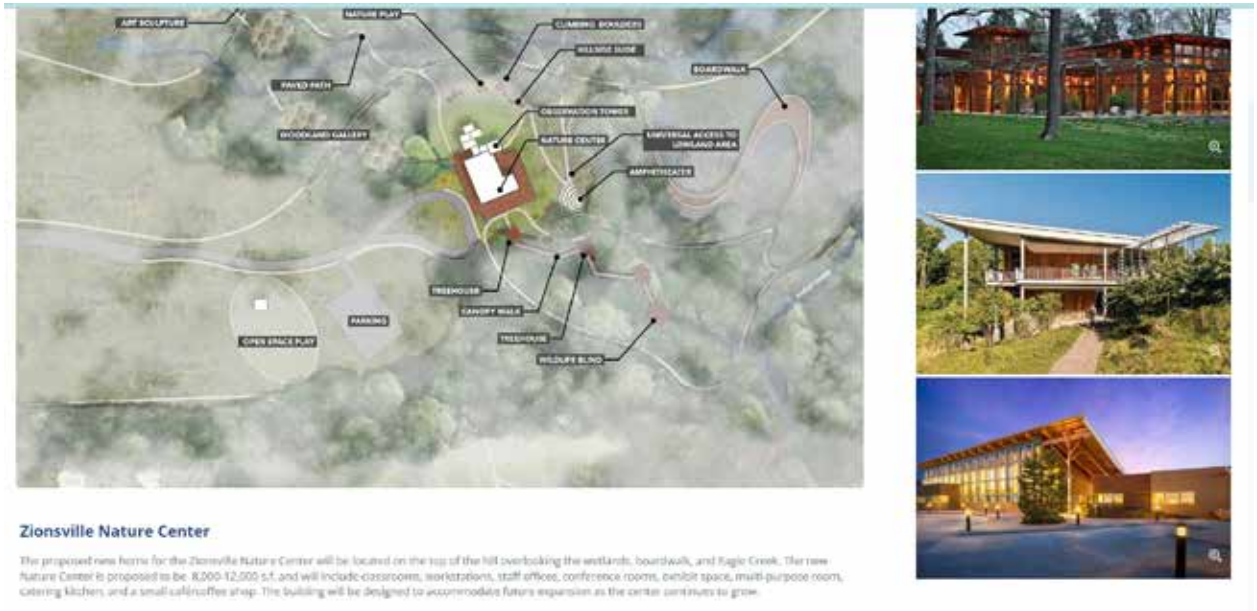
Project website participation dashboard

Which Park feature(s) are you most excited to see? (Select all that apply)

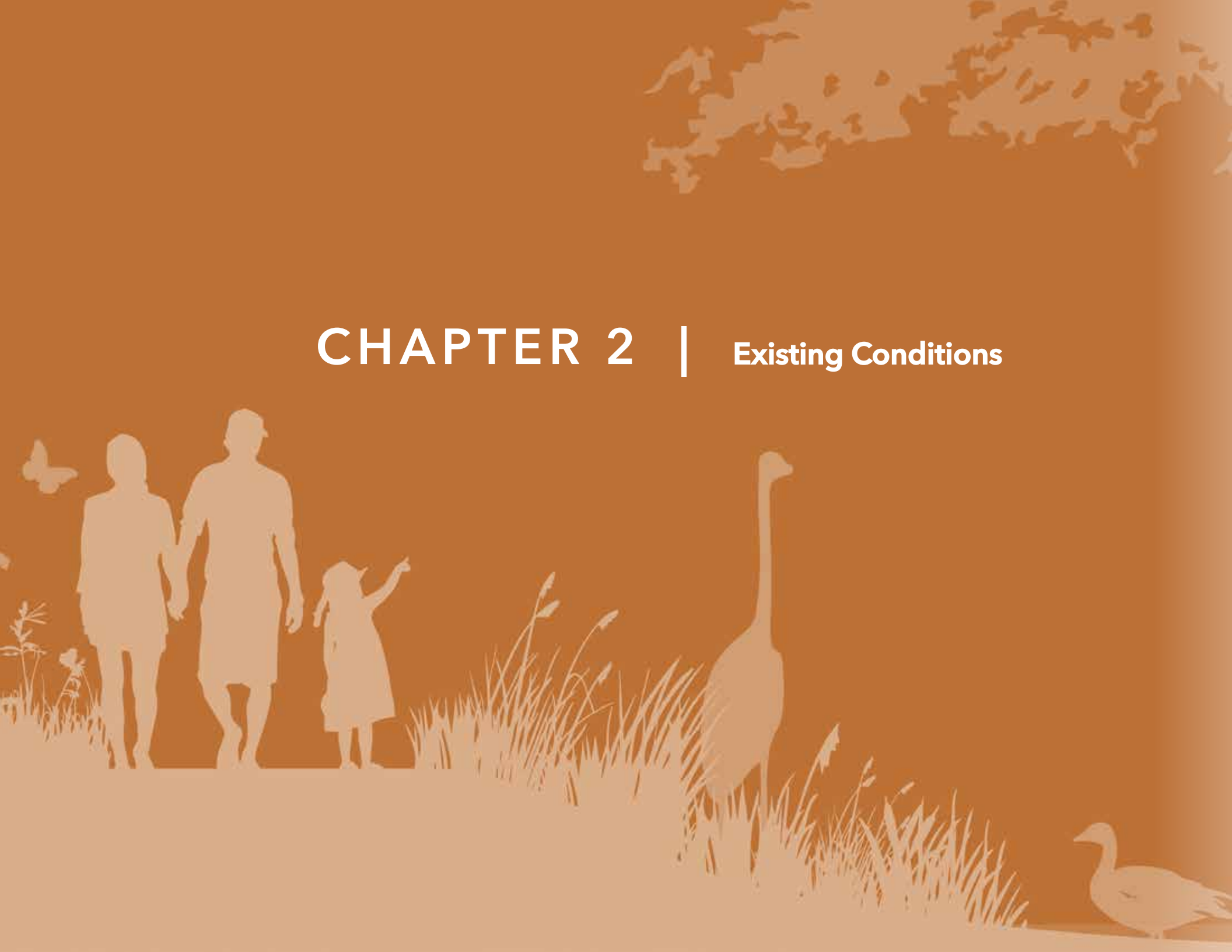


Project website home page

Project website master plan interactive page



CHAPTER 2 | Existing Conditions



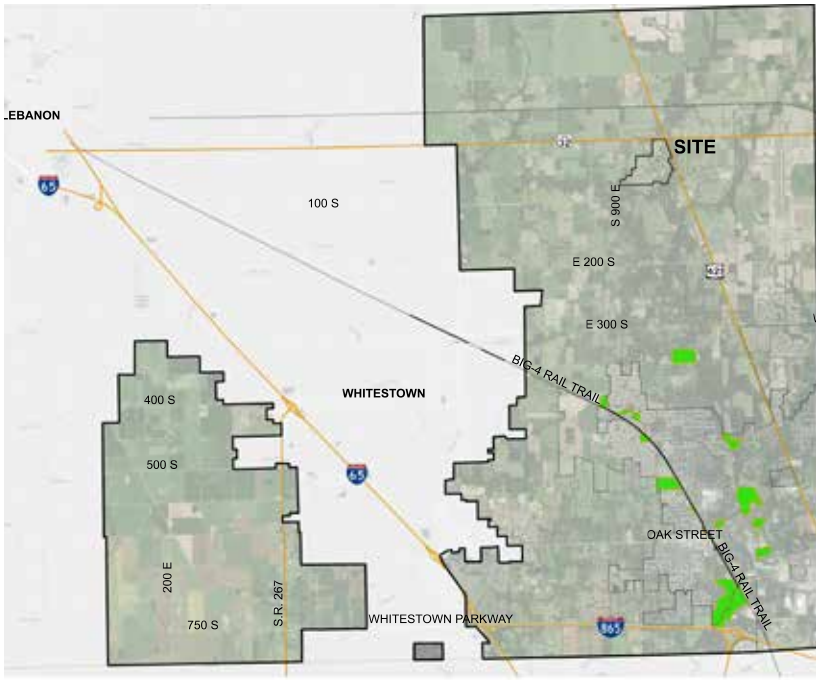
Existing Conditions

INVENTORY

The site is located in northern Zionsville at the intersection of US 421 (Michigan Road) and State Road 32). The Carpenter Nature Preserve will create a park in an underserved area of town as illustrated on the adjacent map. Existing parks for the Town are highlighted in green showing their location and disbursement within the town boundaries.

The property was a mixture of agricultural land on the flat uplands and floodplains and woodlands on the slopes and ravines in historic times until construction of the Wolf Run Golf Course was initiated around 1987. The property was managed as a golf course until it closed in 2017. All utilities on the property are located underground.

This area is within the Tipton Till Plain natural region of central Indiana, an area characterized by glacial till, alluvium, and outwash from the Wisconsin glaciation. The soils of the property are derived primarily from glacial till in the uplands and alluvium in the floodplain of Eagle Creek. Deep below the glacial till lies bedrock consisting of shale, limestone, and dolomite of the Mississippian and Devonian periods.

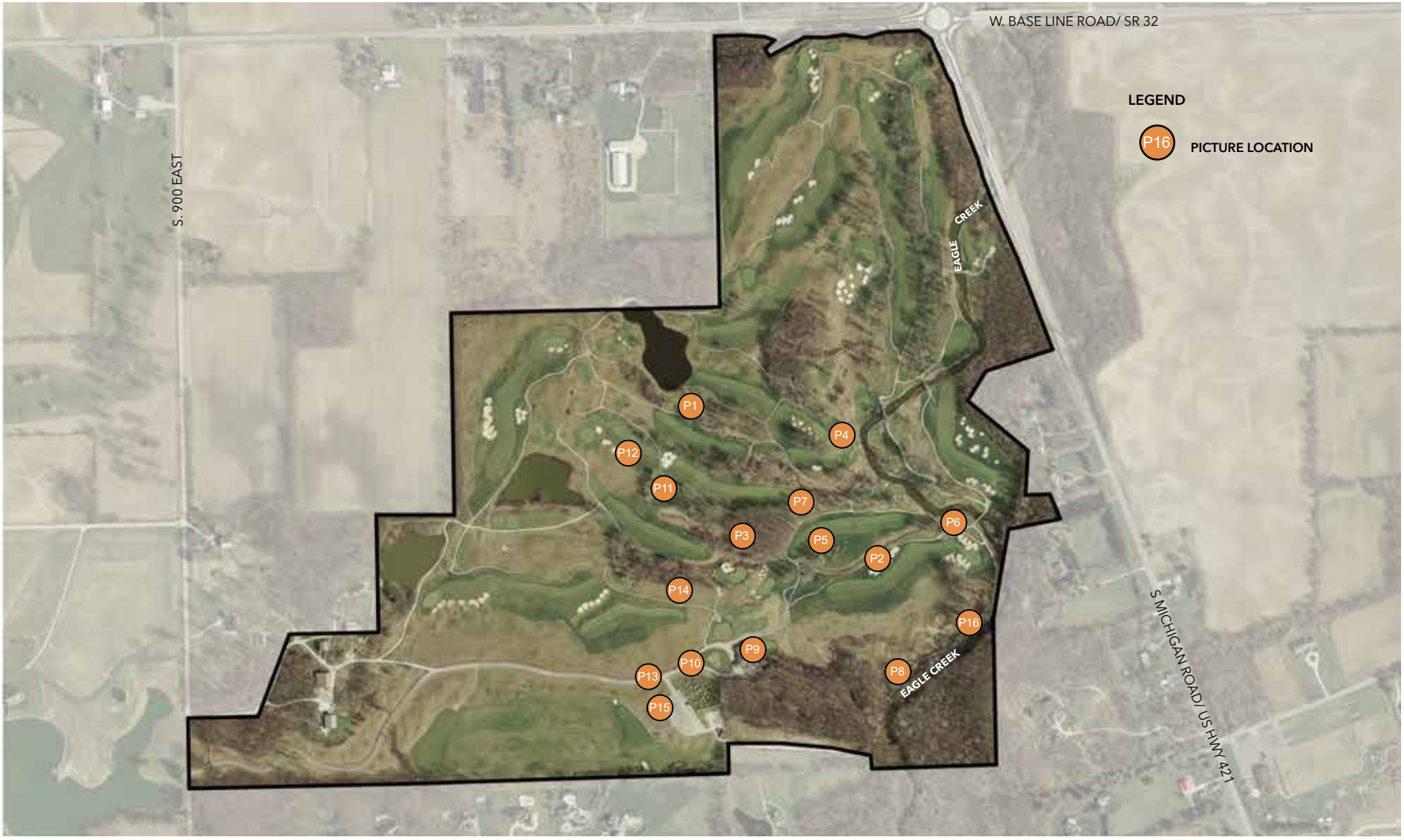


Distribution of Existing Parks (highlighted in green) within Corporate Boundary

The defining natural feature is approximately 4,000 lineal feet of Eagle Creek that flows through the eastern portion of the property. Alluvial soils of the Eel and Beckville groups characterize the floodplain of Eagle Creek.

Several small tributaries ranging from ephemeral to perennial streams traverse the property in a general northwest to southeast flow pattern. The ravines that contain these streams result in rolling topography through the center of the property characterized by Miami and Strawn soils derived from glacial till. The western and southcentral portions of the property are generally flat and characterized by soils of the Crosby-Treaty series also derived from glacial till. Eagle Creek adds greatly to the diversity of property by providing habitat for waterfowl, wading birds, fish, and macroinvertebrates.

PHOTO LOCATIONS




P1


P3


P2


P4


P5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P6


P8


P9


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P12


P13


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P14


P16

Existing site features are illustrated with photos included on the following pages. The map on the adjacent page illustrates the location of each picture. Notable site features include ponds, Eagle Creek corridor, existing woodlands, existing structures, and plant material.

SITE HISTORY

The previous use of the site was a golf course which was closed in 2017. The golf course and associated buildings were constructed in 1987. According to property records, prior to 1987 the property was a mixture of agriculture use on the flat uplands and woodland slopes with floodplain. The buildings on the site were built in 1987 as a part of the golf course construction. There is no other known historical, archaeological, or architectural significant information. A review by the Indiana Department of Natural Resources, Division of Historic Preservation & Archaeology, based on submitted materials and documentation available to staff of the Indiana SHPO, did not identify any historic buildings, structures, districts, or objects listed in or eligible for inclusion in the National Register of Historic Places within the probable area of potential affect.

EXISTING STRUCTURES

The existing buildings constructed on site were built with golf course construction in 1987 and do not have architectural importance. The clubhouse building is 9,250 s.f. at the ground level with a 4,000 s.f. basement, and the adjacent Bunkhouse structure is 2,000 s.f. at the ground level and 2,000 s.f. at the upper level.

Though available building stock is in-place and is useable, the condition and build quality of those buildings are near the end of their usable life-cycle. Significant repairs and upgrades are required in order to bring the buildings to usable and code-compliant condition. There is significant compromise to some of the sub-grade basement walls that would require excavation and reconstruction to repair. There are moisture and mold conditions throughout the building that would need to be remediated, and the building envelope does not meet modern standards of insulation. The mechanical and electrical systems were stripped from the building and need significant re-work and/or full replacement to be functional. There is not a fire protection system in place. The building is not ADA accessible and ramps would need to be added to the exterior to provide access. Windows are absent on 75% of the façade of the existing clubhouse, which does not provide flexibility or align with the goals of a nature-based program.

SITE AERIAL


W. BASE LINE ROAD/ SR 32
S. 900 EAST
EAGLE CREEK
EAGLE CREEK
S MICHIGAN ROAD/ US HWY 421

EXISTING ROADS AND PATHS

While the Carpenter Nature Preserve will be a Zionsville park, it has been designed to be a regional destination. The location of the park along S.R. 32 and Michigan Road create easy access to the site from all regions of the state. The nature preserve is intended to serve all ages and abilities. Accessible pathways will be created to accommodate access to different areas of the site for those with varying abilities. A nature play space and outdoor classrooms will accommodate young children. The natural habitat will attract young and older users. The restroom/shelter (and eventually the future nature center) will allow families and individuals to spend extended amounts of time in the park exploring different habitats and activities.

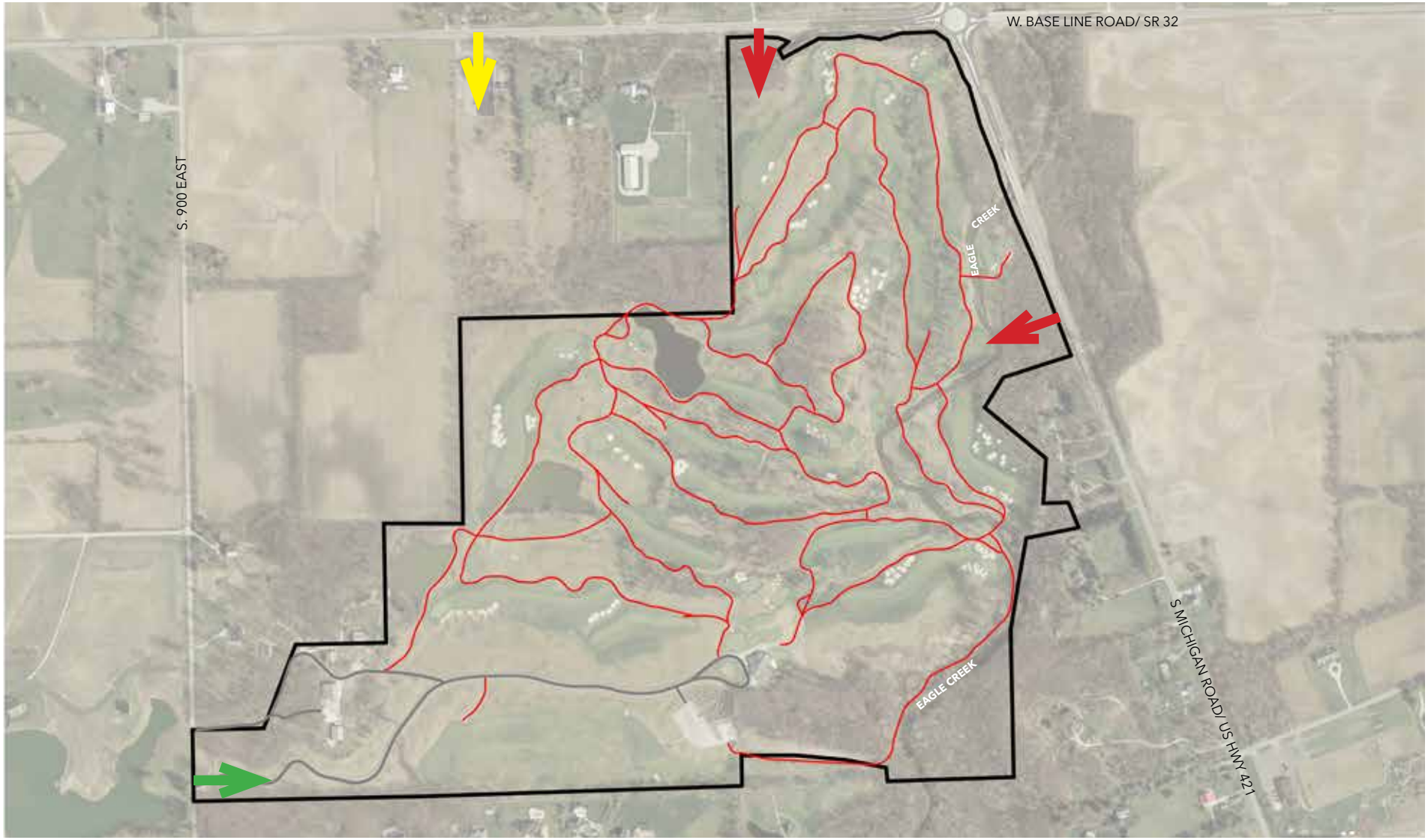
SITE ACCESS

As a future regional destination site access will be important for the nature preserve to accommodate visitors but also to minimize the impact to neighboring properties. Four access points were analyzed during the master plan process and included the following:

- Access from County Road 900 East
- Access from U.S. Hwy. 421
- Two access points from State Road 32

The access points shown with a red arrow were eliminated because of physical challenges including difficult grade changes and drainage ditches/Eagle Creek. The access point off of S.R. 32 shown with a yellow arrow was deemed feasible but will require an easement or property acquisition from the current property owner. Although road improvements may be needed for County Road 900 East, this access point was determined to be the most viable for the future nature preserve.

EXISTING ACCESS



FLOODPLAIN AND TOPOGRAPHY

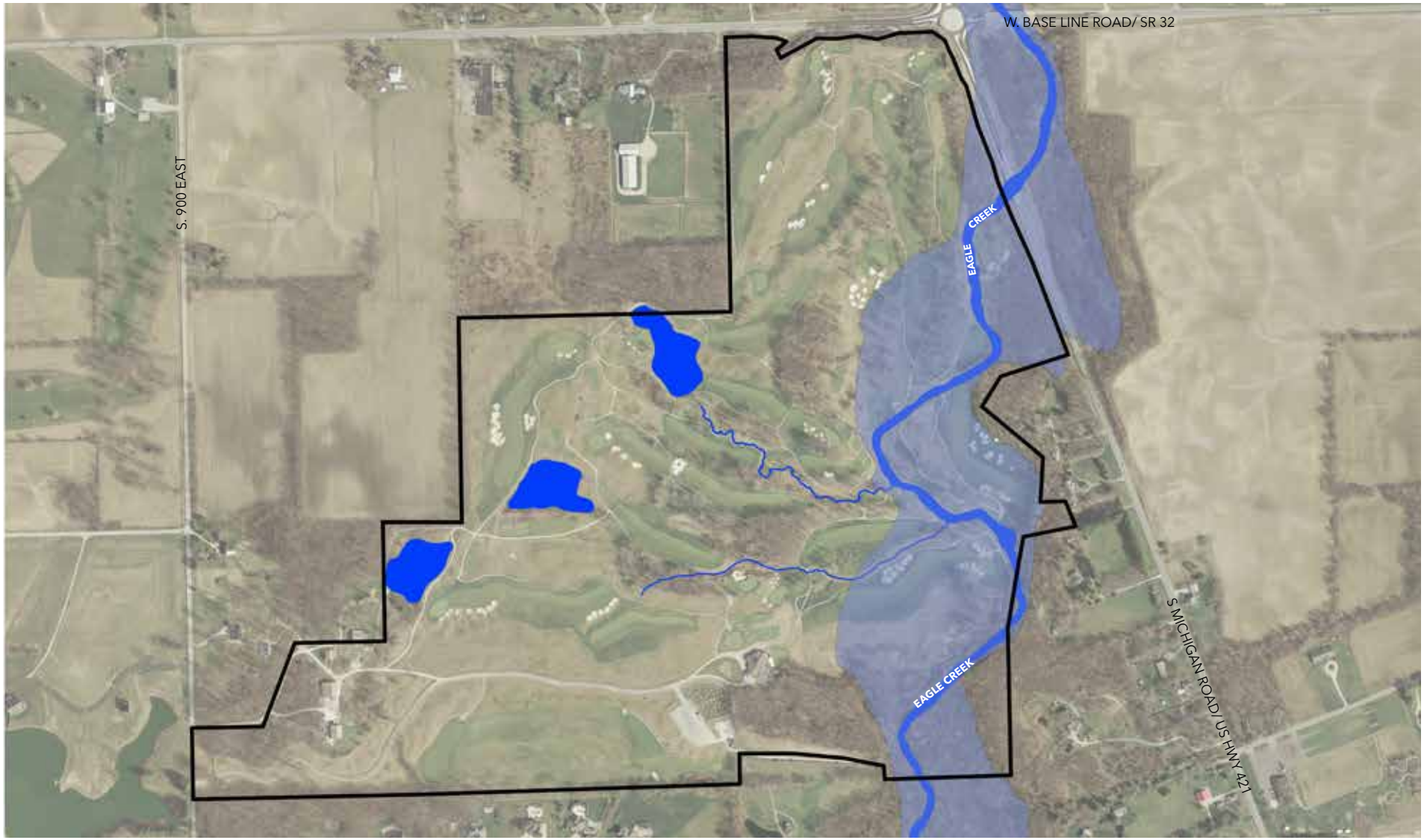
Over 4,000 linear feet of Eagle Creek winds through the eastern edge of the site. There are 4 defined drainage ways carrying water from the upper flatlands to Eagle Creek. There are 3 ponds located on the western edges of the site. The floodplain of Eagle Creek, with the uplands of the site, create unique views of the floodplain corridor. With 215 acres of land, the Carpenter Nature Preserve presents an opportunity to preserve and restore a natural area for Zionsville and the surrounding region. The size of this property also provides an opportunity to create habitat large enough to accommodate a large variety of native species.

Eagle Creek adds greatly to the diversity of the property by providing habitat for waterfowl, wading birds, fish, and macroinvertebrates.

Fish - Eagle Creek harbors a great diversity of fish common in streams of this magnitude. Gamefish that likely inhabit the creek include smallmouth bass, rock bass, and bluegill. Longear sunfish and green sunfish may also occasionally be caught by anglers in the pools of the creek. Creek Chub are likely to be abundant and occasionally caught on small tackle. Yellow bullhead and black bullhead are the catfish species likely to occupy streams of this size. Suckers such as northern hogsucker, white sucker, spotted sucker, and black and golden redhorse likely feed along the stream bottom.

Birds - Common species of waterfowl such as mallards and Canada geese frequent the pools in this section of the creek and likely nest here on occasion in the vegetation on the banks. The other species of waterfowl likely to be encountered here during the breeding season are wood ducks which nest in tree cavities or constructed nest boxes. The flowing water of the creek is likely to stay open in all but the coldest weather, providing winter habitat for non-migratory waterfowl. Two species of fish-eating wading birds are likely to frequent this section in the spring, summer and fall. The great blue heron and the much smaller green heron feed on fish, frogs, and aquatic macroinvertebrates found in the shallow water. Spotted sandpiper and killdeer are the shorebirds most likely to be seen on the sandbars and shorelines of the creek. The densely wooded southern sections of the creek and the adjacent smaller stream in the woodland south of the clubhouse may harbor Louisiana waterthrush, a warbler that forages for aquatic invertebrates along the water's edge. Bald eagles have been observed on the property and there are currently Blue Grosbeaks nesting on the property. Although not documented through the DNR process, several bat species have been observed on the site including the Hoary Bat, Big Brown Bat, Evening Bat, and the Eastern Red Bat.

FLOODPLAIN


W. BASE LINE ROAD/ SR 32
S. 900 EAST
EAGLE CREEK
EAGLE CREEK
S MICHIGAN ROAD/ US HWY 421

VEGETATION

Much of the site has been reclaimed by nature and includes large areas of established hardwood woodlands, areas of grassland, established wetland, and three ponds. A wide variety of wildlife can be observed on the site with numbers increasing as surrounding areas continue to be developed.

There are areas of established woodland, ponds and overgrowth which includes both natives and some invasive plant material. North of the main entrance, near the road and outside of the wooded border, there is a large white oak with a trunk diameter of over six feet.

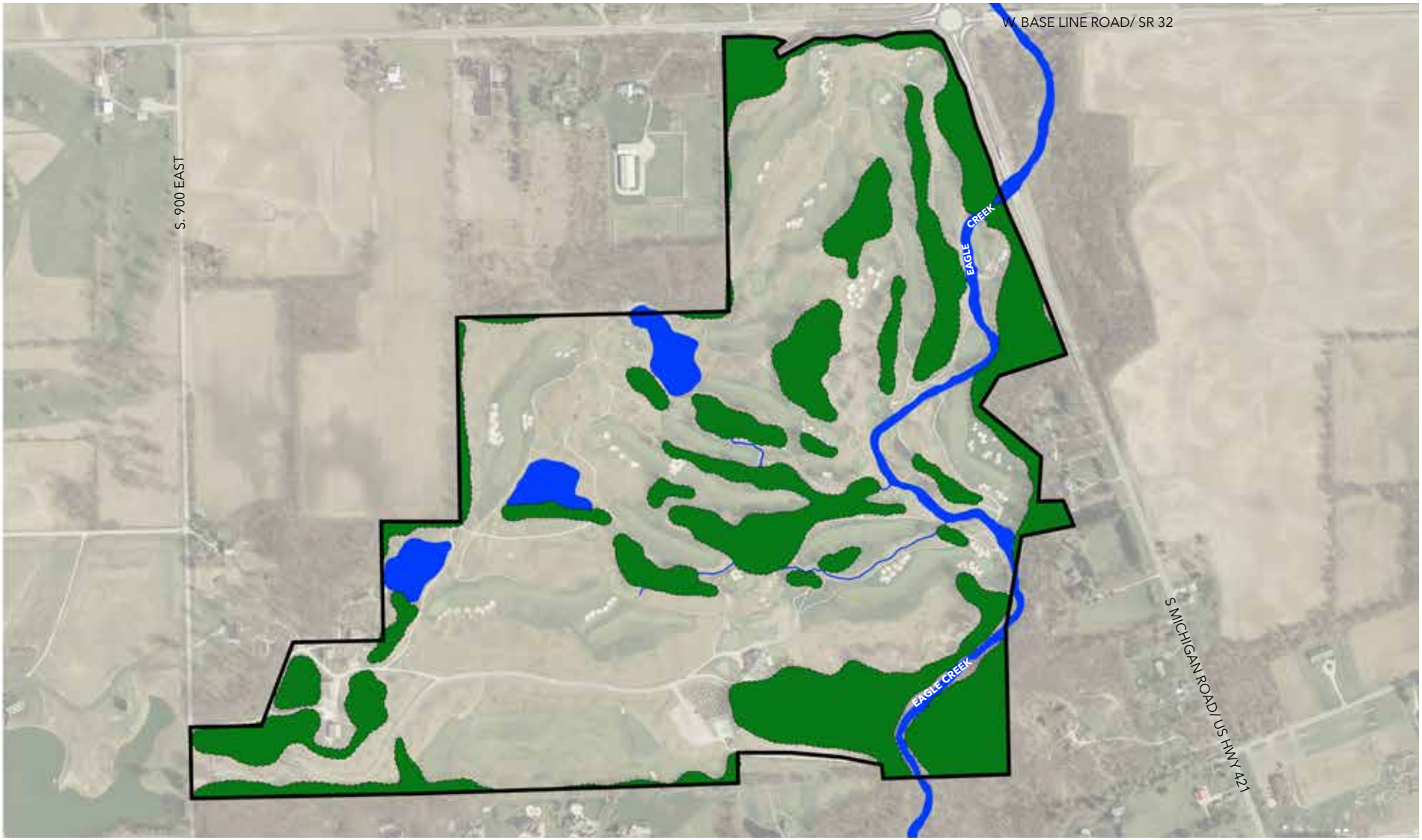
Both natural and created wetlands exist on the property. A significant flatwoods depression southeast of the maintenance complex is seasonally ponded and may harbor amphibian breeding habitat in the spring. Cottonwood, swamp rose (Rosa palustris), and rice-cut grass (Leersia oryzoides) are characteristic species. A large mitigation wetland is located downslope east of the clubhouse. Planted species including river birch and prairie cordgrass (Spartina pectinata) were observed in this area.

Two pollinator plantings have been installed near the clubhouse. To the west of the clubhouse, a teardrop-shaped area encircled by the drive has been plugged with a wide variety of forbs and native grasses. To the east of the clubhouse, a former putting green has received a mixture of sand prairie species. These first-year plantings are currently on a successful establishment trajectory.

A large number of invasive species have been established on the park during the time it has been dormant. Removal of these species will require ongoing efforts from the Parks and Recreation Department. Species found on the site include:

- Callery Pear
- White Mulberry
- Black Locust
- Osage Orange
- Honeysuckle
- Multiflora Rose
- Burning Bush
- Wintercreeper
- Canada Thistle
- Sweet Clover
- Reed Canary Grass
- Poison Hemlock
- Fountain Grass
- Crownvetch

VEGETATION


W. BASE LINE ROAD/ SR 32
S. 900 EAST
EAGLE CREEK
EAGLE CREEK
S MICHIGAN ROAD/ US HWY 421

DNR RIPARIAN BUFFERS

KCI Technologies, Inc. performed a preliminary ecological assessment of potential credit yield from conceptual stream restoration activities at the Carpenter Nature Preserve. This assessment included analysis of Eagle Creek and the drainage ways included on the property for their viability in utilizing DNR ILF funds for stream bank restoration.

Potential areas for restoration through this program are shown with a red highlight on the adjacent mapping. IDNR, the property owners, and the Park and Recreation Board continue to work through design options for potential restoration of these areas.

The interest in this property for this program illustrates the great potential of the property to become a regional asset for the public but also to create important habitat for wildlife in the area.

PROPOSED DNR ILF EASEMENTS

UTILITIES

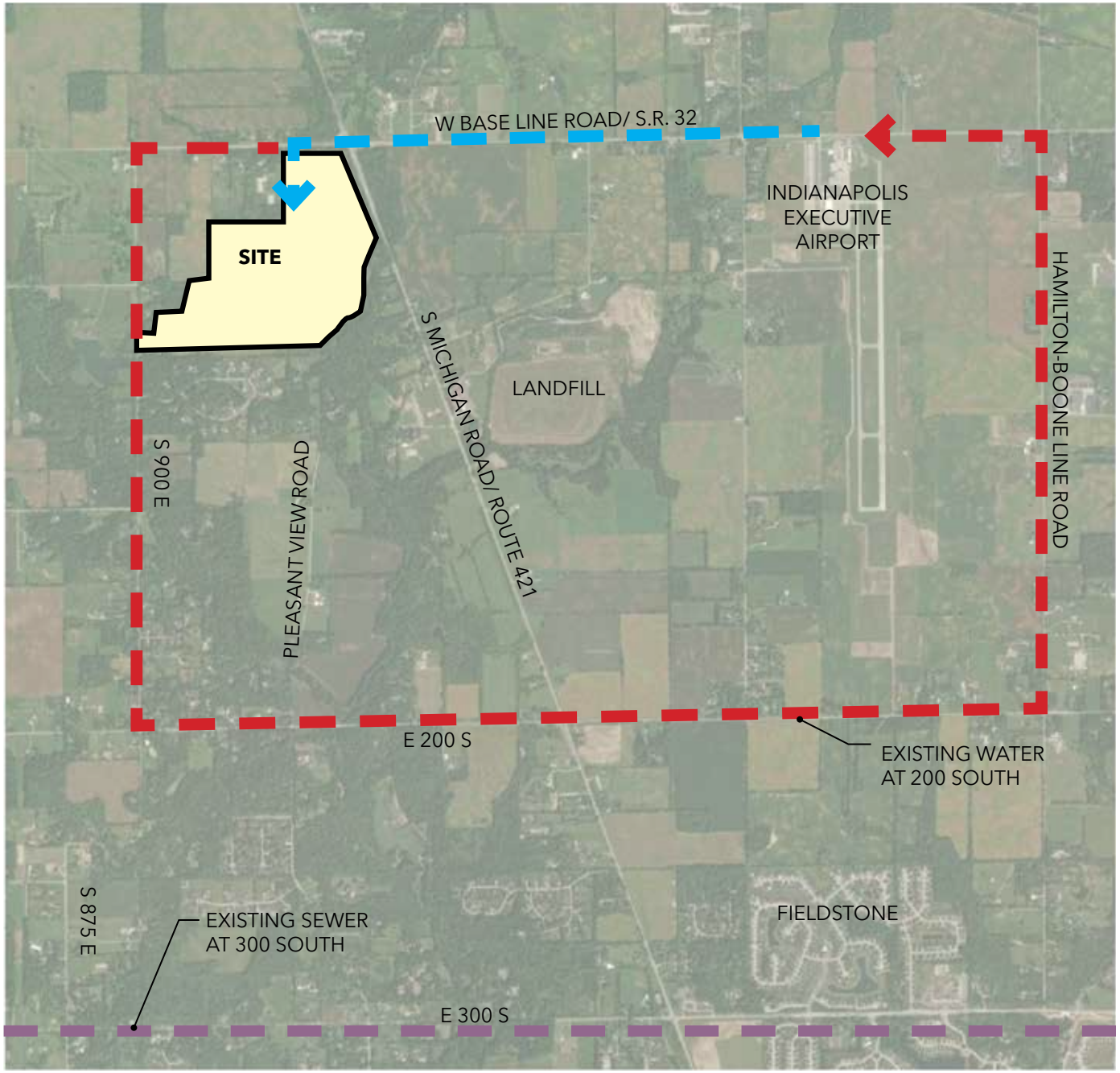
One of the key challenges for the site and its future use includes getting utilities to the site. The site is currently served by electric by a public utility with water and sewer contained within the site. Water service is obtained through wells and sewer is provided with a septic system. The adjacent map illustrates a preliminary assessment of options to bring public water and sewer to the site.

Septic - the closest sewer lines are located at 300 South. A potential proposed water line is shown in red, which would include a more traditional loop installation and blue, which shows a dead end option from the airport. Preliminary calculations include 2 miles of water line with a cost of approximately $2 million and approximately 7 miles with a cost of approximately $7 million for the loop option shown in red.

The above costs can be cost prohibitive in the development of the nature preserve if the Park and Recreation Board were to take this task on by themselves. Instead, it is advised that the Park and Recreation Board wait for an opportunity to team with a developer or other private property owner to bring these utilities to the area.

For the short-term planning, the site will be designed to continue to use current sources for water and sewer service.

UTILITIES


W BASE LINE ROAD/ S.R. 32
INDIANAPOLIS EXECUTIVE AIRPORT
SITE
HAMILTON-BOONE LINE ROAD
S MICHIGAN ROAD/ ROUTE 421
LANDFILL
S 900 E
PLEASANT VIEW ROAD
E 200 S
EXISTING WATER AT 200 SOUTH
S 875 E
EXISTING SEWER AT 300 SOUTH
FIELDSTONE
E 300 S

EXISTING STRUCTURES

CLUBHOUSE

9,250 SF - Main Level
4,000 SF - Lower Level

BUNKHOUSE
2,000 SF - Main Level
2,000 SF - Upper Level

Both existing structures on the site were constructed in the mid-1980s of wood-framed construction. Both need structural repair and enhancement to serve new uses, as well as moisture mitigation. Mechanical, Electrical, and Plumbing systems would need to be installed, as well as a fire suppression system for Assembly uses.

See the appended Structural Assessment for further content.

Two existing buildings located on the property were studied for use as part of the new Nature Center. The clubhouse building is 9,250 s.f. at the ground level with a 4,000 s.f. basement, and the adjacent Bunkhouse structure is 2,000 s.f. at the ground level and 2,000 s.f. at the upper level.

The Clubhouse structure is sited on the property in a manner that takes advantage of compelling views and the existing footprint available is appropriately sized for the proposed program. Additional opportunities identified with renovating these facilities reside in the existing infrastructure that are in place – the parking lots and roadways are in already disturbed areas and could be resurfaced. It is anticipated that the existing septic field and potable water wells could be re-used.

Though available building stock is in-place and is use-able, the condition and build quality of those buildings are near the end of their usable life-cycle. Significant repairs and upgrades are required in order to bring the buildings to usable and code-compliant condition. The existing structural system is insufficient for use as the nature center program and would require substantial upgrades, including doubling up of all floor joists and the addition of steel columns and beams in the basement. There is significant compromise to some of the sub-grade basement walls that would require excavation and reconstruction to repair. There are moisture and mold conditions throughout the building that would need to be remediated, and the building envelope does not meet modern standards of insulation. The mechanical and electrical systems were stripped from the building and need significant re-work and/or full replacement to be functional. There is not a fire protection system in place. The building is not ADA accessible and ramps would need to be added to the exterior to provide access. Windows are absent on 75% of the façade of the existing clubhouse, which does not provide flexibility or align with the goals of a nature-based program.

Perspective view of NW corner of existing Clubhouse

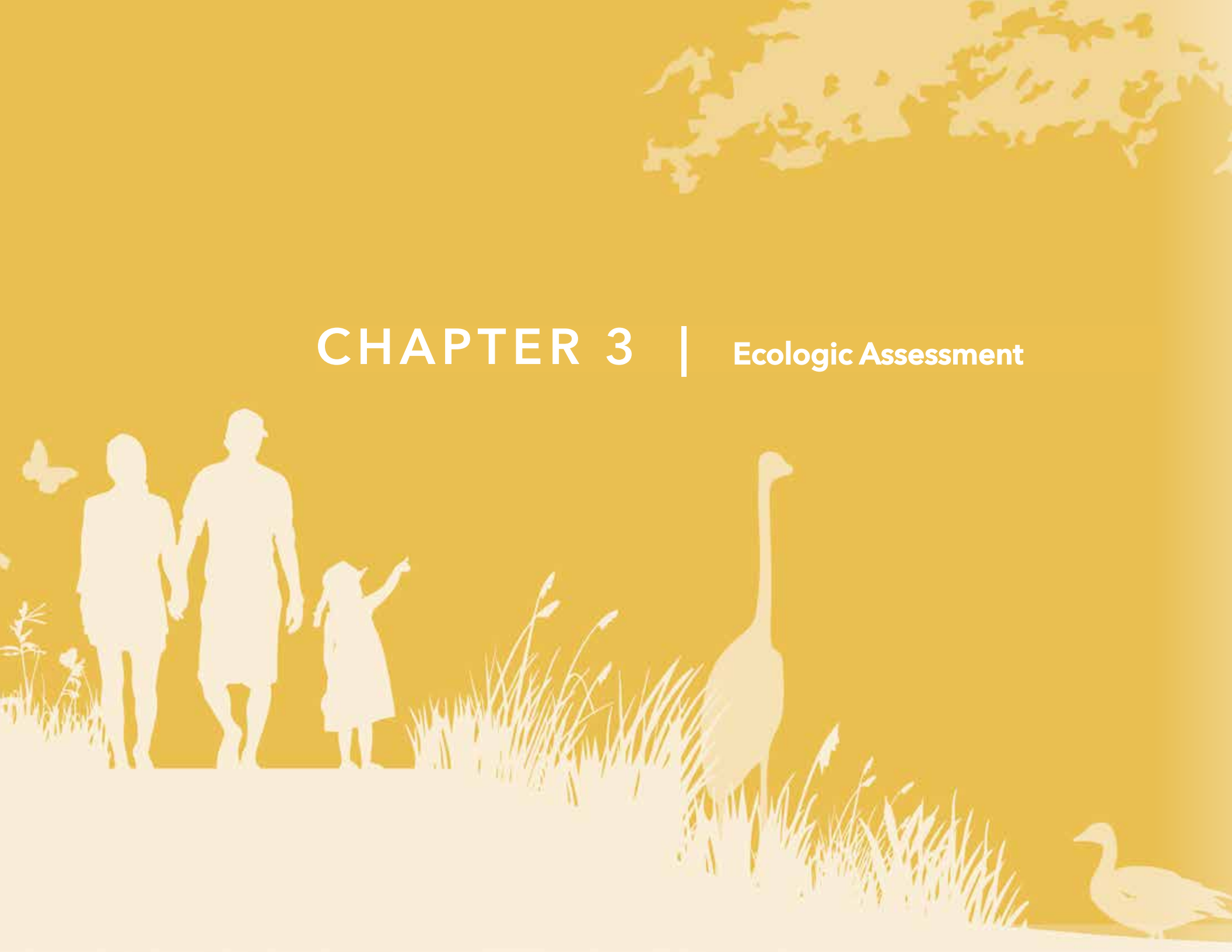
Perspective view of E elevation of existing Clubhouse

Existing Bunkhouse structure

Axon of NW corner of existing Clubhouse

Axon of SW corner of existing Clubhouse

CHAPTER 3 | Ecologic Assessment



Ecological Assessment

INTRODUCTION

As a future nature preserve, an ecological assessment for the existing property was a top priority in the inventory phase of the master plan. Ecologic Inc. conducted a thorough assessment for the property and through this assessment developed a plan for proposed restoration plant communities. This plan was utilized to develop the proposed layout with a focus on enhancing existing plant communities.

While most of the plant communities on the Carpenter property are a legacy of the golf course and prior agricultural use, the property also contains significant remnant woodlands of high conservation value and other altered woodland communities that can be readily restored. Linking these woodland areas to create a large block of contiguous habitat should be a high priority in the planning of this preserve.

While the entire property was almost certainly wooded prior to European settlement, the large open areas currently provide important grassland bird habitat. Another goal in planning this nature park should be the establishment of managed blocks of prairie habitats for the benefit of grassland birds and pollinators.

This floodplain of Eagle Creek has been largely cleared on the property. Reestablishment of a floodplain forest throughout the length of the creek will benefit riparian habitat, water quality, and connectivity. The creek itself undoubtedly harbors a diversity of fish and aquatic invertebrates that would greatly benefit from these improvements.

Management and restoration of the plant communities of this preserve will create a tremendous community asset. The resulting rich mosaic of habitats will be of immense benefit as a refuge for both wildlife and the people of Boone County in this rapidly developing area. Please refer to the map in Appendix I for locations of these communities.

WOODED COMMUNITIES

Flatwoods

These somewhat well-drained to poorly drained woodlands occur at the west end of the property near the entrance drive and the maintenance buildings. They are found primarily on soils of the Treaty- Crosby soil series with small inclusions of Miami and Williamstown Soils. The better-drained sections contain typical species of mesic woodlands including sugar maple, American beech, bitternut hickory, American elm, shagbark hickory, black walnut, common hackberry, and black cherry. Wetter sections harbor eastern cottonwood, American sycamore, boxelder, and black willow. Native shrubs in this section include spicebush (Lindera benzoin), blackhaw viburnum (Vibrunum prunifolium), and roughleaf dogwood (Cornus drummondii).

This area is divided into low and medium quality parcels based on the density of invasive shrubs in the understory. The medium quality areas contain relatively low coverage of invasive shrubs, generally under 20% while the low-quality areas contain 30-100% coverage of invasive shrubs in the understory.

A fencerow on the western border of the property contains a strip of flatwoods characterized by shagbark hickory, bur oak, and swamp white oak. There is significant recruitment of these hardwoods in the adjacent rough area which should be encouraged through management of less desirable and invasive woody plants.

North of the main entrance near the road and outside of the wooded border stands a prodigious white oak with a huge spreading crown. This massive tree measure 186 centimeters (6.1 feet) in diameter. Every effort should be made to maintain the health of this impressive specimen.

Crown of white oak at entrance

ure 2: Carex woodii in the high-quality woods

Corex woodii in high quality woods

Mesic Sloping Woodlands

These woodlands occur on gently to steeply sloping soils of the Miami and Strawn Series with some occurring on higher terraces of Eagle Creek on Eel and Beckville Soils. These woodlands represent the original plant community on most of the sloping portions of the property. They contain a diverse array of tree species including sugar maple, American beech, bur oak, white oak, northern red oak, chinquapin oak, common hackberry, American basswood, tulip tree, black walnut, bitternut hickory, and shagbark hickory. Understory trees include Ohio buckeye, hophornbeam, hornbeam, and eastern redbud. Native shrubs include spicebush and blackhaw viburnum.

The highest quality remnant plant communities on the property fall into this classification. The best tracts of mesic sloping woodlands are found southeast of the clubhouse and near the center of the property. Conservative plants such as sharp-hepatica (Anemone acutiloba), pretty sedge (Carex woodii) and

horse balm (Collinsonia canadensis) indicate a high quality and diverse herbaceous layer in these areas. The areas designated as high quality on the map contain both conservative native understory species and very low densities of invasive shrubs. Medium quality areas are lacking in conservative native species and have considerable coverage of invasive shrubs.

Floodplain Woodlands

These woodlands occur along Eagle Creek on Eel and Beckville Soils. A high-quality example of this type of woodland at the southeastern corner of the property was unfortunately inaccessible during the survey due to high water on Eagle Creek. Trees characteristic of this woodland type include American sycamore, eastern cottonwood, boxelder, common hackberry, American elm, silver maple, black walnut, bur oak, and Kentucky coffee tree.

Further north, a young, degraded version of this woodland occurs where Eagle Creek enters the property at the U.S. Highway 421 bridge. This woodland was formerly dominated by green ash that were killed during the past decade by the emerald ash borer. As a result, this woodland is currently in transition, with both native and invasive trees sharing the canopy. Locally native species include honeylocust, black walnut, box elder, common hackberry, American elm, and Kentucky coffee tree. Invaders include black locust (Robinia pseudoacacia) and osage orange (Maclura pomifera) from elsewhere in North American, and white mulberry (Morus alba) from Eurasia. The understory is heavily infested with invasive shrubs, especially Amur honeysuckle (Lonicera maackii), and multiflora rose (Rosa multiflora).

Eagle Creek

Mature Native Trees with Non-Native Understory

This community occurs where mature native trees were retained when the land was cleared for the golf course, but the shrub, sapling, and mid-canopy layers were removed. In most cases, the understory now contains planted fine fescues with a scattering of recently recruited saplings and invasive shrubs. This community will be easily restorable to native woodlands by treating the non-native fescues and seeding a native woodland seed mix in conjunction with removal of invasive shrubs.

The mature tree composition of the upland version of this community reflects the same mix as the sloping mesic woodlands while the floodplain version contains primarily cottonwood, sycamore, black walnut, and silver maple. As exceptionally large cottonwood is present along the west bank of Eagle Creek near the northern-most cart-path bridge over the creek.

Several large white ash trees are present in these areas that have survived the initial wave of emerald ash borers. It is likely these were treated when the land was still a golf course.

Invasive-Dominated Edges and Fencerows

Some of the property boundaries as noted on the plant community map support this low- quality woody community that is dominated by invasive trees and shrubs such as white mulberry, Osage orange, Amur honeysuckle and autumn olive (Elaeagnus umbellata).

WETLANDS AND PONDS

Both natural and created wetlands exist on the property. A significant flatwoods depression southeast of the maintenance complex is seasonally ponded and may harbor amphibian breeding habitat in the spring. Cottonwood, swamp rose (Rosa palustris), and rice-cut grass (Leersia oryzoides) are characteristic species.

Several groundwater seepage areas occur on the slopes of the ravines within the property. The more open one near the center of the property contains cattails (Typha X glauca), boneset (Eupatorium perfoliatum), and monkeyflower (Mimulus ringens). The seep along the stream in the northwest corner of the property near State Road 32 contains the conservative wetland species bottle gentian (Gentiana andrewsii) and swamp lousewort (Pedicularis lanceolata). This wetland is being heavily impacted by invasive shrubs that should be a high priority for removal.

The other wetlands on the property have either been intentionally or accidentally created by earthwork. A large mitigation wetland is located downslope east of the clubhouse. Planted species including river birch and prairie cordgrass (Spartina pectinata) which are unlikely to occur naturally at this site indicated this as a created and planted wetland.

Other small pockets of wetland exist either from compaction resulting in poor drainage, or through the creation of a swale to convey stormwater from small streams across the relatively flat floodplain.

A shallow excavated pool exists to the east of the high-quality mesic woodlands southeast of the clubhouse. It appears to have been excavated, possibly for fill or gravel many decades ago. It has potential value as amphibian breeding habitat.

Three significant ponds exist on the property. Two have relatively little wetland buffer while the third pond is surrounded by a strip of cattail marsh and large thickets of sandbar willow as indicated on the map. Another tiny pond is found along the south property boundary south of the clubhouse parking lot.

OPEN ANTHROPOGENIC HABITATS

Former Tees, Greens and Fairways

These areas remain largely free of woody invasive species and remain dominated by the cool-season grasses used on the golf course including bluegrass and creeping bentgrass.

Invasive herbaceous species including sweet clover (Melilotus spp), red clover (Trifolium pratense), common teasel (Dipsacus fullonum), Queen Anne's Lace (Daucus carota) and Canada thistle (Cirsium arvense) are rapidly colonizing these areas.

Sand Traps

These relics of the golf era will provide an opportunity to create unusual sand prairie habitat with benefits to both pollinators and birds. Currently, they range from mostly bare to colonized by weedy annuals and biennials. Former greens and tees are also typically underlain by sand.

Former Rough Area

This is the largest open plant community on the property. This rough area was mowed annually when the property was an active golf course but has not been since. As a result, woody plants whose stature had been controlled are now growing rapidly. This include both invasive species such as callery pears (Pyrus calleryana) and autumn olive and native species such as white ash saplings. Woody recruitment varies greatly in these areas from isolated specimens to nearly 100 percent coverage. Invasive herbaceous weed communities are similar to those occurring on the fairways.

OTHER HABITATS

Pollinator Plantings

Two pollinator planting have been installed near the clubhouse. To the west of the clubhouse, a teardrop-shaped area encircled by the drive has been plugged to a wide variety of forbs and native grasses. To the east of the clubhouse, a former putting green has received a mixture of sand prairie species. These first-year plantings are currently on a successful establishment trajectory.

INVASIVE PLANTS

Introduction

Invasive plants are one of the largest threats to protected places, especially those undergoing rapid successional transition including most of this property. The ability of invasive plants to rapidly spread in old-field successional habitats has the potential to derail successful establishment of native plant communities on this preserve if not proactively addressed. Development of a plan to address current invasive plant issues and anticipate and manage future issues is critical to the long-term success of this project. Please refer to Appendix II for maps of invasive species locations and densities.

Trees

Callery Pear (Pyrus calleryana)

This escaped ornamental tree is one of the biggest threats to the open areas of the park and can also recruit more slowly in shaded woodland habitats. The small fruits are consumed by starlings, robins, and other birds that disperse the seeds in their droppings. Its ability to establish in thick cool-season grass sod makes it particularly problematic for this property where it is already common.

Volunteer labor has already removed hundreds of these trees along the entrance drive and elsewhere. The larger trees that have begun to flower and fruit should be removed first. This species should be the highest priority for removal.

White Mulberry (Morus alba)

This tree also has fruit that are readily consumed by birds. Like callery pear, it can establish in dense cool-season sod and thrives along woodland edges. This tree is already common in

White Mulberry

open areas, but in many places is being kept from maturing by excessive deer browse. Large specimens occur along woodland edges, especially in the eastern portion of the property. Removal should be a high priority.

Black Locust (Robinia pseudoacacia)

This tree is native to areas to the southeast, but not locally here in central Indiana. It is colonial by root suckers, giving it the ability to form large spreading colonies. This habit makes it a particular threat to the large open areas on the property. It is a legume that fixes nitrogen in the soil which encourages other invasive plants that thrive in high-nitrogen soils such as garlic mustard to grow in the understory. Several colonies are found on the property. Removal should be a high priority.

Osage Orange (Maclura pomifera)

This tree is native to the southern plains but was planted throughout the Midwest as a living fence. The large lime-green fruit are often dispersed by floodwaters, so it is primarily a threat on the floodplain of Eagle Creek where most of the specimens on the property are found. Removal should be a medium priority.

Northern catalpa (Catalpa speciosa)

This tree is native further south, but not locally here in central Indiana. The seeds are contained in long pods that can be dispersed by floodwaters. From there, it can eventually form dense thickets in openings that prevent locally native floodplain trees such as sycamore, black walnut, silver maple and boxelder from establishing. This tree occurs along the floodplain of Eagle Creek. There is also an abundance of saplings, mostly on adjacent property, north of the golf course maintenance complex. Removal should be a medium priority.

Norway Maple (Acer platanoides)

Two specimens of the European import were planted as shade trees near the cart paths. Reproduction was not observed during the survey, but this tree is highly shade tolerant and can invade mature woodlands, so removal is recommended, although it is a low priority.

Shrubs

Amur honeysuckle (Lonicera maackii)

This ubiquitous invader thrives in well-drained to moist woodland habitats. Its abundant fruit are eaten by birds in the winter after more nutritious fruit have been consumed. It grows rapidly in partial shade and woodland edges and somewhat slower in dense shade. Its ability to recruit in shade makes it one of the biggest threats to the reestablishment of a native understory under existing trees in the preserve as well as reforestation efforts. It is currently common to locally abundant on the property. Removal should be a high priority.

Autumn Olive (Elaeagnus umbellata)

Like the previous species, this shrub was introduced for wildlife in an era of poorly conceived habitat programs. Autumn olive prefers partial to full sun but will also grow in filtered shade. It readily recruits into the old-field habitats that make up much of the property. The seeds of this highly invasive species are primarily dispersed by birds. This shrub is a major threat to all but densely shaded and wetland habitats on the property. Removal should be a high priority.

Multiflora Rose (Rosa multiflora)

Another shrub introduced for wildlife, this thorny pest is a threat to nearly all habitats on the property including sunny, shady, and wetland habitats. It can form dense thickets that are best treated via foliar herbicide application due to the difficulty of getting to the base to cut them. It is common on the property. It should be noted that two native rose species, Illinois rose (Rosa setigera) and swamp rose (Rosa palustris) also occur on the property. They both have pink flowers in contrast to the white flowers of multiflora rose. Treatment of multiflora rose should be a high priority.

Burning bush (Euonymus alatus)

This common ornamental shrub is becoming an increasingly problematic invasive species. It is capable of invading high-quality woodlands with little history of disturbance. It currently occurs in scattered locations in the woodlands near Eagle Creek. Removal should be a high priority.

Privet (Ligustrum vulgare and Ligustrum obtusifolium)

These shrubs tend to invade damp woods and wetlands. They currently occur in the flatwoods near the entrance and in woodlands near Eagle Creek. Like most invasive shrubs, their fruit is dispersed by birds. Removal should be a medium priority.

European Cranberrybush Viburnum (Viburnum opulus)

Another ornamental shrub that naturalizes in woodlands and wetlands, it is currently found in a small colony in the southeastern portion of the property. Removal should be a low priority.

Japanese Barberry (Berberis thunbergii)

This prickly escapee from the ornamental nursery trade invades mesic woods. Only a couple of specimens were seen on the property. Removal should be a low priority.

Vines and Groundcovers

Oriental Bittersweet (Celastrus orbiculatus)

This high climbing vine is currently uncommon on the property with only one large climbing specimen and few small sprawling ones found. It has the potential to climb into the canopy of the trees and damage the branches due to added weight, particularly in the case of an ice storm. It is very problematic in young woodland areas, preventing normal canopy formation. Treatment should be a high priority.

Wintercreeper (Euonymus fortunei)

A common groundcover now banned for sale in Indiana, it spreads along the ground and climbs trees where it can form massive vines that fruit profusely. It is currently in a patch along Eagle Creek near US 421 and along the small stream near the north boundary near State Road 32. Treatment should be a medium priority.

Myrtle (Vinca minor)

This evergreen groundcover spreads by rooting runners to form clonal patches but is not known to spread by seed. It occurs in one location near US 421 and Eagle Creek. Treatment should be a low priority.

Japanese Hops (Humulus japonicus)

This annual vine is spread by floodwaters and sprawls over other riparian vegetation forming a dense mat. It is not shade tolerant and is best controlled by reforesting floodplains to reduce its vigor through shading. It is found along Eagle Creek in the southeastern portion of the property. Treatment should be a low priority.

Herbaceous Plants

Canada Thistle (Cirsium arvense)

This rhizomatous perennial is abundant in old rough areas as well and former in-play areas along the fairways. Due to its ubiquitous nature, it was not mapped. This plant represents a serious threat to grassland habitats on the property including both the existing cool season grassy habitats and any proposed prairie plantings. It spreads readily by both seeds and creeping rhizomes. It can be effectively controlled utilizing selective herbicides. Treatment should be a high priority.

Maiden grass (Miscanthus sinensis)

This ornamental warm-season grass was planted as part of the golf course landscaping near the entrance and the clubhouse and a few other scattered locations. This long-lived perennial spreads by seeds. The seedlings take several years to mature into large clumps, so there are likely numerous starts that are not yet obvious. This plant is a threat to open grassland habitats on the property. Treatment should be a high priority.

Sweet Clover (Melilotus spp)

Yellow and white sweet clover are biennials that grow to 5 feet or more in height the second year when they flower. They are particularly pernicious in prairie plantings because their seeds are stimulated to germinate by prescribed fire. They are widespread in former fairways and rough and were not mapped due to their widespread presence. They are readily controlled with selective herbicides. Treatment should be a high priority in areas designated for prairie planting.

Common Teasel (Dipsacus fullonum)

This biennial is a threat to sunny plant communities where it can form dense stands of plants that grow to 6 feet or greater in height. It is a threat to any open plant community including prairie plantings. Only the dense stands were mapped. Scattered specimens occur elsewhere. It can be controlled with selective herbicides. Treatment should be a medium priority. The more aggressive cutleaf teasel (Dipsacus laciniatus) was not observed on the property but should be promptly treated if it is found in the future.

Reed Canary Grass (Phalaris arundinacea)

This sprawling perennial cool-season grass is a threat to wetlands on the property. It grows rapidly in the spring to smother native wetland plants. Its abundant rhizomes make it relatively difficult to control, typically requiring several herbicide treatments. Treatment should be a medium priority.

Parsnip (Pastinaca sativa)

A biennial of sunny open areas, parsnip grows to 6 feet when it flowers in its second year. It occurs in scattered location across the property, but only a large dense stand on the floodplain of Eagle Creek was mapped. It is a threat to sunny communities including prairie plantings. It should not be handled or pulled as exposure to the sap followed by exposure to sunlight causes a severe blistering rash (photophytodermatitis). Treatment should be a medium priority.

Poison Hemlock (Conium maculatum)

This toxic tall biennial is fatal to ingest. It grows in sunny to partially shaded areas, preferring areas with disturbed soil profiles. It occurs in scattered locations along Eagle Creek and near the former golf course maintenance complex. A large population is found growing on old spoil piles south of the woodlands adjacent to the clubhouse. Control should be a medium priority.

Fountain Grass (Pennisetum alopecuroides)

This is a perennial warm-season grass that was planted as an ornamental grass on the golf course. It is readily recognized in the summer and fall by its foxtail-like inflorescence. It is common along the road near the entrance and the near the clubhouse with a few scattered occurrences elsewhere. It is a threat to sunny communities including prairie plantings. Treatment should be a medium priority.

Ravenna Grass (Saccharum ravennae)

This large showy ornamental warm-season grass is potentially invasive in prairie plantings. Its large stature of 10 feet or more makes it highly conspicuous. A single clump was found near the northern edge of the large open field northwest of the clubhouse. Treatment should be a medium priority.

Crownvetch (Securigera varia)

This sprawling perennial legume tends to smother native vegetation in sunny areas with its vigorous growth in spring to early summer. A few scattered patches are present in the eastern portion of the property. It is primarily a threat to prairie plantings. Treatment should be a low priority.

Japanese hops

Common teasel

Hybrid Cattails (Typha X glauca)

This common rhizomatous perennial is a hybrid of the native broadleaf cattail (Typha latifolia) and the introduced narrowleaf cattail (Typha angustifolia). It is abundant around the central pond and is scattered elsewhere in wet habitats. While treatment is recommended in the mitigated wetland habitat east of the clubhouse, it should not be prioritized around the border of the pond where it stabilizes the shoreline and provides emergent wetland habitat.

Common Mullein (Verbascum thapsus)

This fuzzy biennial occurs in scattered locations across the property but only two unusually dense stands on former greens where mapped where it appears to thrive in the sandy soil mix. It is not likely to form dense stands outside this environment but may occur in any sunny well-drained habitat. Treatment should be a low priority.

Red clover (Trifolium pratense)

This short-lived perennial is common in sunny open areas formerly devoted to rough or fairways on the golf course. It was not mapped due to its widespread presence. While it is not a long-term problem in most native plant communities, it is very deleterious to prairie establishment where its rapid growth in early spring tends to smother prairie seedlings. It generally remains very problematic for 3-5 years in a prairie planting, preventing proper establishment of the desired seeded species. Treatment with a selective herbicide should be a high priority in areas designated for prairie plantings and a low priority elsewhere.

Garlic Mustard (Alliaria petiolata)

This biennial invades disturbed woodland habitats where it can form thick stands that vary greatly in location and density from year to year. It is commonly pulled for control, however the soil disturbance resulting from pulling often worsens the infestation by stimulating the seed bank in established stands. The rosettes may be treated with herbicide in the fall or early spring. It occurs in disturbed woodlands on the property but was not mapped due to the transient nature of its occurrence. Treatment should be a low priority.

Orange Daylilies (Hemerocallis fulva)

A single patch of this clonal perennial was found in an area of scattered trees northwest of Eagle Creek in the east central portion of the property. It spreads slowly from the rootstalks. Treatment should be a low priority.

WATER RESOURCES

Eagle Creek Watershed

Eagle Creek is a large perennial stream that flows through the eastern section of the property. The portion of the watershed upstream from the park encompasses approximately 25 square miles. Most of the upper watershed is in row crop agriculture. This land use has major impacts on the runoff flowing into Eagle Creek. The soil compaction associated from both farm equipment and raindrop compaction on bare soil results in higher volumes and more rapid runoff from these agricultural areas. This runoff also carries high nutrient loads from fertilizers and high sediment loads. This degradation has profound effects on the water quality of the stream and on many aquatic organisms including fish and macroinvertebrates. This is a watershed-scale problem that requires watershed scale solutions such as no-till agriculture, more targeted fertilizer applications, cover crops, and conservation plantings adjacent to streams and agricultural ditches. Working with federal and state conservation agencies to address these issues should be a priority for stakeholders along the entire length of Eagle Creek.

Eagle Creek Habitats

Eagle Creek adds greatly to the diversity of property by providing habitat for waterfowl, wading birds, fish, and macroinvertebrates.

Birds

Common species of waterfowl such as mallards and Canada geese undoubtedly frequent the pools in this section of the creek and likely nest here on occasion in the vegetation on the banks. The other species of waterfowl likely to be encountered here during the breeding season are wood ducks which nest

Great Blue Heron

in tree cavities or constructed nest boxes. The flowing water of the creek is likely to stay open in all but the coldest weather, providing winter habitat for non-migratory waterfowl.

Two species of fish-eating wading birds are likely to frequent this section in the spring, summer and fall. The great blue heron and the much smaller green heron feed on fish, frogs, and aquatic macroinvertebrates found in the shallow water.

Spotted sandpiper and killdeer are the shorebirds most likely to be seen on the sandbars and shorelines of the creek. The densely wooded southern sections of the creek and the adjacent smaller stream in the woodland south of the

clubhouse may harbor Louisiana waterthrush, a warbler that forages for aquatic invertebrates along the water's edge.

Fish

Eagle Creek undoubtedly harbors a great diversity of fish common in streams of this magnitude. Gamefish that likely inhabit the creek including smallmouth bass, rock bass, and bluegill. Longear sunfish and green sunfish may also occasionally be caught by anglers in the pools of the creek. Creek Chub are likely to be abundant and occasionally caught on small tackle. Yellow bullhead and black bullhead are the catfish species likely to occupy streams of this size. Suckers such as northern hogsucker, white sucker, spotted sucker, and black and golden redhorse likely feed along the stream bottom.

Small fish including various shiners, minnows, and darters are also likely inhabitants of this section of Eagle Creek. Shiners and minnows likely to occur in this section include striped shiner, sand shiner, spotfin shiner, and bluntnose minnow. Darters likely to inhabit the creek include rainbow darter, Johnny darter, blackside darter, and logperch.

Aquatic Macroinvertebrates

Macroinvertebrates are a crucial part of the aquatic food chain in streams, providing food for predatory invertebrates, fish, and shorebirds. They are also strong indicators of water quality as certain groups are highly intolerant of pollution while others such as mosquito larva are very tolerant of poor water quality. Groups that may inhabit Eagle Creek that are relatively intolerant of pollution include mayfly, dobsonfly and caddisfly larva. Moderately intolerant groups include dragonfly and damselfly larva and crayfish.

Groups such as black fly and midge larva are quite tolerant of poor water quality.

Freshwater mussels are one of our most endangered groups of organisms. Communities of freshwater mussels in streams that flow through urban and agricultural areas of central Indiana have generally been severely degraded in both diversity and numbers since European settlement. Pollution as well as collection of the shells for the button industry decimated numbers until they were strictly protected several decades ago. As filter feeders, mussels play an important role in water quality, but this trait also makes them extremely vulnerable to pollution and excessive sediment. A preliminary mussel survey should occur prior to any stream work on Eagle Creek.

Small Streams

A few perennial and several ephemeral to intermittent streams traverse the property generally flowing from northwest to southeast. Along the north property line a small perennial stream flows through the northwest corner before flowing under State Road 32 to the north. The other significant perennial stream exits the northern pond and flows southeast through a ravine. The lower stretches of the stream in the high-quality woods south of the clubhouse are also considered perennial. Several smaller streams also drain central portions of the property.

A full summary of the physical condition of the streams and streambanks on the property can be found in the Carpenter Nature Preserve Preliminary Stream Credit Assessment report.

Ponds

Three ponds exist on the property. The northernmost pond has the largest watershed including agricultural fields to the northwest of the property. Consequently, it has the highest nutrient loading and biggest issues with eutrophication. At the time of the field survey the pond was ninety percent covered with duckweed. Personal communication with owners indicated that pond suffered a fish kill last year. Fish kills typically result when decomposition of excess dead vegetation lowers the dissolved oxygen content below the minimum required to support fish.

Because warm water holds less dissolved oxygen than cold water, fish kills most often occur in summer when water temperature and vegetation loads reach their peak. Addressing the excess nutrient issues in the watershed of this pond will require the cooperation of adjacent landowners.

The central pond is relatively hidden during the growing season by dense stands of sandbar willow and other native and invasive woody plants surrounding the perimeter. Inside this collar of woody plants is a ring of cattails in the shallow water. This pond has a very small watershed, resulting in less nutrient loading and eutrophication than the northern pond. The dense cover around this pond provides good habitat for birds such as common yellowthroat, yellow warbler, brown thrasher, and indigo bunting.

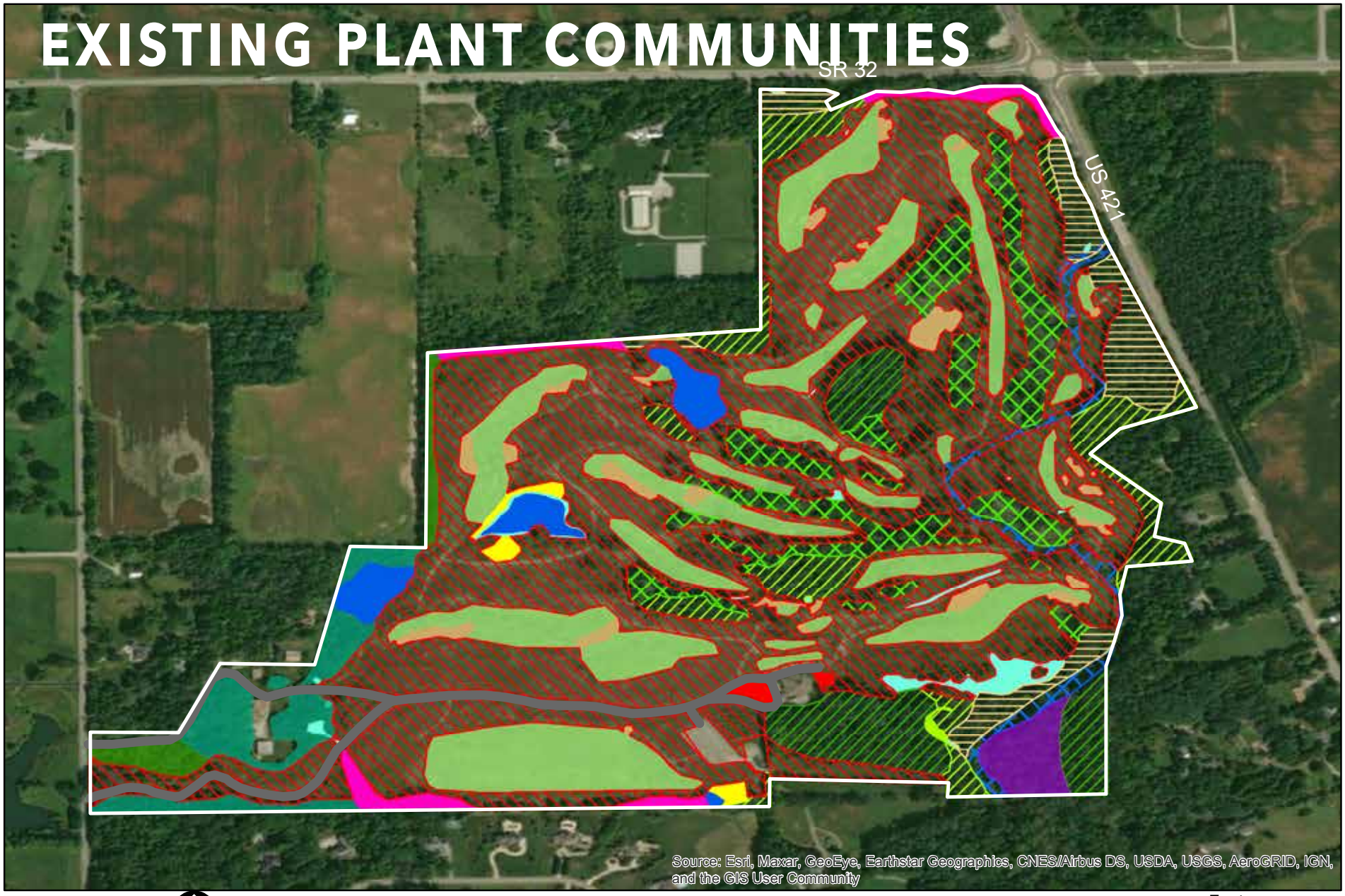
The third shallow pond is along the west property boundary. It is also surrounded by dense woody growth including a high percentage of invasive shrubs. It also has a small watershed but lacks that emergent cattail growth of the central pond.

These ponds are likely to harbor the common gamefish of ponds including bluegill and largemouth bass. The open water provides a stopover for a variety of migrant waterfowl as well as resident Canada geese and mallards. A bald eagle was spotted high overhead during the field survey for this report. They likely visit Eagle Creek and these ponds for fish on a regular basis as their population continues to increase in Indiana.

Bald Eagle

Bluegill

EXISTING PLANT COMMUNITIES



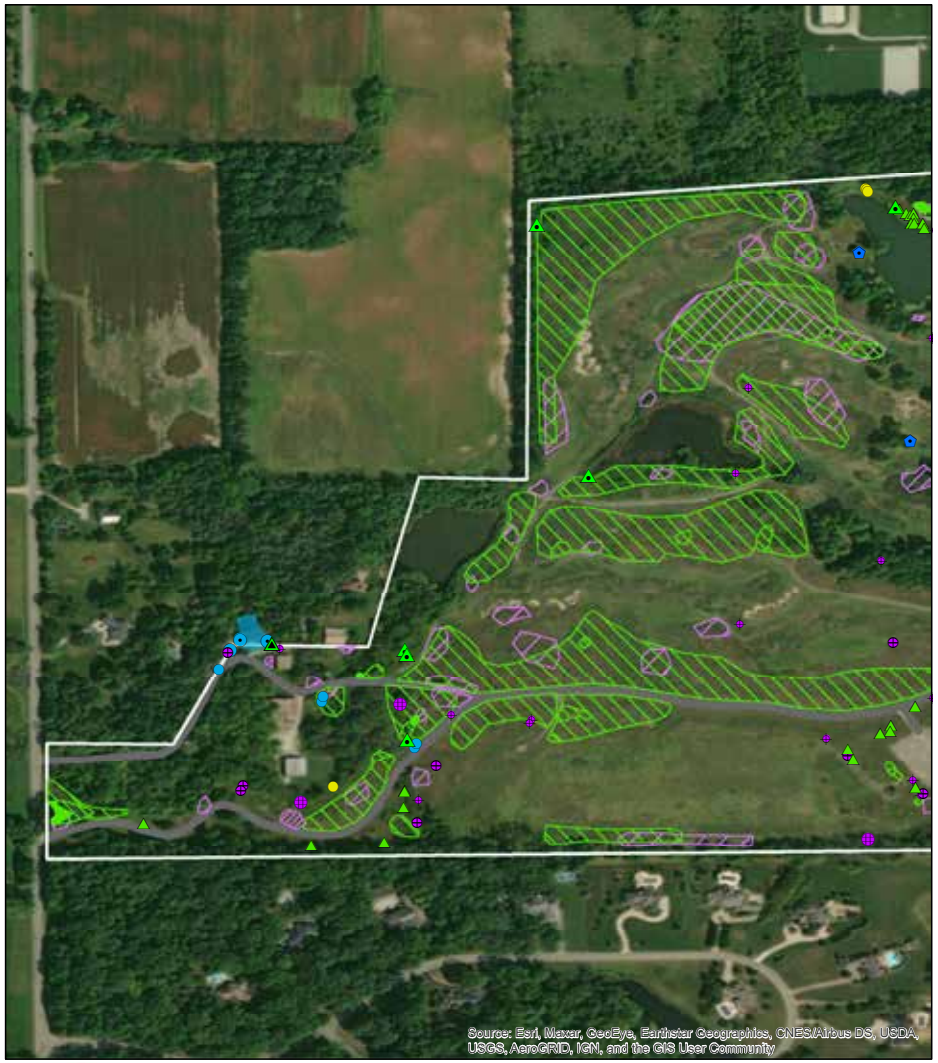
0 1,250 2,500 5,000 Feet

1 in = 667 feet

- Existing Roads
- High Quality Floodplain Woodlands
- Old Field Habitat in Former Out of Play Areas
- Sand Trap Areas
- Pollinator Plantings
- Invasive Dominated Edges and Fencerows
- Mature Native Trees with Lawn Grasses
- Willow Thickets
- Shallow Excavated Pool
- Low Quality Floodplain Woodlands
- Medium Quality Sloping Mesic Woodland
- Eagle Creek
- Ponds
- Low Quality Flatwoods
- Medium Quality Flatwoods
- Former Fairways - Little Woody Recruitment
- High Quality Mesic Sloping Woodlands
- Probable Wetlands based on Vegetation

Eco Logic
8685 W. Vernal Pk.
Bloomington, IN 47404
(812) - 876 - 7711

INVASIVE TREES WEST



Eco Logic

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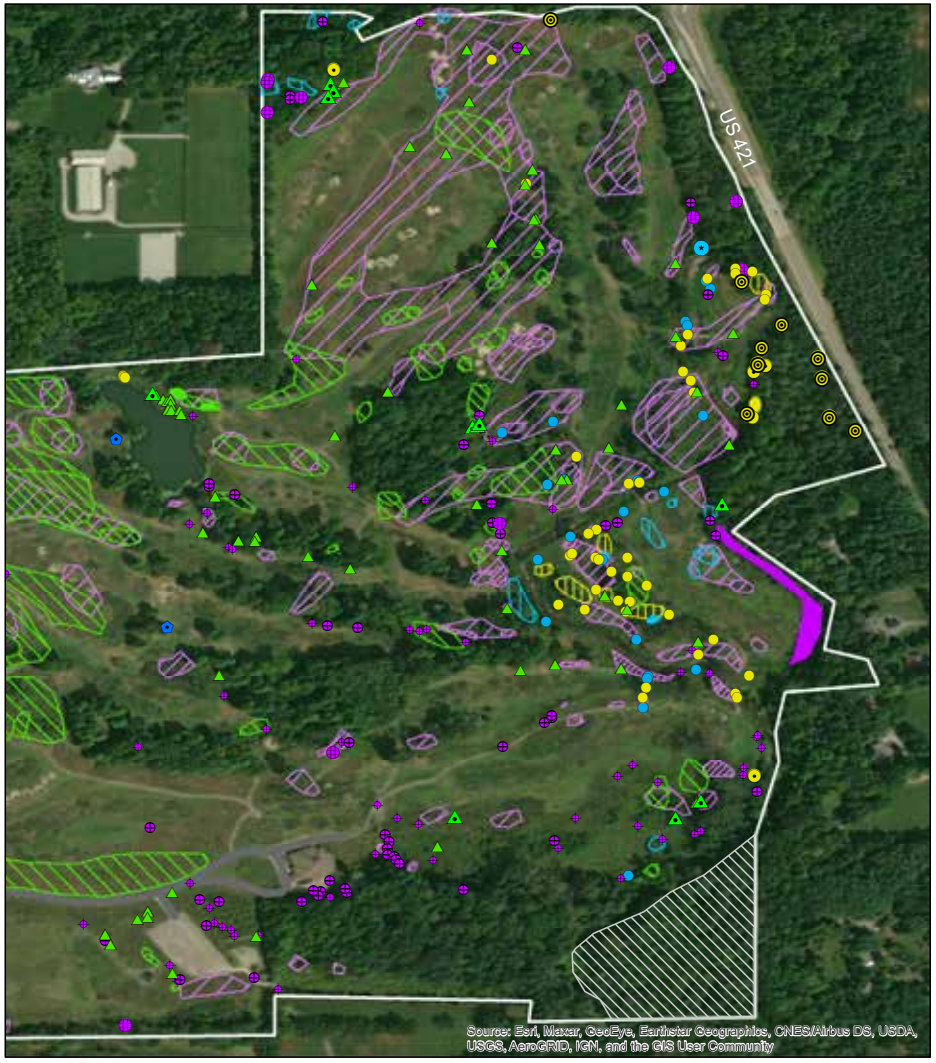
0 500 1,000 2,000 Feet

1 in = 417 feet

- 1-5% Small White Mulberry
- 5-20% Small White Mulberry
- 20-50% Small White Mulberry
- 60-80% Catalpa Saplings
- 1-5% Callery Pear
- 5-20% Callery Pear Saplings
- 20-50% Callery Pear Saplings
- Small Callery Pear
- Medium Callery Pear
- Large Callery Pear
- Small White Mulberry
- Medium White Mulberry
- Large White Mulberry
- Small Catalpa
- Medium Catalpa
- Large Norway Maple

INVASIVE TREES EAST



Eco Logic

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0 500 1,000 2,000 Feet

1 in = 417 feet

- Not Surveyed due to high water.
- 1-5% Small White Mulberry
- 5-20% Small White Mulberry
- 20-50% Small White Mulberry
- 50-70% Large White Mulberry
- 5-20% Small Osage Orange
- 60% Medium Osage Orange
- 1-5% Callery Pear
- 5-20% Callery Pear Saplings
- 20-50% Callery Pear Saplings
- 5-20% Black Locust Saplings
- 50-80% Black Locust Saplings
- Small Callery Pear
- Medium Callery Pear
- Large Callery Pear
- Small Osage Orange
- Medium Osage Orange
- Large Osage Orange
- Small White Mulberry
- Medium White Mulberry
- Large White Mulberry
- Small Catalpa
- Medium Catalpa
- Large Catalpa
- Large Norway Maple

AMUR HONEYSUCKLE WEST & EAST

Eco Logic

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Bloomington, IN 47404
(812) - 876 - 7711

0 500 1,000 2,000 Feet

1 in = 417 feet

- 1-5% Amur Honeysuckle
- 5-20% Amur Honeysuckle
- 20-50% Amur Honeysuckle
- 50-80% Amur Honeysuckle
- 80-100% Amur Honeysuckle
- Amur Honeysuckle

Eco Logic

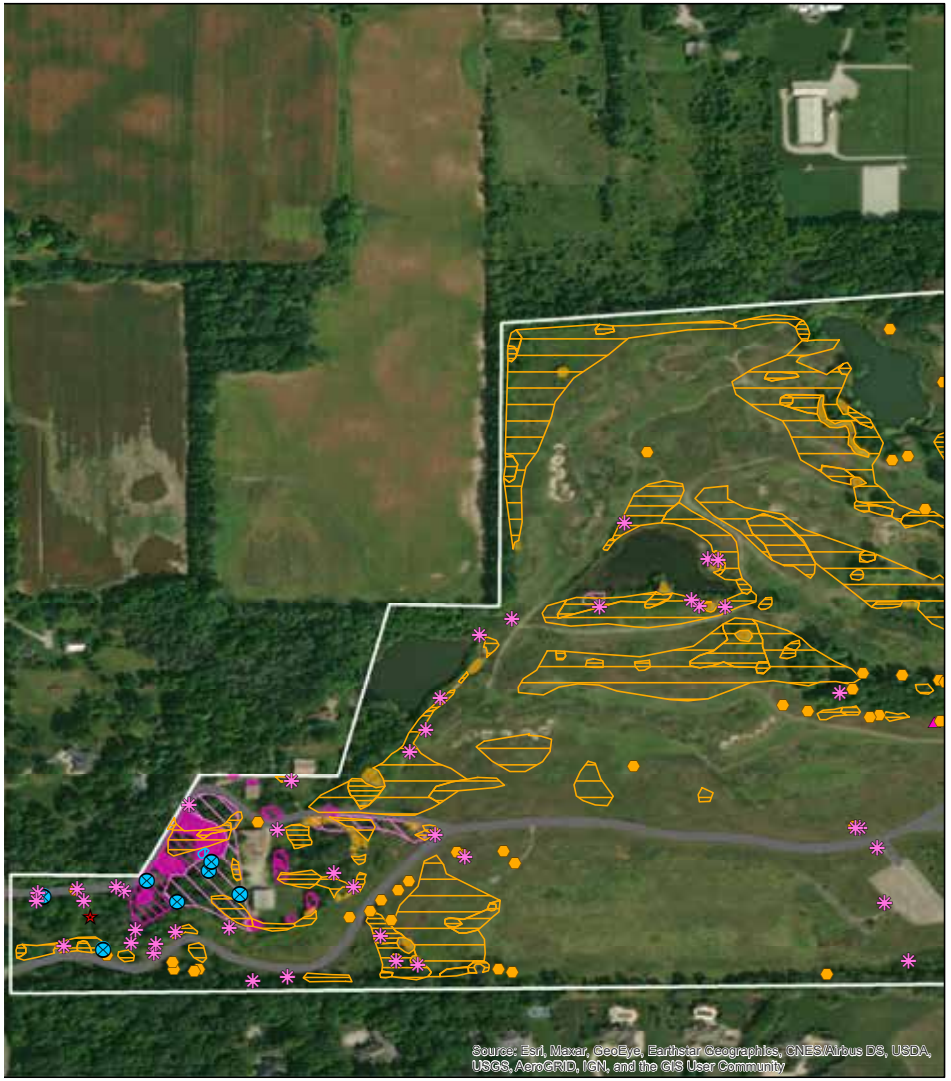
8685 W. Vernal Pk.
Bloomington, IN 47404
(812) - 876 - 7711

0 500 1,000 2,000 Feet

1 in = 417 feet

- Not Surveyed due to high water.
- 1-5% Amur Honeysuckle
- 5-20% Amur Honeysuckle
- 20-50% Amur Honeysuckle
- 50-80% Amur Honeysuckle
- 80-100% Amur Honeysuckle
- Amur Honeysuckle

INVASIVE SHRUBS WEST



Eco Logic

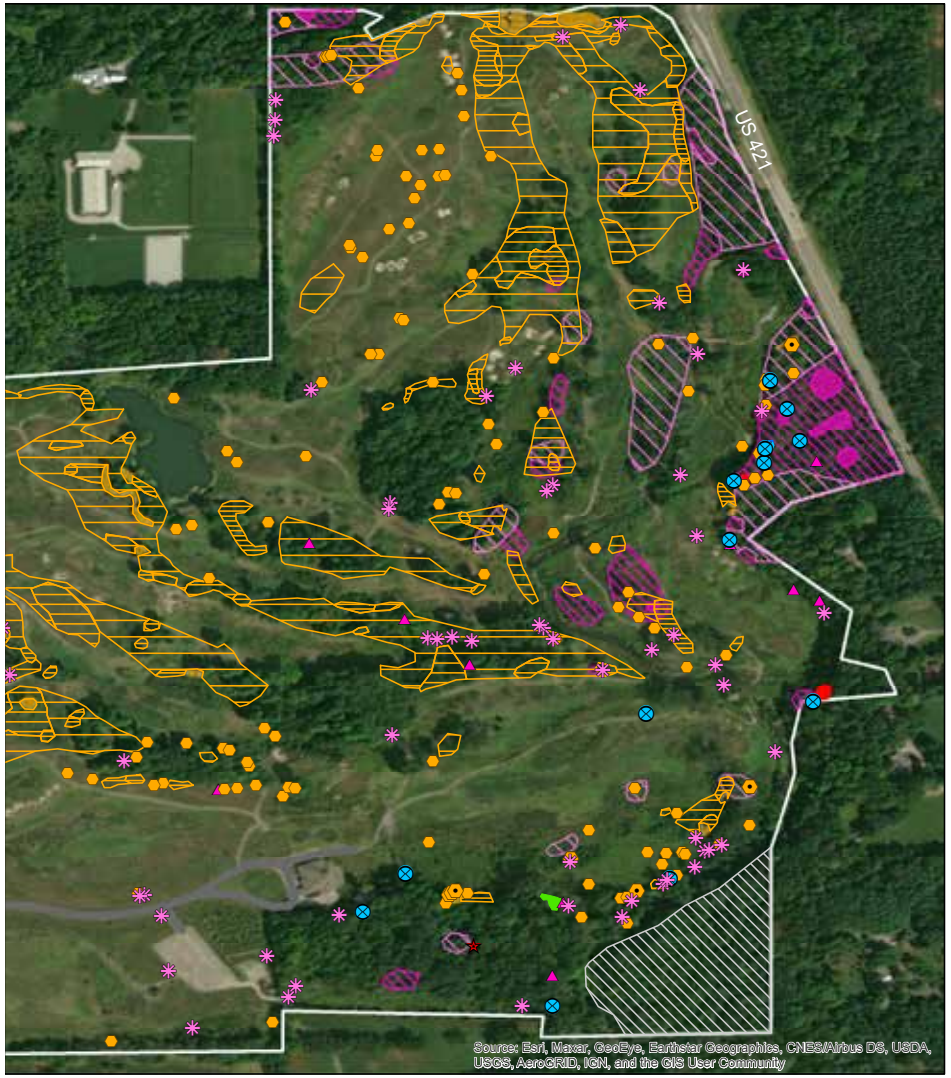
8685 W. Vernal Pk.
Bloomington, IN 47404
(812) - 876 - 7711

0 500 1,000 2,000 Feet

1 in = 417 feet

- 1-5% Multiflora Rose
- 5-20% Multiflora Rose
- 20-50% Multiflora Rose
- 1-5% Autumn Olive
- 5-20% Autumn Olive
- 20-50% Autumn Olive
- 50-80% Autumn Olive
- 80-100% Autumn Olive
- 10-50% Privet
- Privet
- Multiflora Rose
- Autumn Olive
- Large Autumn Olive
- Japanese Barberry

INVASIVE SHRUBS EAST



Eco Logic

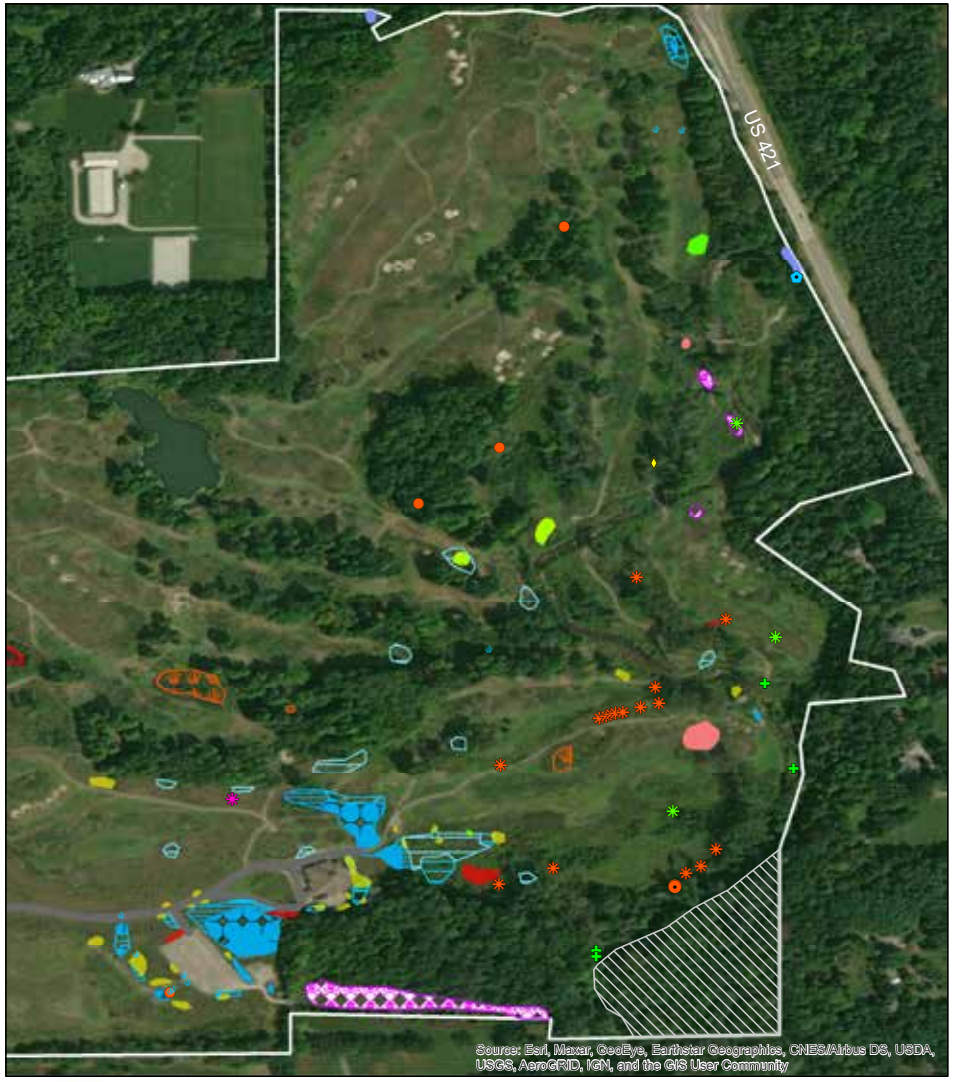
8685 W. Vernal Pk.
Bloomington, IN 47404
(812) - 876 - 7711

0 500 1,000 2,000 Feet

1 in = 417 feet

- Not Surveyed due to high water.
- 5-10% Burning Bush
- 1-5% Multiflora Rose
- 5-20% Multiflora Rose
- 20-50% Multiflora Rose
- 1-5% Autumn Olive
- 5-20% Autumn Olive
- 20-50% Autumn Olive
- 50-80% Autumn Olive
- 80-100% Autumn Olive
- 20-50% European Cranberrybush Viburnum
- 10-50% Privet
- 50-70% Privet
- Privet
- Multiflora Rose
- Autumn Olive
- Large Autumn Olive
- Burning Bush
- Japanese Barberry

INVASIVE VINES 7 PLANTS WEST & EAST



Eco Logic

8685 W. Vernal Pk.
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(812) - 876 - 7711

0 500 1,000 2,000 Feet

1 in = 417 feet

- Widespread Poison Hemlock
- Widespread Phragmites
- Widespread Hybrid Cattails
- 1-5% Maiden Grass
- 5-20% Maiden Grass
- 20-50% Maiden Grass
- 50-80% Maiden Grass
- 80-100% Maiden Grass
- Widespread Fountain Grass
- Plume Grass
- Reed Canary Grass in Wetlands or Swales
- Maiden Grass

Eco Logic

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Bloomington, IN 47404
(812) - 876 - 7711

0 500 1,000 2,000 Feet

1 in = 417 feet

- Not Surveyed due to high water.
- Widespread Poison Hemlock
- Widespread Wintercreeper
- Widespread Phragmites
- 1-5% Maiden Grass
- 5-20% Maiden Grass
- 20-50% Maiden Grass
- 50-80% Maiden Grass
- 80-100% Maiden Grass
- Dense Mullein
- Dense Parsnip
- Widespread Fountain Grass
- Dense Teasel
- Widespread Hybrid Cattails
- Vinca Minor
- Plume Grass
- Reed Canary Grass in Wetlands or Swales
- Maiden Grass
- Japanese Hops
- Daylilies
- Crownvetch
- Climbing Oriental Bittersweet
- Sprawling Oriental Bittersweet

NOTABLE NATIVES WEST

Eco Logic

8685 W. Vernal Pk.
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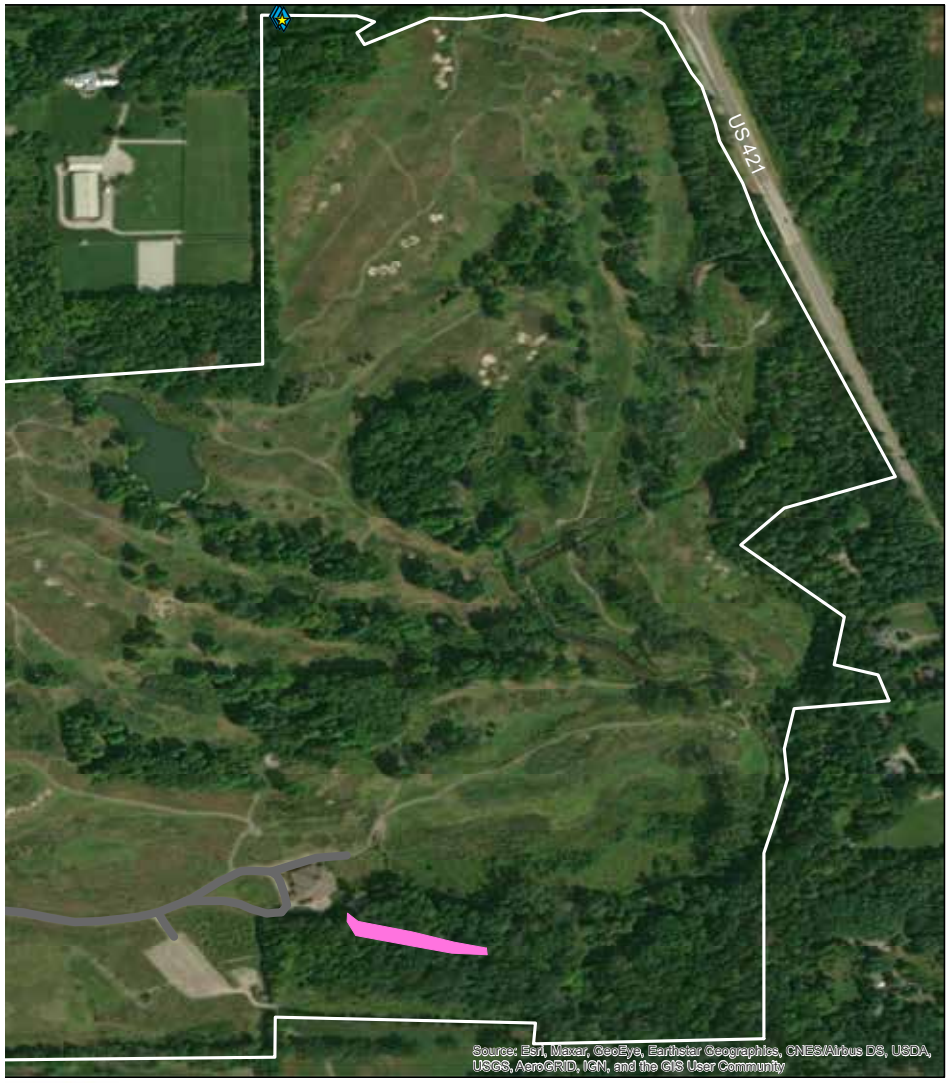
(812) - 876 - 7711

0 500 1,000 2,000 Feet

1 in = 417 feet

- Massive White Oak
- Ladies' Tresses Orchid

NOTABLE NATIVES EAST



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0 500 1,000 2,000 Feet

1 in = 417 feet

- Hepatica in Ravine
- Swamp Lousewort
- Bottle Gentian

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PROPOSED RESTORED PLANT COMMUNITIES

The Carpenter property provides an opportunity to create a great diversity of habitats thanks to its size and varied topography. Defragmenting the existing remnant woodlands through reforestation and creating large blocks of grassland habitat in open areas will be key to providing the habitat needs of declining area-dependent species. Additional habitat creation including shrublands, wetlands, and bioretention areas as described below will greatly improve the value of the property for the widest possible variety of organisms. This can be done while still providing excellent experiences for the public by concentrating high use activities to limited areas but allowing low impact uses such fitness walking and interpretive trails to extend widely to sample all the available habitats.

Prairie Establishment for Grassland Bird Habitat

These areas would receive a mixture of low stature prairie grasses focusing on little bluestem, side-oats grama, prairie dropseed, and Virginia wild rye along with forbs with high pollinator value. The forb diversity may need to be limited initially to allow for continued control of invasive legumes and composites that would threaten to smother the developing prairie.

The habitat created by this prairie seeding would target a wide variety of grassland birds including Henslow's sparrow, savanna sparrow, dickcissel, eastern meadowlark, bobolink, sedge wren, and northern bobwhite.

Shrubs Planting for Shrubland Bird Habitat

A variety of birds depend on dense shrubby areas for breeding habitat. To establish these areas, invasive woody plants would first be treated and removed. Native shrubs including silky and roughleaf dogwood, blackhaw viburnum, American hazelnut, downy hawthorn, common ninebark, American plum, smooth sumac, and Illinois rose would be planted in these areas. Existing sandbar willow thickets would be preserved. A simple native cool season grass mix including pollinator species would be planted between the shrubs.

The habitat created by this planting would target declining shrubland birds including yellow-breasted chat, prairie warbler, blue-winged warbler, yellow warbler, common yellowthroat, indigo bunting, white-eyed vireo, brown thrasher, woodcock, and eastern towhee.

Floodplain Reforestation Areas

Many of these areas have scattered existing cottonwood, sycamore, black walnut, and silver maple. These existing trees would be augmented with bur oak, shumard oak, shellbark hickory, hackberry, and native shrubs such as spicebush, blackhaw viburnum, hazelnut, elderberry, paw paw, and buttonbush. An herbaceous forested floodplain seed mix would complete the restoration. Tree plantings immediately adjacent to the banks of Eagle Creek should emphasize additional sycamores and silver maples to take advantage of their superior ability to stabilize creek banks.

This restoration would have obvious benefits for water quality and riparian habitat including mitigating summer stream temperatures by improved shading of the water. Birds that thrive in riparian forests such as yellow-throated warbler, northern parula, prothonotary warbler, Baltimore oriole, and summer tanager are also expected to benefit from this restoration.

Mesic Sloping Woodland Restoration

This area includes both areas that are fully open and areas with scattered mature trees, but no native understory. In area lacking mature trees, species such as white oak, northern red oak, bur oak, chinquapin oak, shagbark hickory, bitternut hickory, tulip tree, black cherry and blue ash may be established. The entire area would receive understory plantings including eastern redbud, flowering dogwood, Allegheny serviceberry, hophornbeam, American hornbeam, spicebush, blackhaw viburnum, and hazelnut. An herbaceous upland woodland seed mix would complete the restoration. This woodland area would also be contiguous with the floodplain reforestation area, created a large, forested block covering much of the northeastern and east-central portions of the property.

This restoration will consolidate may of the fragmented areas of upland woods into a single large block that will have the potential to support breeding neotropical migrants such as wood thrush, scarlet tanager, Kentucky warbler, ovenbird, hooded warbler, yellow throated vireo, and red-eyed vireo. Common resident woodland birds such as a variety of woodpeckers, Carolina chickadees, tufted titmice, and white-breasted nuthatch will also thrive in this expanded habitat.

Flatwoods Establishment

Open areas along the first portion of the entrance drive as well as fencerow margins in the south and west borders would receive tree plantings to defragment and expand the ecological value of existing flatwoods in the western portion of the property. Trees such as bur oak, swamp white oak, pin oak, shumard oak, white oak, shellbark hickory, shagbark hickory, black walnut, tulip tree, and black cherry would be planted to consolidate this block of woodland. Understory species such as American hornbeam, redbud, spicebush, buttonbush, and blackhaw viburnum will be added along with an herbaceous understory seed mix.

Consolidation of this block of flatwoods will increase the likelihood of its use by many of the same neotropical migrant species mentioned in the mesic sloping woodland restoration section above.

Proposed Bioretention Area

A flat area adjacent to the existing golf course parking lot could be utilized as a bioretention area for stormwater from the clubhouse, the parking lot, and the circle drive. By capturing and infiltrating much of this stormwater, it will reduce the storm water traveling through the ravine in the adjacent high quality mesic woodland, thereby preventing erosion, downcutting, and degradation of the stream in this important natural area. This bioretention area would be planted with native wet-tolerant species including many with high pollinator value such as swamp milkweed (Asclepias incarnata), spotted joe- pye weed (Eutrochium maculatum), boneset (Eupatorium perfoliatum), mountain mint (Pycnanthemum virginianum), Riddell's goldenrod (Oligoneuron riddellii), and New England aster (Symphyotrichum novae-angliae).

The existing pollinator plantings west and east of the clubhouse combined with the proximity of this proposed bioretention planting could create a substantial pollinator resource for native pollinators including varied groups like bumblebees, mason bees, small and large carpenter bees, mining bees, wasps, butterflies, and syrphid files.

Wetland Mitigation Expansion Area

This area is adjacent to an existing wetland restoration area. Expanding this wetland through the Indiana In-Lieu Fee Mitigation Program would expand valuable wetland habitat in this area. A variety of wetland organisms including amphibians such as northern leopard frog and birds such as marsh wren could benefit from this restoration.

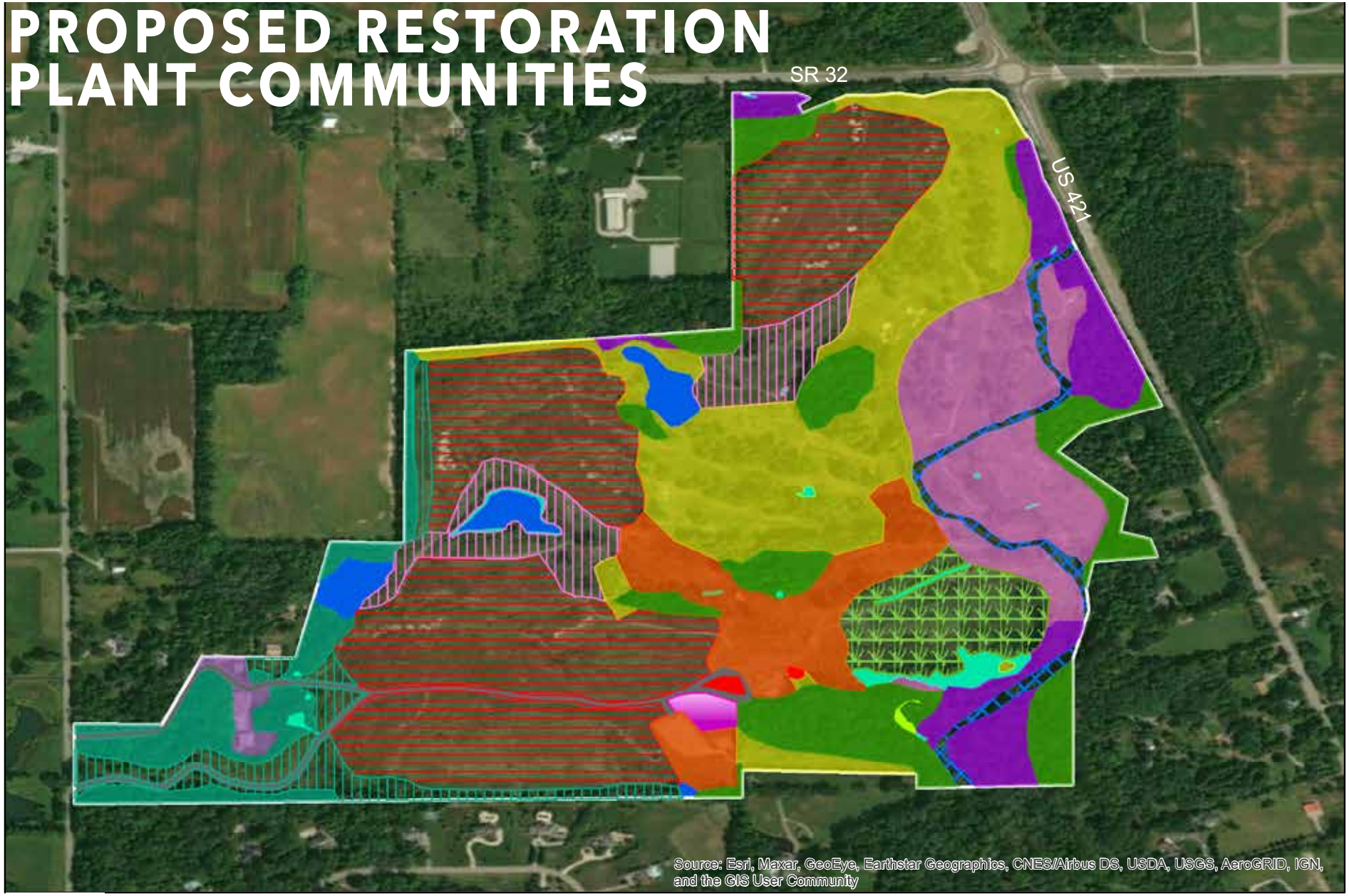
Concentrated Public Usage Area

Balancing the needs of a public park with the critical habitat functions desired on this property will require thoughtful planning. This public usage area extends through areas already altered by the golf course. It would feature scenic views of Eagle Creek from the bluff on the east end where an observation platform could be constructed that would provide a viewshed that would include vistas down both angles of the creek from above its bend and a platform for birders to train their scopes on both the creek below and into crowns of the tall cottonwoods on the floodplain.

Other features that could be included in this area include frisbee golf, picnic areas, natural playgrounds, a fitness trail, additional pollinator plantings, and an interpretive nature trail that could extend more widely through the park. To maximize the effectiveness of the habitats in the park, leash restrictions on pets will need to be strictly enforced by park rangers.

Monarch on New England Aster

PROPOSED RESTORATION PLANT COMMUNITIES



Eco Logic

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0 1,250 2,500 5,000 Feet

1 in = 667 feet

Existing Communities to be Stewarded

- Existing Flatwoods
- Existing Sloping Mesic Woodlands
- Existing Floodplain Woodland
- Probable Wetlands based on Vegetation
- Ponds
- Eagle Creek
- Shallow Excavated Pool
- Pollinator Plantings
- Park Maintenance Area

Proposed Communities

- Prairie Establishment for Grassland Bird Habitat
- Shrub Planting for Shrubland Bird Habitat
- Mesic Sloping Woodland Restoration
- Flatwoods Establishment
- Floodplain Reforestation and Understory Establishment
- Wetland Mitigation Expansion Area
- Proposed Bioretention Area
- Concentrated Public Usage Areas

CHAPTER 4 | Master Plan Concept

Concept Development

INTRODUCTION

The vision for the proposed Carpenter Nature Preserve is to inspire, attract, and preserve. The concept plans were developed to meet this vision and create a park which can honor the unique qualities of the property. Three separate concepts were developed for the site but all three had some elements in common. The following include some guiding principals that were utilized during the development of each concept.

ACTIVE TO PASSIVE

Although the highest priority for the site is to provide a nature preserve, there is still the desire to share this habitat with the public. However, early on in the process it was recognized that active uses for the site should be kept closer to C.R. 900 East with the site elements transitioning to less active the closer visitors get to Eagle Creek. The concept plans were developed with the most intrusive uses kept on higher elevations of the site and the areas nearest Eagle Creek to have uses with little impact to the natural environment.

NATURE AND HABITAT AS PRIORITY

As a designated nature preserve, each of the concepts was developed utilizing the proposed plant communities map that was developed during the ecological assessment. This was a guiding plan for where site features were located and where existing plant communities could be enhanced to provide additional habitat or new plant communities created for new habitat. New plant communities were looked at for their regional impact for habitat in addition to a more localized impact on the site. The Eagle Creek corridor is becoming more and more important as a habitat corridor as developments continue to encroach into surrounding areas. The new plant communities that are proposed include several that are becoming harder to find in this region of the state.

MINIMIZING DEVELOPMENT FOOTPRINT

The concept designs were laid out with a focus of minimal impacts to the site including using the existing entrance drive and cart path locations. Two of the three concepts that were developed have utilized the footprint of the existing clubhouse. Former parking areas were also utilized in the concept plans. Additional measures to lessen the impact of development should continue to be the focus during construction efforts including limiting the area of disturbance, utilizing recycled materials where possible, and developing facilities which are more energy efficient and sustainable.

RESPONSIBLE PUBLIC ACCESS

The Carpenter Nature Preserve has been planned to develop the needed balance between creating a natural area for the public to enjoy and still preserving undisturbed areas, the reasons for the need to limit human areas for habitat and wildlife. Many programmed uses were included in the master plan design for the nature preserve with a mixture of active and passive uses. Areas of the site will be preserved for wildlife habitat with limited public access. To create the balance between creating areas for people to explore and observe and the need to preserve wildlife habitat, the site has been designed to transition from more active uses near the entrance and surrounding the future nature center to quieter, more passive uses closer to the Eagle Creek corridor. Educational activities will include programming to teach the public about native habitats in central Indiana and the environments that wildlife need to survive and flourish including the need to limit human impacts in certain areas or during different times of the year.

CONCEPT PLAN A

While Concept Plan A was developed around the proposed plant communities map that was developed as a part of the ecological assessment, this plan was also focused on creating opportunities for nature, education, and art across the site. Concept A was developed to enhance and further develop the natural areas of the property.

BUILDING SITE

The proposed Nature Center was located in roughly the same footprint as the existing clubhouse. This would allow the building to utilize the main entrance road and parking lot footprints and would take advantage of the views over the Eagle Creek floodplain and the different habitats present in the valley. This would allow year-round education opportunities through the use of the club house to protect visitors from the elements with views over a large portion of the site.

The Nature Center connects with the entire site through a combination of paved pathways, natural trails, and boardwalks.

SITE ELEMENTS

Main elements of this concept plan include a dog park, new nature center, outdoor classrooms, tree canopy walk, wetlands with boardwalks, observation towers, wildlife viewing blinds, and rustic camping for groups like boy scouts.

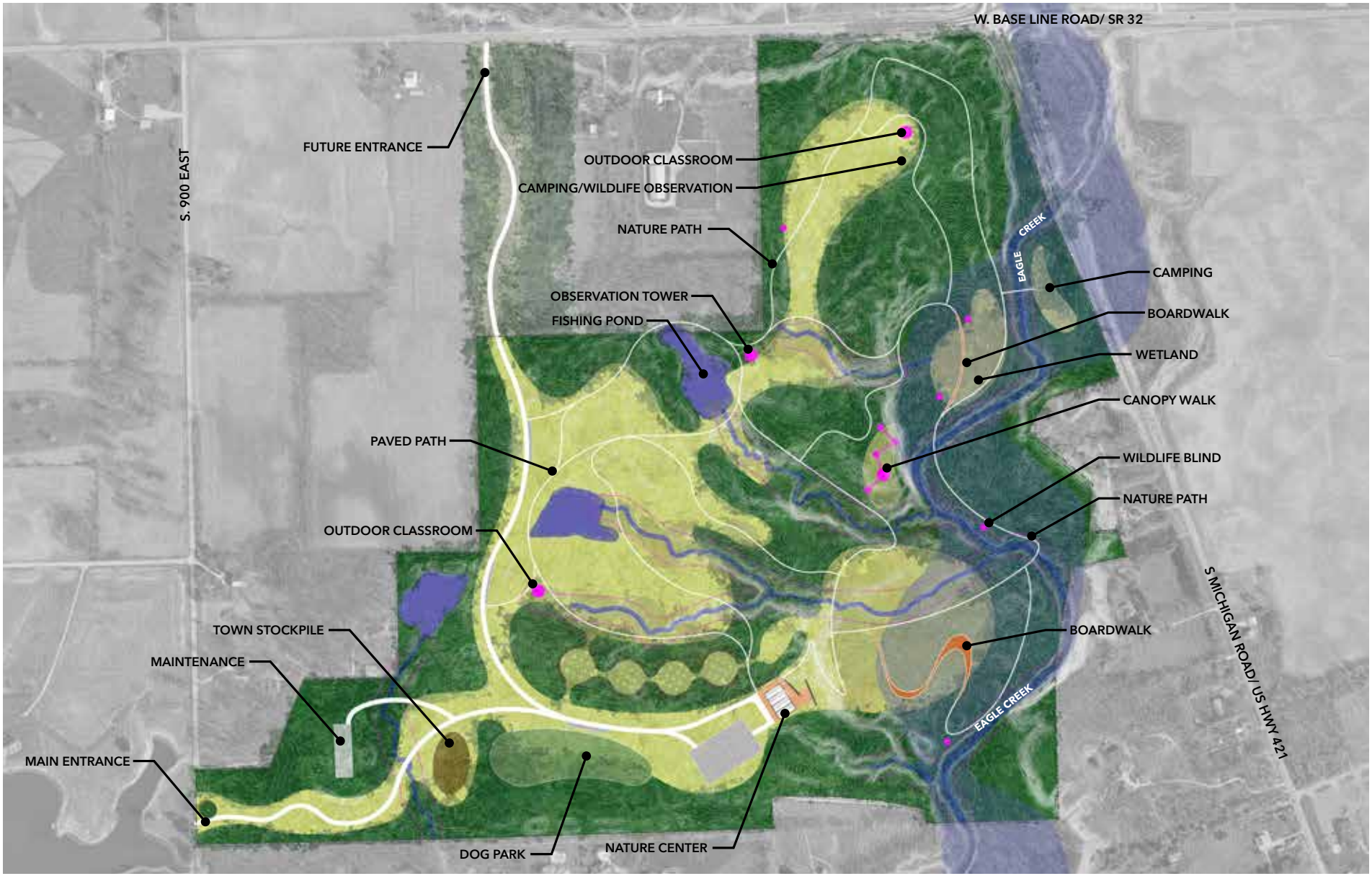
This concept utilized the existing barns near C.R. 900 East as a new maintenance hub for the Parks and Recreation Department. The majority of the new trails would follow the alignment of the former cart paths to minimize impacts on the site.

Other improvements for the site include developing plant habitat zones as proposed by the ecologic assessment including shrubland habitat, woodland restoration, floodplain woodlands, prairie grasslands, mesic woodlands, wetlands, and bank stabilization for Eagle Creek.

Unique features included in Concept Plan A include a tree alley with interpretive signage, public art appropriate for the natural setting, a location for the Town's leaf stockpile, and utilization of one of the ponds as a fishing pond. Observation towers, along with wildlife viewing blinds, are sprinkled throughout the site to provide unique views of the natural setting for visitors.

A second entrance through a property to the north of the site was proposed in this concept plan. This area is shaded in a lighter color to indicate that this is a long range concept and additional study and coordination would be needed for this entrance to be viable.

CONCEPT PLAN A



CONCEPT PLAN B

The focus of Concept Plan B was developed to meet one of the goals developed during the planning process for the Carpenter Nature Preserve. This goal was to provide a use that would attract users to the site who might not initially be attracted to the site to explore nature and the outdoors. This goal was meet with the proposal for a restaurant and commercial use near the entrance of C.R. 900 East. As with the other concept plans, this concept plan would be developed in phases.

BUILDING SITE

Concept B includes two main building sites, one for the new Nature Center and one for White Oak Commons which would house the aforementioned restaurant and outfitter type retail establishments.

Zionsville Nature Center - The new nature center would be located in roughly the same location as the existing clubhouse. This location takes advantage of the expansive views into the site from a higher vantage point. This makes the location attractive for educational programming but also as a host to small events like a small wedding or gathering. This location would also capitalize on the existing entrance drive, although parking for this concept is proposed in a different configuration than the former golf course parking lot.

White Oak Commons - White Oak Commons, which is named after the great oak tree near the entrance, is envisioned as being a small development that could support the nature preserve while remaining respectful and contextual to the more passive natural environment. Precedent images on the following pages provide the vision for the architecture and character of this area. The restaurant and event venue would not only attract visitors to the site but could also generate revenue to support continued improvement of the nature preserve. The suggested retail shops would be outfitter-type establishments focused on users of the nature preserve. These could include rental of fishing equipment or snow skiing gear or bait and tackle type retail. Although White Oak Commons is envisioned as a long-range phase for the site, if the opportunity presents itself with an appropriate partner this development might occur in a much shorter time frame.

SITE ELEMENTS

Main elements of this concept plan include a tree canopy walk, tree houses, enhanced wetlands, outdoor classrooms, wildlife viewing blinds, public art, paved and natural paths, shelters and rustic camping.

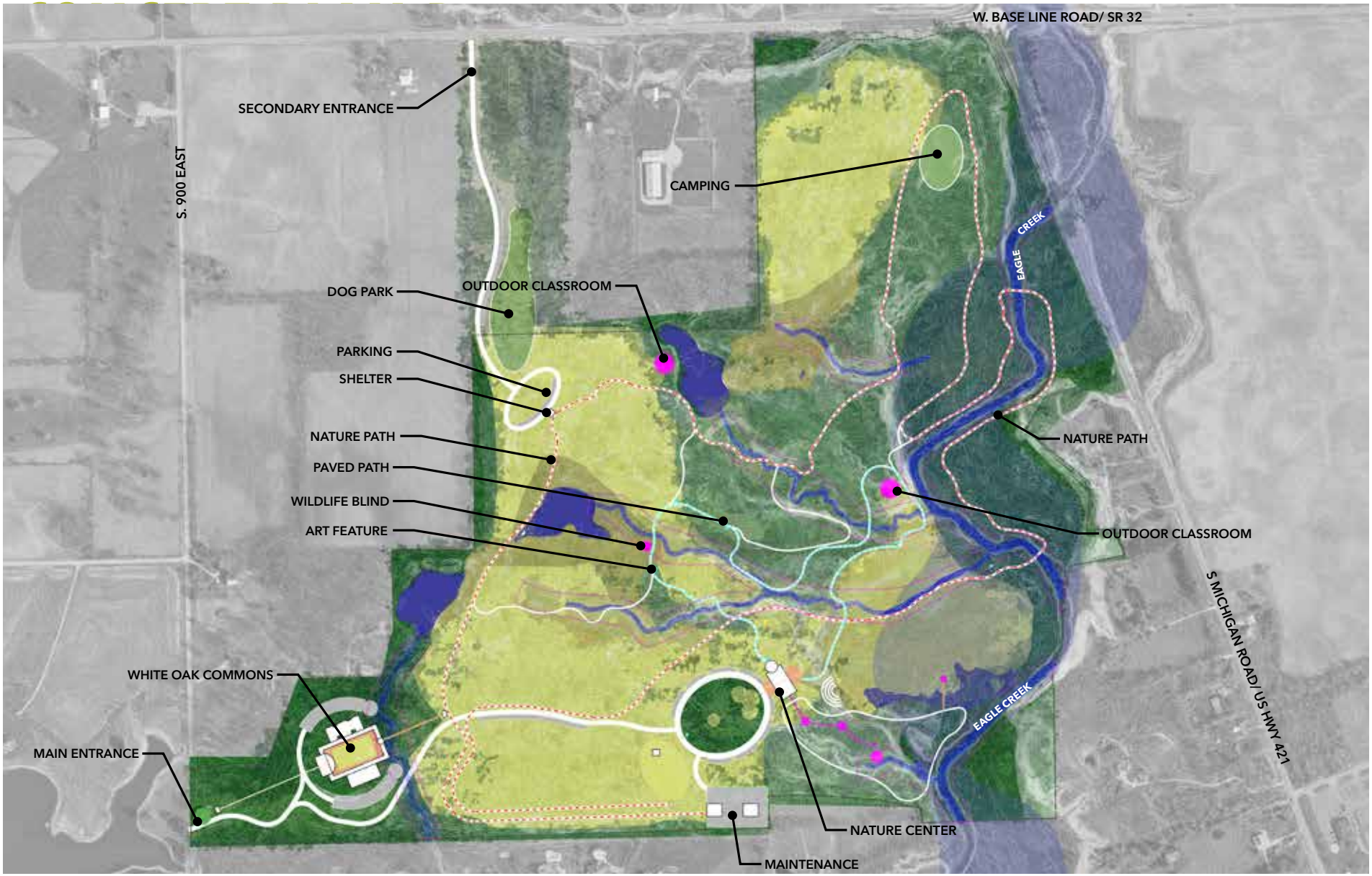
Concept Plan B proposes a new location for the new Parks & Recreation Department maintenance hub closer to the new nature center. The property where the existing barns are located would be needed for the future White Oak Commons. The existing barns could be utilized until the time of development at which time the new maintenance facilities could be built.

Other improvements for the site include plant habitats as proposed by the ecologic assessment including shrubland habitat, woodland restoration, floodplain woodlands, prairie grasslands, mesic woodlands, wetlands, and bank stabilization for Eagle Creek.

Unique features included in Concept Plan B include White Oak Commons, a 5K length running/walking course, and an accessible paved path that would connect outdoor classrooms, play areas, and wildlife viewing areas to the nature center.

A second entrance through a property to the north of the site was proposed in this concept plan similar to Concept Plan A.

CONCEPT PLAN B



CONCEPT PLAN C

Development of Concept Plan C centered around educational programming for the site. Suggested programming associated with this concept include nature camps, interpretive signage, and art spread across the site.

BUILDING SITE

Concept Plan C utilized one of the existing ponds on the site as a feature that would be incorporated into the design of the new nature center. This location would create opportunities that are different from the previous proposed nature center locations. Different areas of the site would be more accessible from the nature center. This location also creates an opportunity for a large, nature inspired, inclusive playground near the nature center.

This concept plan took a unique look at the existing bunkhouse choosing to utilize the existing building and incorporate rustic camping in the same area. The existing building could provide restroom facilities for the rustic camping.

SITE ELEMENTS

Main elements of this concept plan include paved and natural trails, tree houses, two overlooks at the top of the hill, wildlife viewing blinds near Eagle Creek, a formal tree allee entrance to the nature center, outdoor classrooms, shelters, and fishing piers on the ponds.

This concept utilized the existing barns near C.R. 900 East as a new maintenance hub for the Parks and Recreation Department. The majority of the new trails would follow the alignment of the former cart paths to minimize the impact on the site.

Other improvements for the site include plant habitats as proposed by the ecologic assessment including shrubland habitat, woodland restoration, floodplain woodlands, prairie grasslands, mesic woodlands, wetlands, and bank stabilization for Eagle Creek.

Unique features included in Concept Plan C include a tree entrance allee which could be used for pictures and small events. Tree houses, which could also serve as outlook towers, are sprinkled along the top of the hillside to take advantage of the great views over Eagle Creek. Another unique feature included in Concept Plan C is a spiral overlook which would include a large berm with spiral walkway to provide views over the grasslands and be a key spot for birders.

A second entrance through a property to the north of the site was proposed in this concept plan which would be even more advantageous with the nature center located closer to this entrance. Two large parking areas were illustrated on this concept plan to provide ample parking for visitors to the site, nature center, and camping.

CONCEPT PLAN C

NATURE CENTER PROGRAMMING

The design team studied two program options to construct a purpose-built new facility for the Nature Center, at approximately 5,000 s.f. building and 12,000 s.f. building respectively. The smaller option of the two buildings would include multi-purpose space for up to 49 people and 1,000 s.f. of dedicated exhibit space. The larger option would include multi-purpose space for 149 people and 3,200 s.f. of dedicated exhibit space. A larger building would also provide more space for classrooms, offices, and catering capacity.

A primary opportunity for constructing a new Nature Center facility is that the building could be designed and located to align with the overall park mission and could be positioned to promote visibility as a regional tourism destination. A new building may be designed to Net-Zero energy standards and to a 50-100 year projected life-span. A new building may also be designed to support phased-growth and be adaptable into the future.

With these opportunities in mind, a new building may be a higher initial cost than renovating the existing structures. New septic or sewer connections would be needed to accommodate it, and the design of a fire suppression system will present a challenge.

RECOMMENDATIONS

The design team conducted a life cycle cost analysis of the three options described above to accommodate a Nature Center program on the site. These options include renovating the existing facilities, constructing a new 5,000 s.f. facility, and constructing a new 12,000 s.f. facility.

Of the three options studied, a new facility at 12,000 s.f. presents the highest up-front cost and a new 5,000 s.f. facility the lowest up-front cost. The projected costs of renovating the existing buildings fall between the two new-build options. Annual and cumulative energy (operational) costs were applied to the three options, and those are significantly higher in the renovation option than the new construction options. A new facility would be designed to exceed current energy codes and to a net-zero standard, reducing the overall long-term operating costs.

Even with a significant investment in remediation, stabilization, and renovation, the existing structures are still nearing the end of their usable life-cycle, are sub-optimal for the proposed program and use, and would require full replacement in 15-20 years. Coupled with the aspirational mission of the Nature Preserve Master Plan to inspire, attract, and preserve, it is the design team's recommendation to forgo renovation of the existing facilities. At a minimum, a phased approach with an initial build of 5,000 s.f. is advised. However, in taking into consideration the projected growth of Zionsville and anticipated increased demand and engagement, a new construction of 12,000 s.f. may be a better long-term vision for the project. It is the design team's recommendation to further study the opportunities and costs associated with a new 12,000 s.f. facility for a Nature Center at Carpenter Nature Preserve.

NATURE CENTER PROGRAMMING

		(Renovation) Option 1				(New Build) Option 1				(New Build) Option2			
	Name	Qty	SF	Total SF	Description	Qty	SF	Total SF	Description	Qty	SF	Total SF	Description
				8,930	(includes 15% AOF)			**11,689**	(includes 15% AOF)			**5,066**	(includes 15% AOF)
Building	Program Element			7,765				10,164				4,405	
Nature Center	Multi-purpose space	1	735	735	49 ppl, subdivides into 2 areas	1	1950	1,950	130 ppl, subdivides into 3 areas	1	735	735	49 ppl, subdivides into 2 areas
(9,250 main, 4,000 basement exst)	Catering Kitchen	1	250	250		1	250	250		1	120	120	kitchenette
main level appropriate for public program	Classrooms	2	450	900		2	450	900		1	450	450	
basement appropriate for mech and storage	Workstations (6x8)	0	48	0		8	48	384		4	48	192	
	Offices (10x12)	0	120	0		4	120	480		2	120	240	
	Conference (16 x 20)	0	320	0		1	320	320		0	320	0	
	Public Restrooms (12x24)	2	288	576		2	288	576		2	288	576	
	Staff RR (8x9)	2	72	144		2	72	144		1	72	72	
	Exhibit Space	1	3200	3,200		1	3200	3,200		1	1000	1,000	
	Storage	1	600	600		1	600	600		1	400	400	
	Café	1	500	500		1	500	500		0	500	0	
	Mechanical	1	250	250		1	250	250		1	200	200	
	Water/Cistern	1	250	250		1	250	250		1	120	120	
	Elec	1	120	120		1	120	120		1	100	100	
	Data/IT	1	120	120		1	120	120		1	80	80	
	Reception/Info/Greeting	1	120	120		1	120	120		1	120	120	
				3,962	(includes 20% AOF)			**550**	(includes 0% AOF)			**550**	(includes 0% AOF)
				3,302				550				550	
Bunkhouse	Residences	3	550	1650		1	550	550	Trailer/ Cabin	1	550	550	Trailer/ Cabin
(4,000 sf exst)	Residential Lounge/ Kitchentte	1	150	150		0	0	0		0	0	0	
appropriate for offices and residential	Workstations (6x8)	6	48	288		0	0	0		0	0	0	
	Offices (10x12)	5	120	600		0	0	0		0	0	0	
	Conference (16 x 20)	1	320	320		0	0	0		0	0	0	
	Staff RR (8x9)	2	72	144		0	0	0		0	0	0	
	Storage	1	150	150		0	0	0		0	0	0	

NATURE CENTER PROGRAMMING

REHABILITATION
14,200 SF

High-Level Design Assumptions:

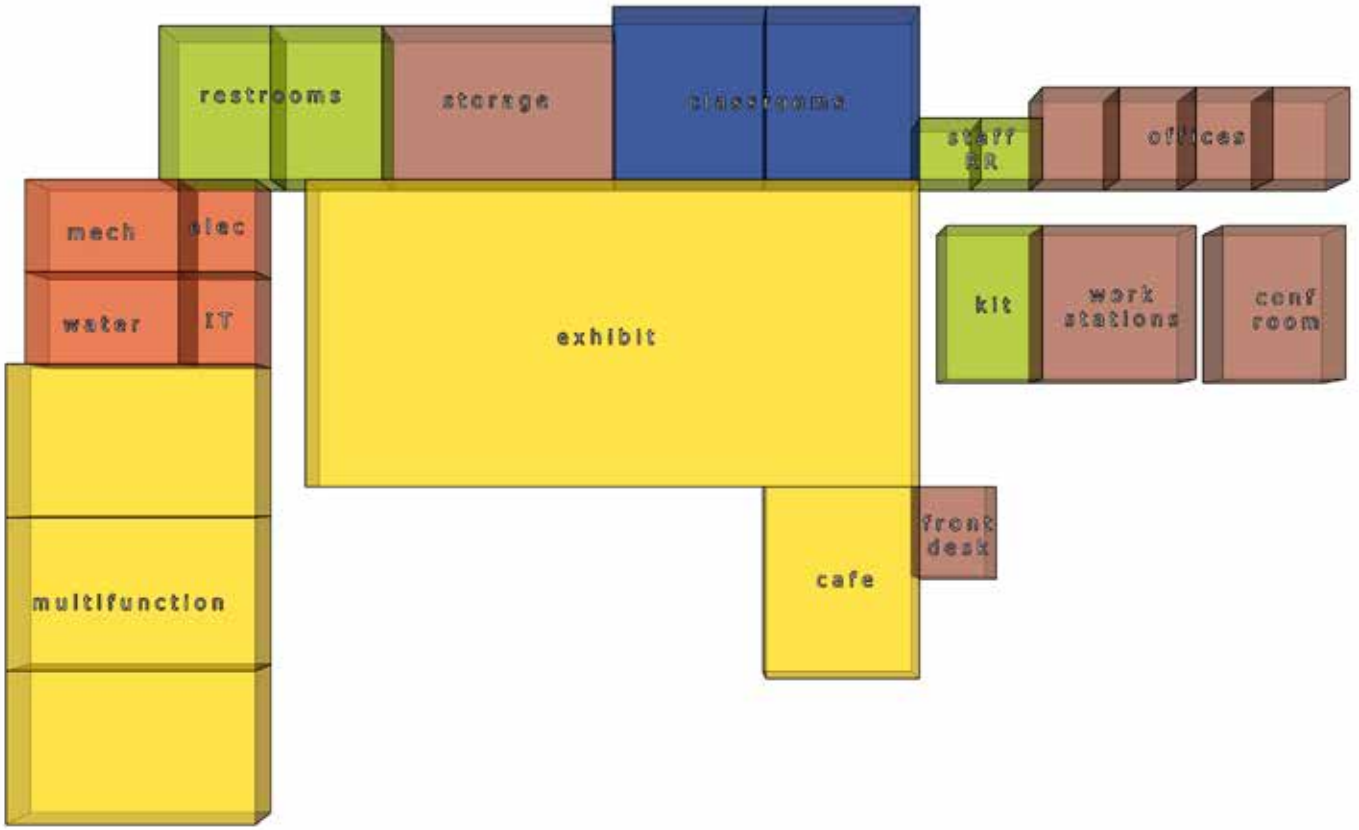
- Execute all recommended structural and moisture mitigation.
- Install new fire suppression system.

NATURE CENTER PROGRAMMING

NEW BUILD OPTION 2A
11,689 SF

High-Level Design Assumptions:

- General E/W orientation to maximize N/S exposures for daylight control
- 5% grossing factor applied for circulation, shown in white space
- Large schemes show cafe and kitchen, while small schemes include a kitchenette
- Large scheme multipurpose space for 135; Small scheme multipurpose space for 49

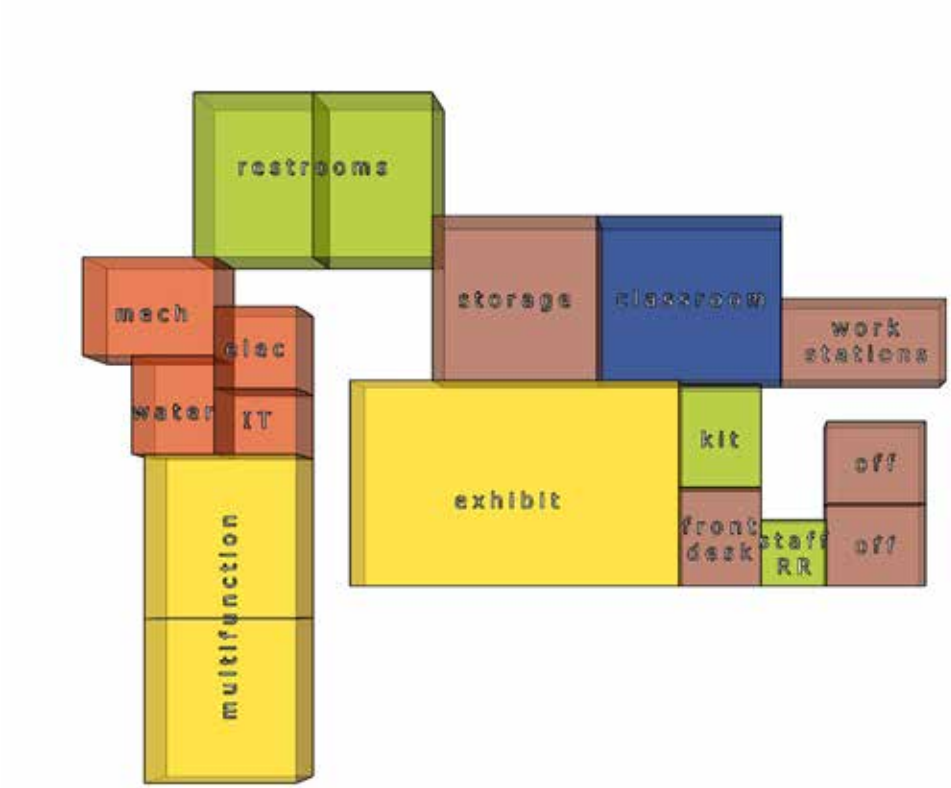


NATURE CENTER PROGRAMMING

NEW BUILD OPTION 2B
5,066 SF

High-Level Design Assumptions:

- General E/W orientation to maximize N/S exposures for daylight control
- 5% grossing factor applied for circulation, shown in white space
- Large schemes show cafe and kitchen, while small schemes include a kitchenette
- Large scheme multipurpose space for 135; Small scheme multipurpose space for 49



SUSTAINABILITY STRATEGIES

UTILIZE BOTH PASSIVE AND ACTIVE STRATEGIES: PASSIVE STRATEGIES REDUCE ENERGY NEEDS AND EMBODIED CARBON, AND ACTIVE STRATEGIES MEET ENERGY NEED ON SITE AND RENEWABLY.

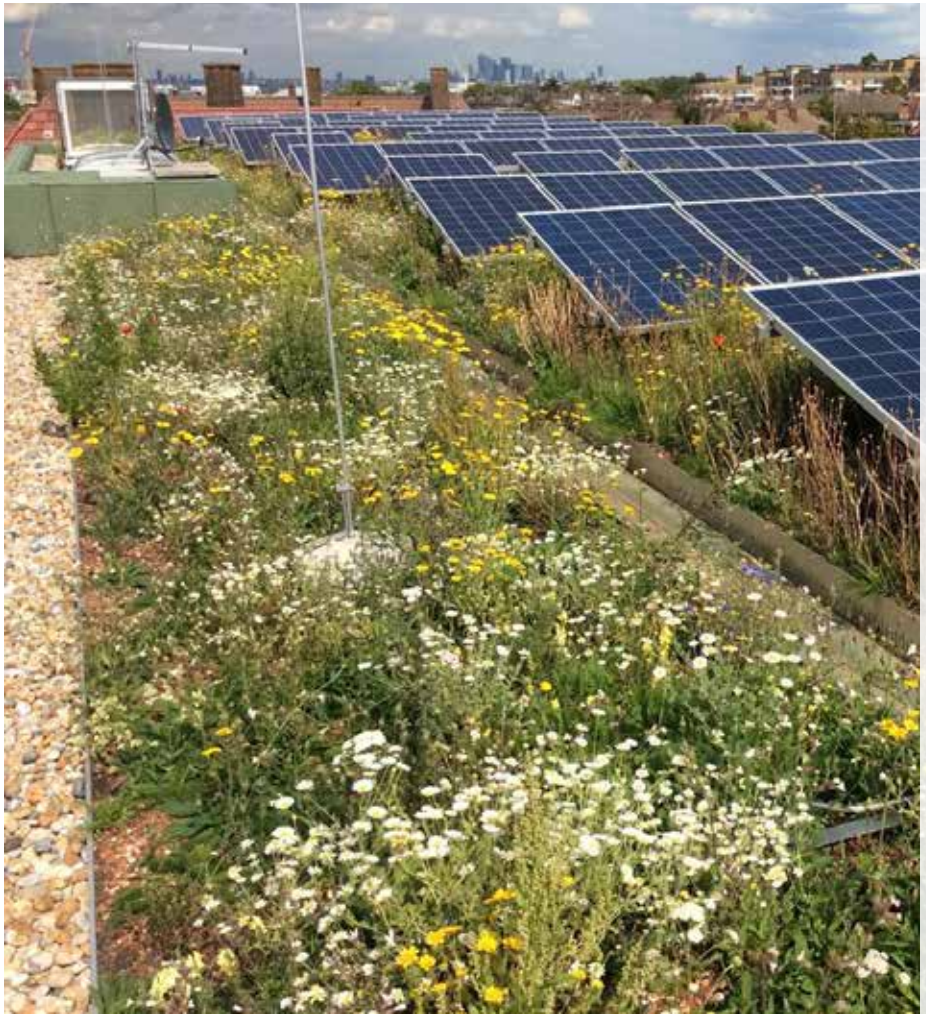
PHIUS Passive House Institute US

U.S. GREEN BUILDING COUNCIL LEED USGBC

WELL

LIVING BUILDING CHALLENGE

GREEN GLOBES



- PASSIVE

WATER
Rainwater harvesting,Low flow, Bioswales, Permeable pavers

MATERIALS
Embodied Carbon, Renewable

ENVELOPE PERFORMANCE
R-Values, Thermal Transfer, Heat

SYSTEMS' PERFORMANCE
Efficiencies of HVAC, Lighting...

- ACTIVE

SOLAR PANELS
Rooftop PV for electricity or water heating

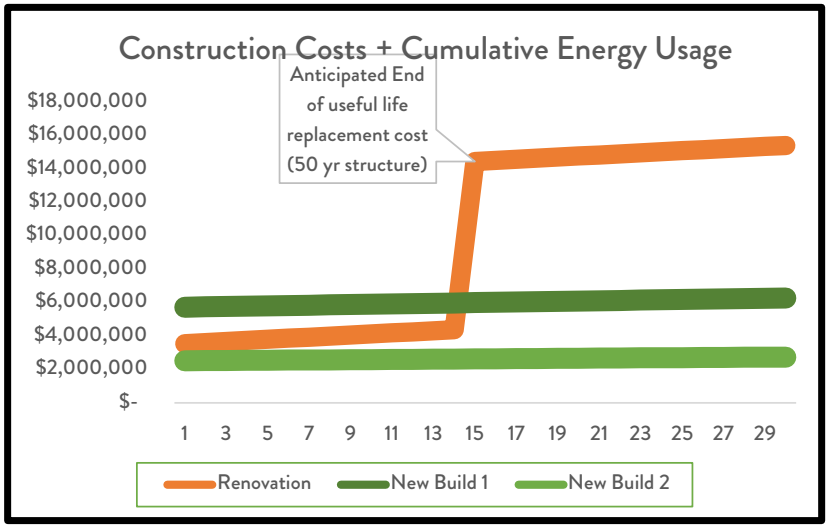
GEOTHERMAL
Utilize thermal exchange

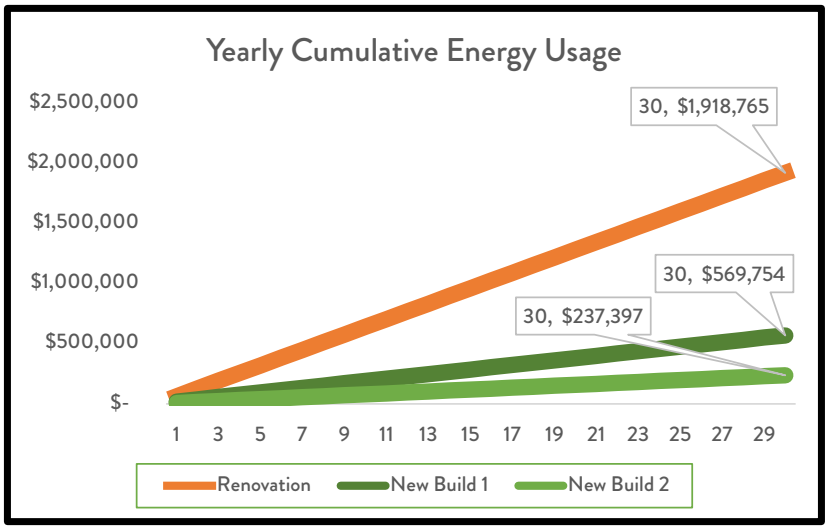
SUSTAINABILITY LIFE CYCLE ANALYSIS

High-Level Design Assumptions:

- Existing structures were built to a level of quality with an estimated 50 year life-span.
- New structures would be built to a net-zero energy standard

		Initial Cost
(Renovation) Option		
13,250	Total Sf	
9,250	Clubhouse Sf	
Clubhouse Remediation Costs	$	1,188,250
Clubhouse Renovation Costs	$	1,524,375
	$	293.26
	$	2,712,625
4,000	Bunkhouse Sf	
Bunkhouse Remediation Costs	$	400,000
Bunkhouse Renovation Costs	$	360,000
	$	760,000
	$	**3,472,625**
Source EUI (kBtu or GJ)		122
	$	262
(New Build) Option 1		
12,000	sf	
New Construction ($475/sf)	**$**	**5,700,000**
Source EUI (kBtu or GJ)		40
	$	475
(New Build) Option2		
5,000	sf	
New Construction ($500/sf)	**$**	**2,500,000**
Source EUI (kBtu or GJ)		40
	$	500





SUSTAINABILITY STRATEGIES

	OPPORTUNITIES	CHALLENGES
EXISTING FACILITIES 	• Reuses existing building stock (takes advantage of existing embodied energy) • Takes advantage of great view • Could reuse existing parking lots and roadways • Could reuse existing septic fields • Could reuse existing potable water well • Building square footage is appropriate for intended use	• Existing building structure is near end of usable life cycle • Existing floor structure requires stiffening for new use • Existing roof structure would require stiffening if solar arrays are desired • Existing basement walls require structural repairs • Existing layout may be suboptimal to nature center adjacencies • Existing local roads would not support traffic loads if main park entrance was near existing building location • Existing water supply would not support new, required, fire protection systems • Windows are absent from 75% of existing building areas • Existing building is not ADA accessible • Existing building has moisture issues • Existing building requires mold remediation • Existing building envelop does not have modern standards of insulation • Existing building has ceiling height constraints • Daylighting would be challenging for interior space because of building footprint dimensions • Would be difficult to achieve a Net-Zero energy consumption
NEW BUILDING 	• Building could be located to support overall park layout • Building could be designed to align with overall park mission • Building could be designed to promote visibility and regional tourism • Building could be designed to be Net-Zero • Building could be designed to accommodate any usage • Building could be designed to take advantage of any view • Building could be designed as a 50 to 100 year building • Building could be designed to support phased growth • Building could be designed to support sustainable and wellness initiatives	• Depending on overall size, a new building could be more expensive than renovating the existing building • Fire suppression system capacity is challenging • New septic or sewer connections would be needed if placed in area away from existing building septic field

CHAPTER 5 | Master Plan Layout

Master Plan Phases

MASTER PLAN LAYOUT

The Carpenter Nature Preserve is a 215-acre nature preserve proposed by the Zionsville Parks and Recreation Department as a town and regional destination for a new Nature Center, walking trails, boardwalks, nature inspired playground, outdoor classrooms, Eagle Creek overlooks, enhanced wetlands, woodlands, and prairies. The nature preserve will enhance existing wildlife habitats, provide for viewing these habitats, while teaching visitors of all ages about the natural environment.

The site is located at the intersection of U.S. Hwy. 421 and S.R. 32 in Union Township and was a former golf course which was abandoned in 2017. The defining feature of the property is approximately 4,000 linear feet of Eagle Creek.

There are many proposed features for the park which can be broken down into the following primary amenities:

- Zionsville Nature Center
- Ecological Habitats
- Pathways & Boardwalk
- Outdoor Classrooms and Wildlife Viewing Blinds
- Future White Oak Commons

While the property is still owned by private citizens, the Town hopes to work towards funding both the purchase of the property and the construction of the project in the near future. The proposed master plan will be developed over multiple phases as funding becomes available. The future White Oak Commons will likely be the last feature of the master plan to be implemented in the park.

The following renderings and precedent images illustrates the proposed character for the park.

Zionsville Nature Center

The proposed location for the Zionsville Nature Center is located on the top of the hill overlooking the wetlands, boardwalk, and Eagle Creek. The new Nature Center is proposed to be 12,000 s.f. and will include classrooms, workstations, staff offices, conference rooms, exhibit space, multi-purpose room, catering kitchen, and a small café/coffee shop. The building will be designed to accommodate future expansion as the center continues to grow.

Precedent images illustrating the potential character for the new Nature Center building are included in the following pages.

Nature Inspired Play

A nature inspired play space will be located adjacent to the Nature Center. This area will include natural play elements like logs and stones and a bouldering rock. A slide utilizing the natural topography of the hill and tunnels to crawl through will engage children with their environment.

Woodland Gallery & Amphitheater

The woodland gallery is envisioned as an arboretum with an opportunity to highlight different species of trees in a more formalized location than in the woodlands located on the site. Art sculptures would be located within the woodland gallery as well as other active areas of the site. The art sculptures will be curated for their ability to fit within the context of the Carpenter Nature Preserve.

Canopy Walk with Tree Houses

The canopy walk and tree houses located adjacent to the Nature Center create a unique experience for visitors in the canopy of an established woodland on the property. The canopy walk will be accessible to all visitors and will allow additional viewing of wildlife.

Ecological Habitats

The proposed ecological habitats were designed to increase wildlife on the property while enhancing and preserve existing ecosystems. See the following pages for detailed drawings and images which represent the character of these areas.

Proposed Plant Communities - The proposed enhancement, preservation, and creation of ecological habitats within the park will create a wide diversity of habitats. Supplementing the existing woodlands through reforestation and creating large blocks for grassland habitat in open areas will provide habitat needs for declining area-dependent species. Additional habitat creation including shrublands, wetlands, and bioretention areas will provide for existing wildlife on the property while attracting new wildlife. This can be done while still providing meaningful and educational experiences for the public by concentrating high use activities to limited areas but allowing low impact uses such as fitness walking and interpretive trails to extend widely throughout the available habitats.

Prairie Grasslands – The habitat created in the prairie grasslands highlighted in the mapping will target a wide variety of grassland birds including Henslow's sparrow, savanna sparrow, dickcissel, eastern meadowlark, bobolink, sedge wren, and northern bobwhite. These areas will receive a mixture of low stature prairie grasses focusing on little bluestem, side-oats grama, prairie dropseed, and Virginia wild rye along with forbs with high pollinator value.

Shrublands and Wetlands – The shrubland habitat highlighted on mapping will create areas that will target declining shrubland birds including yellow-breasted chat, prairie warbler,

blue-winged warbler, yellow warbler, common yellowthroat, indigo bunting, white-eyed vireo, brown thrasher, woodcock, and eastern towhee.

A variety of birds depend on dense shrubby areas for breeding habitat. Native shrubs including silky and roughleaf dogwood, blackhaw viburnum, American hazelnut, downy hawthorn, common ninebark, American plum, smooth sumac, and Illinois rose will be planted in these areas. Existing sandbar willow thickets will be preserved. A simple native cool season grass mix including pollinator species will be planted between the shrubs.

The proposed wetland area is adjacent to an existing wetland restoration area. Expanding this wetland will provide valuable wetland habitat. A variety of wetland organisms including amphibians such as northern leopard frog and birds such as marsh wren will benefit from this restoration.

Woodlands - Floodplain Reforestation Areas - Many of the floodplain reforestation areas have some existing cottonwood, sycamore, black walnut, and silver maple. These existing trees would be augmented with bur oak, shumard oak, shellbark hickory, hackberry, and native shrubs such as spicebush, blackhaw viburnum, hazelnut, elderberry, paw paw, and buttonbush. Tree plantings immediately adjacent to the banks of Eagle Creek will emphasize additional sycamores and silver maples to take advantage of their superior ability to stabilize creek banks. Birds that thrive in riparian forests such as yellow-throated warbler, northern parula, prothonotary warbler, Baltimore oriole, and summer tanager will also be expected to benefit from this restoration.

Mesic Sloping Woodland Restoration - This area includes both areas that are fully open and areas with scattered mature trees, but no native understory. In areas lacking mature trees, species such as white oak, northern red oak, bur oak, chinquapin oak, shagbark hickory, bitternut hickory, tulip tree, black cherry and blue ash will be established. The entire area will receive understory plantings including eastern redbud, flowering dogwood, Allegheny serviceberry, hophornbeam, American hornbeam, spicebush, blackhaw viburnum, and hazelnut. This woodland area would also be contiguous with the floodplain reforestation area, creating a large, forested area covering much of the property. This restoration will consolidate may of the fragmented areas of upland woods into a single large block that will have the potential to support breeding neotropical migrants such as wood thrush, scarlet tanager, Kentucky warbler, ovenbird, hooded warbler, yellow throated vireo, and red-eyed vireo. Common resident woodland birds such as a variety of woodpeckers, Carolina chickadees, tufted titmice, and white-breasted nuthatch will also thrive in this expanded habitat.

Flatwoods Establishment - Open areas near the C.R. 900 East entrance as well as fencerows on the south and west borders would receive tree plantings to defragment and expand the ecological value of existing flatwoods in the western portion of the property. Trees such as bur oak, swamp white oak, pin oak, shumard oak, white oak, shellbark hickory, shagbark hickory, black walnut, tulip tree, and black cherry would be planted to consolidate this block of woodland. Understory species such as American hornbeam, redbud, spicebush, buttonbush, and blackhaw viburnum will be added along with an herbaceous understory seed mix.

Pathways & Boardwalk

The trails, paths, and boardwalks provide access to the park through a variety of trail types including rustic dirt trails, paved asphalt paths, and boardwalks. See detailed drawings on the following pages along with images which represent the character of these amenities.

The pathways, trails and boardwalks allow visitors to the Nature Preserve to explore the many different habitats within the park with little impact to the natural areas. There will be a variety of trail types with a paved, accessible loop connecting the Nature Center with an outdoor classroom and pond; rustic trails winding throughout the park; and boardwalks allowing users to experience the wetlands.

Outdoor Classrooms & Wildlife Viewing Blinds

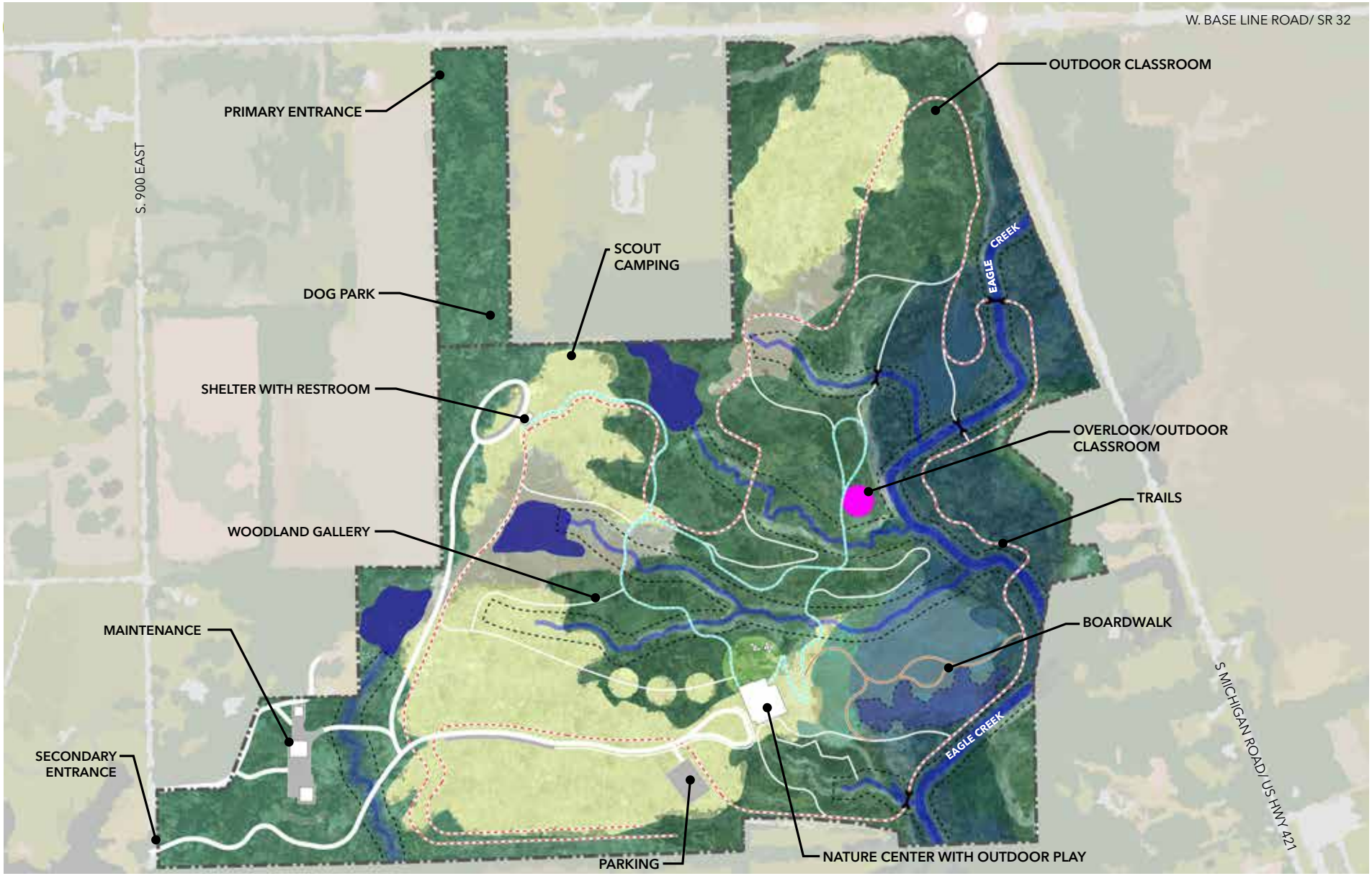
A variety of outdoor classrooms are proposed for the park. Some of the classrooms would be accessible through a paved path while others will only be accessible through rustic trails. The classrooms will provide the opportunity for students to experience different habitats while learning about the environment they are in. One of the outdoor classrooms is positioned on a bluff overlooking Eagle Creek and will be a great viewing point for all park visitors.

Wildlife blinds will also be positioned around the park. These rustic buildings will provide areas for park visitors to view wildlife while being somewhat hidden. Seating will be available and the larger wildlife viewing blinds can be used as outdoor classrooms for the Nature Center and students on field trips.

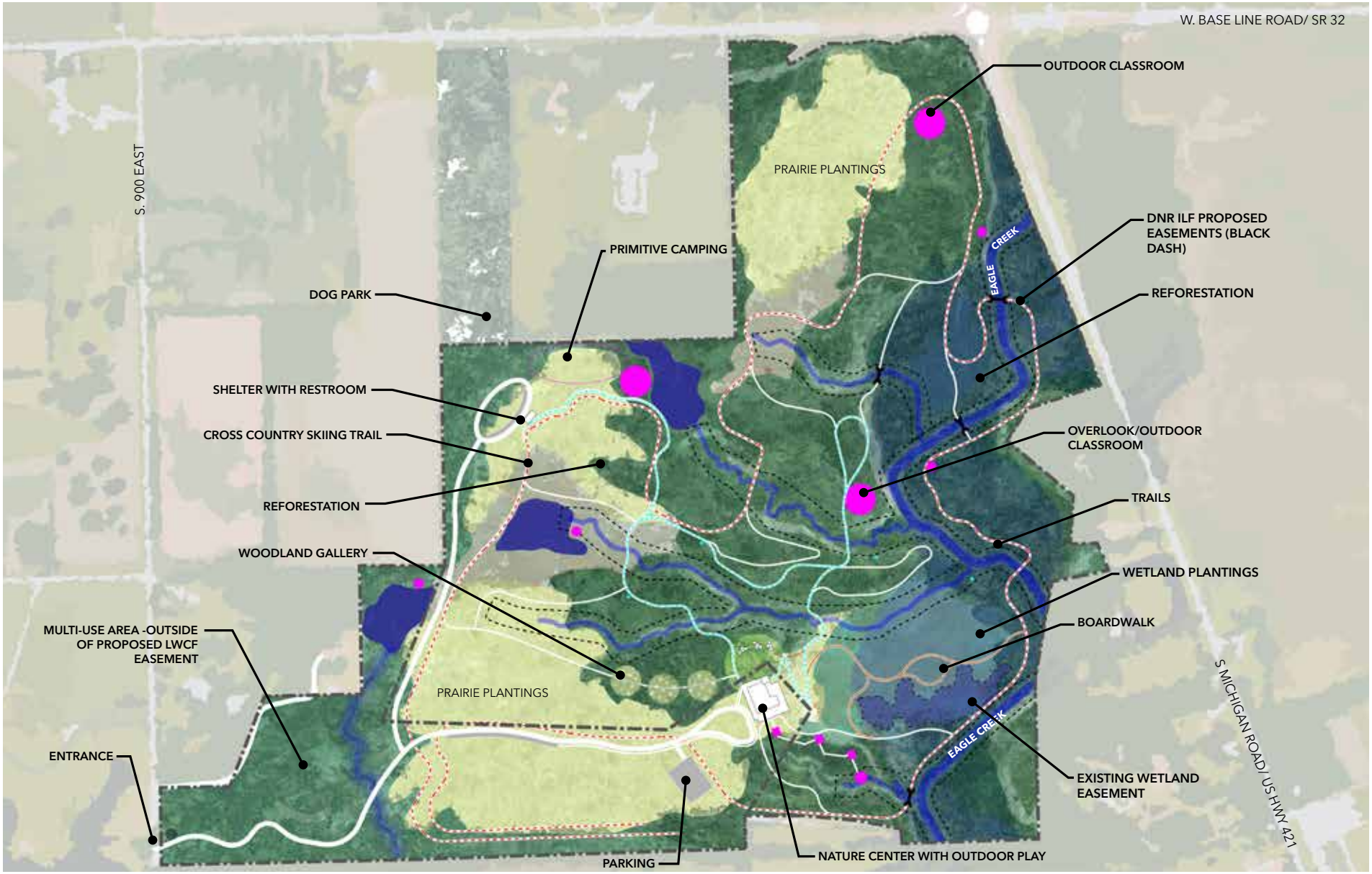
Future White Oak Commons

White Oak Commons is located close to the entrance off C.R. 900 East and will supplement the Nature Preserve as a future phase of development. White Oak Commons is envisioned with a state park like character that fits within the context of the site. The complex of buildings will be aligned with the great white oak tree located near the entrance of the park. It will include a restaurant (possibly farm-to-table), outfitter buildings for small retail and rental, and will be utilized for larger events such as weddings and reunions. The outfitter buildings will include rentals for outdoor equipment to be utilized in the park such as fishing gear and cross-country skis. White Oak Commons will attract visitors to the park who might not normally be inclined to explore a Nature Preserve treating them to the beauty of the park.

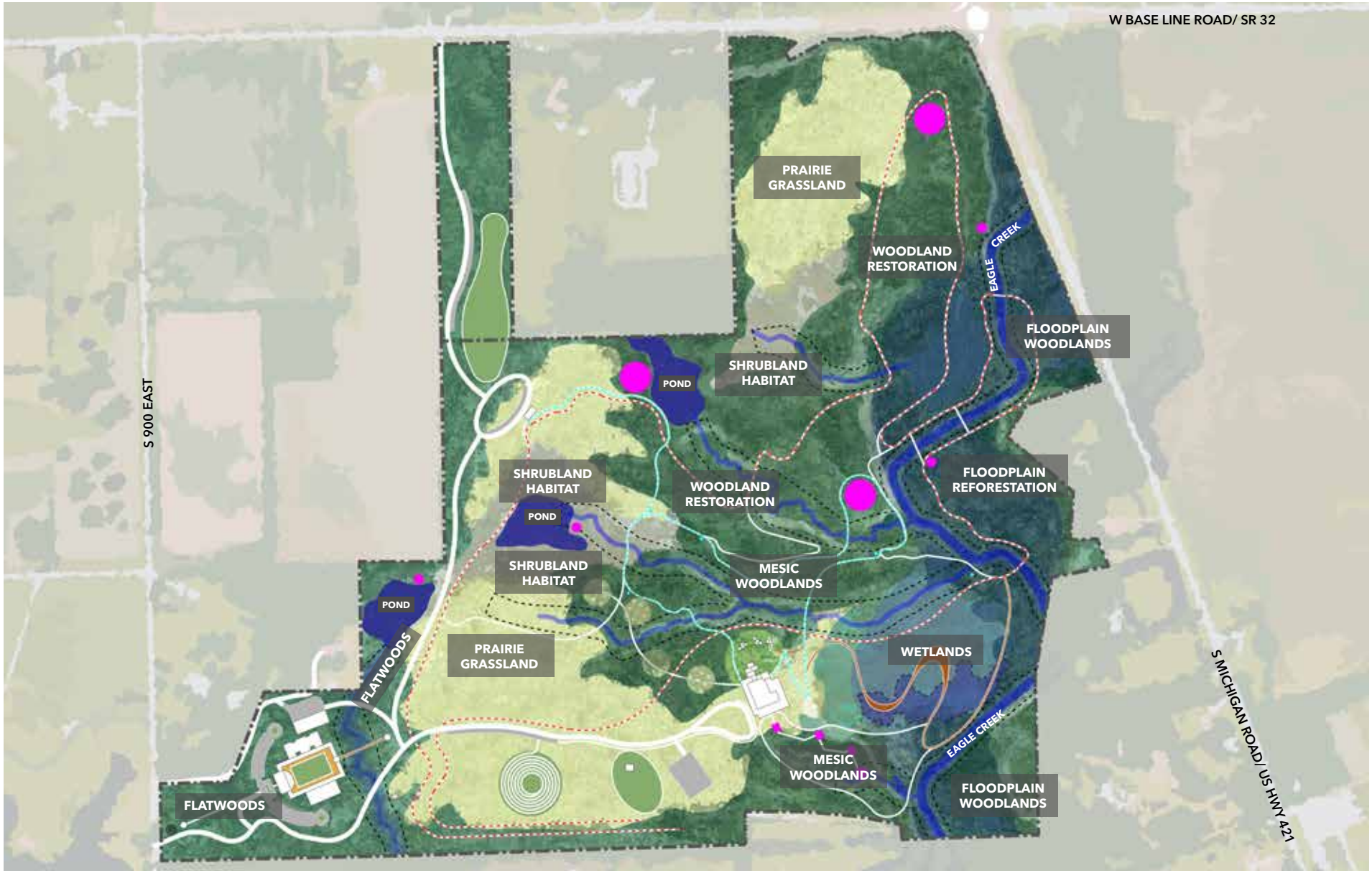
MASTER PLAN - PHASE 1



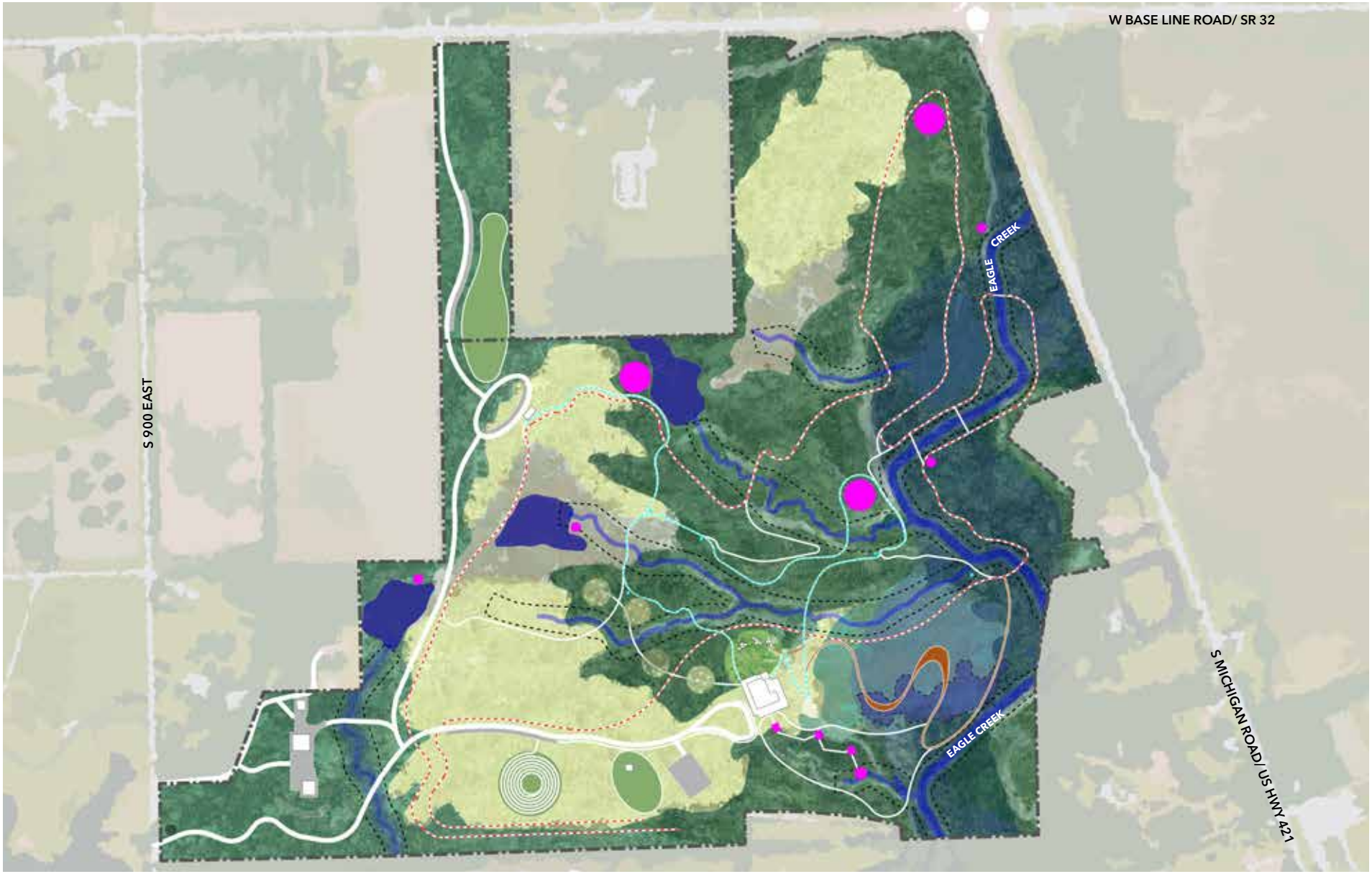
MASTER PLAN - FULL BUILD



HABITATS

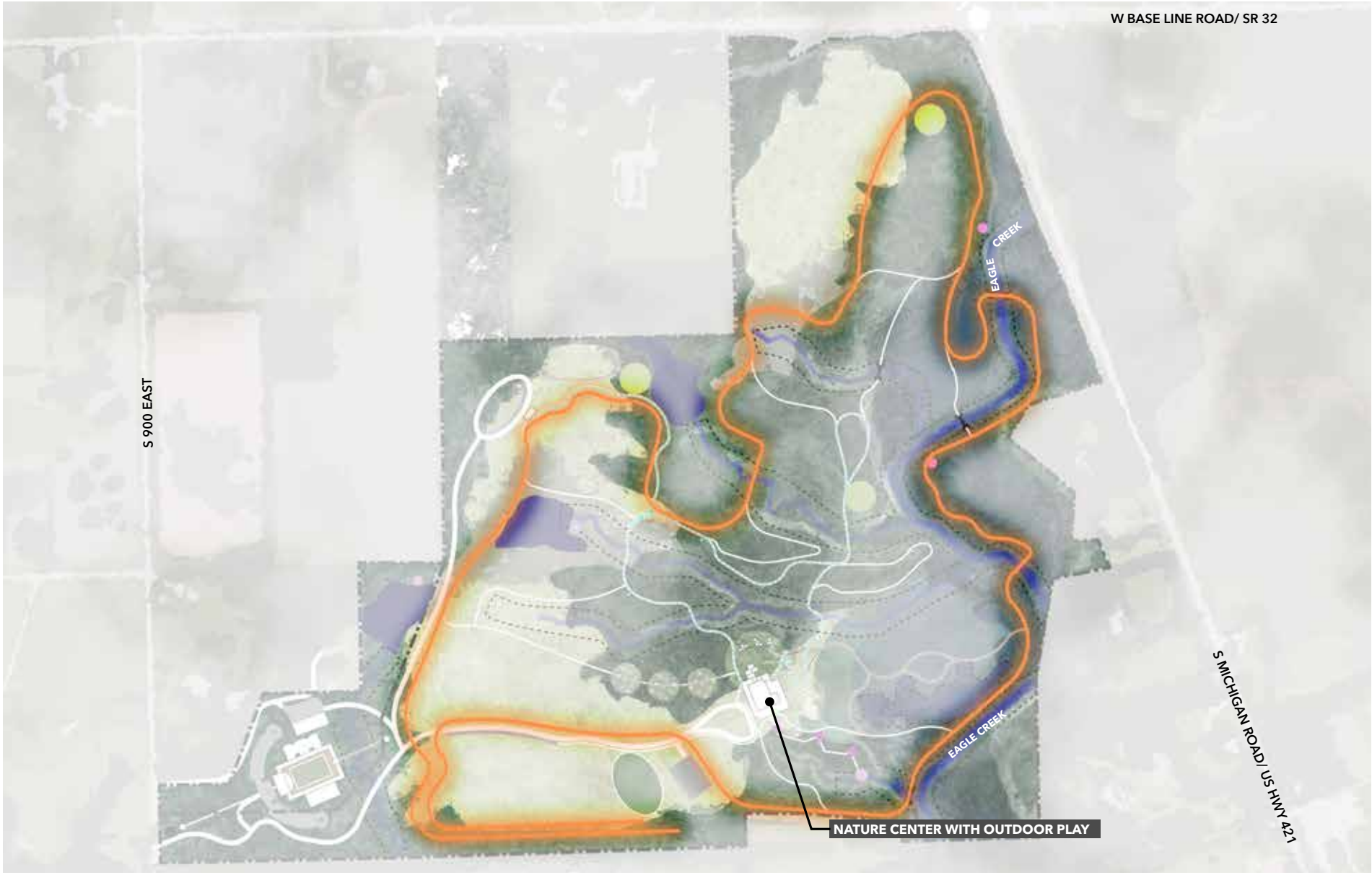

W BASE LINE ROAD/ SR 32
S 900 EAST
S MICHIGAN ROAD/ US HWY 421
PRAIRIE GRASSLAND
WOODLAND RESTORATION
EAGLE CREEK
FLOODPLAIN WOODLANDS
SHRUBLAND HABITAT
POND
SHRUBLAND HABITAT
WOODLAND RESTORATION
FLOODPLAIN REFORESTATION
POND
SHRUBLAND HABITAT
MESIC WOODLANDS
POND
FLATWOODS
PRAIRIE GRASSLAND
WETLANDS
EAGLE CREEK
MESIC WOODLANDS
FLOODPLAIN WOODLANDS
FLATWOODS

TRAILS

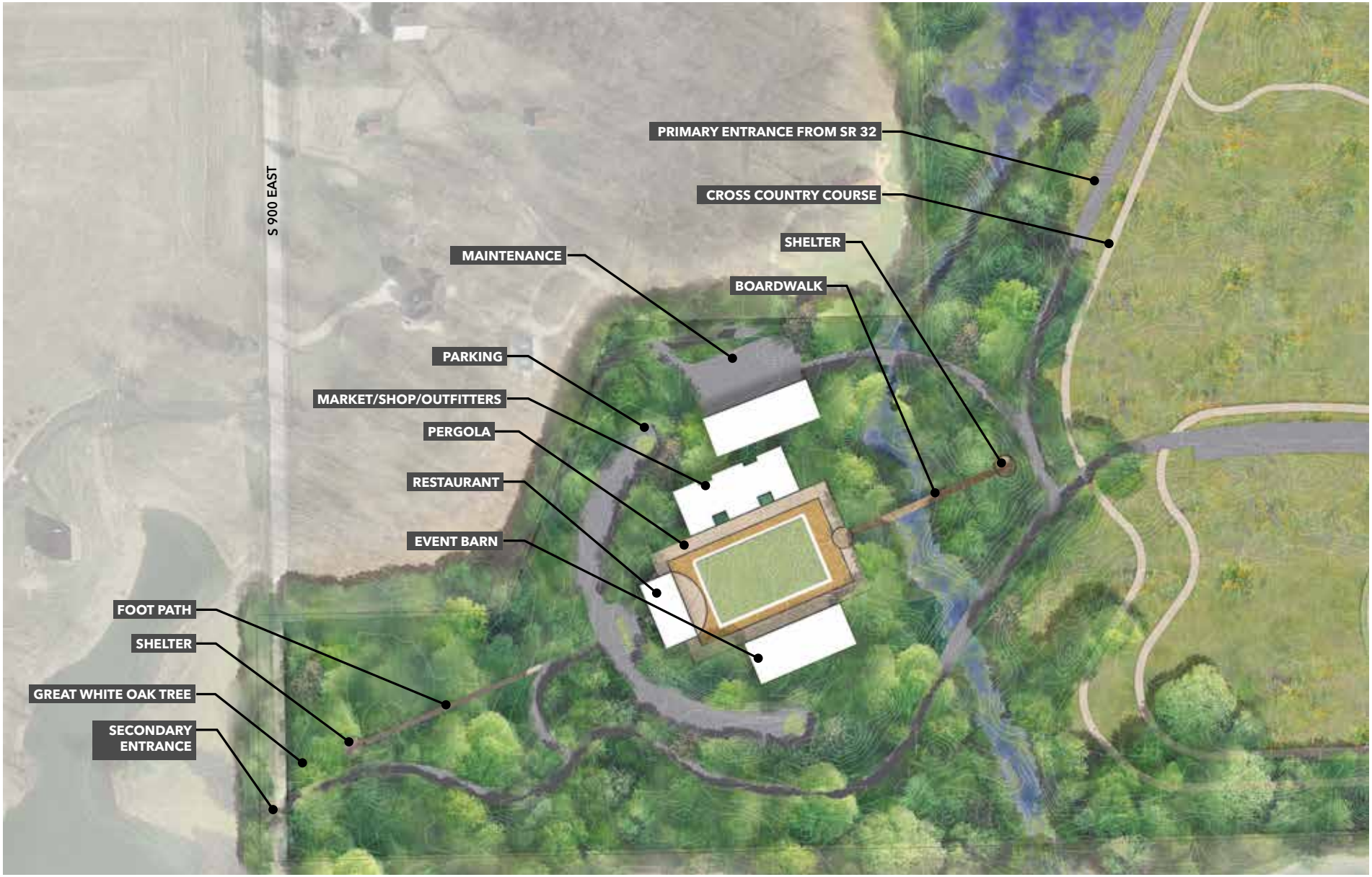

W BASE LINE ROAD/ SR 32
S 900 EAST
EAGLE CREEK
EAGLE CREEK
S MICHIGAN ROAD/ US HWY 421

PAVED TRAIL (ADA)

5K CROSS COUNTRY COURSE

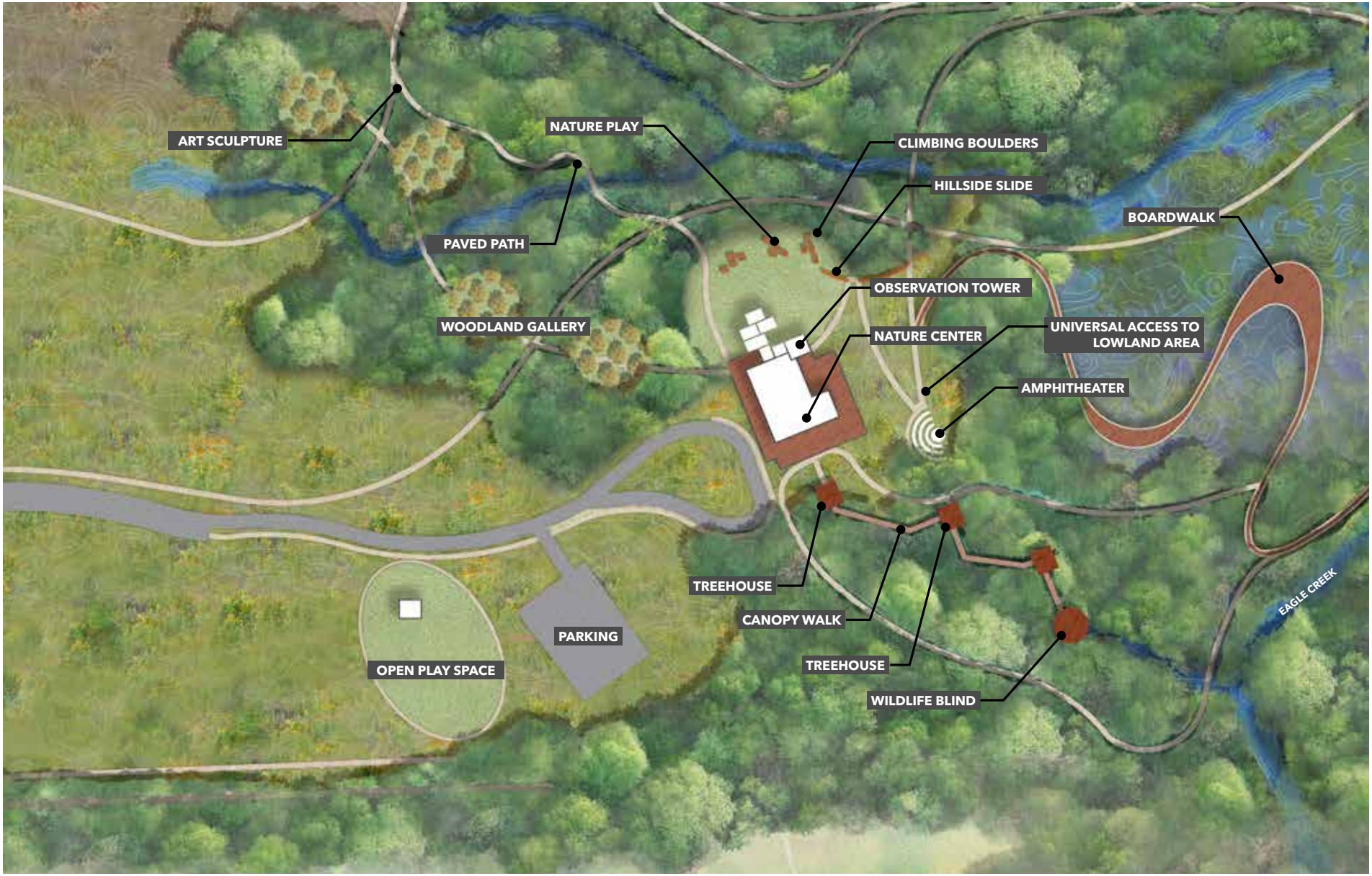


WHITE OAK COMMONS



PRECEDENTS - WHITE OAK COMMONS

NATURE CENTER



PRECEDENTS - TREE HOUSES/BOARDWALKS

PRECEDENTS -ART IN NATURE

NATURE CENTER PRECEDENT STUDY

An extensive precedent study was conducted for the new nature center to provide a comparison of similar nature centers in terms of size and programming and also to establish the potential character for the new building. The proposed Zionsville Nature Center will be designed to fit in the context of the site and be sustainable. The following images and information for existing nature centers will serve as a preliminary study of the potential for the new building.

PRECEDENT STUDY

FRICK ENVIRONMENTAL CENTER

PITTSBURGH, PA
15,600 SF

"Nestled into a sloping hillside and clad in locally harvested black locust, the Frick Environmental Center is a gateway to the 644-acre Frick Park, literally and symbolically a bridge between built and natural worlds. The LEED-Platinum building is a living classroom for environmental education, providing hands-on opportunities to experience nature and learn about sustainable design. The project features a public living room and gallery, classrooms for K-12 environmental education programs, and offices, as well as support space for staff. Porous indoor and outdoor spaces provide multisensory learning experiences for students of all ages and learning styles."

https://www.bcj.com/projects/civic-cultural/frick-environmental-center/

PRECEDENT STUDY

ENVIRONMENTAL NATURE CENTER

NEWPORT BEACH, CA
9,000 SF

"The challenge was to develop a top-tier green building without breaking the bank, leading the design team to focus on cost-effective passive controls. They started by siting the building in a north-south orientation to best control solar heat gain glare. To reduce HVAC costs, LPA's engineers designed the space for natural ventilation. Ocean breezes pass through low intake windows along the south; excess hot air rises up the sloped ceiling and exhales out high operable windows along the north. The steep-pitched roof accommodates a large photovoltaic (PV) array set at optimum angle for southern sun exposure.

The PV panels supply 100 percent of the ENC's power. Other sustainable features include waterless urinals, dual-flush toilets and low-flow fixtures that reduce potable water by 15,000 gallons per year. Native, drought-tolerant plants eliminate the need for irrigation; and bioswales and rainwater harvesting techniques capture all stormwater runoff."

https://lpadesignstudios.com/projects/environmental-nature-center

PRECEDENT STUDY

HARDBDERGER URBAN ECOLOGY CENTER

SAN ANTONIO, TX
11,400 SF

"The Phil Hardberger Park Urban Ecology Center, San Antonio's first public nature center, contributes to a wealth of knowledge about our environment and the interaction of plants, animals and humans with each other in urban settings. The Urban Ecology Center is a model for environmental stewardship through its use of locally sourced and sustainable materials, its extensive rainwater harvesting system, and its preservation of native, mature trees. The LEED Gold certified visitor center serves as a focal point of the park and includes a multi-purpose classroom / community room and offices for the center's staff. The Urban Ecology Center fosters ecologically responsible citizens through educational offerings that focus on botany, wildlife and general ecology, while connecting the community with nature through hands-on discovery."

https://www.lakeflato.com/eco-conservation/phil-hardberger-park-urban-ecology-center/?project=open

PRECEDENT STUDY

BATTELLE DARBY CREEK NATURE CENTER

COLUMBUS, OH
11,400 SF

"The Battelle Darby Creek Metro Park Nature Center is a 14,000 SF visitors' center for Metro Parks' largest park, the 7,000 acre Battelle Darby Creek Metro Park. The Nature Center serves as an educational and interpretive building for visitors to cultivate their knowledge of the park's diverse ecosystems. At the heart of the building is a 53-foot long living stream, which reproduces the riparian habitats found within the park, and other interactive exhibits which encourage engagement by visitors with the natural world around them.

The primary challenge faced by the design team was how to place a building in a unique and fragile natural setting. Consequently, the team pursued the design of a building that reduces its own impact, physically, visually, and environmentally. The building recedes into the landscape, allowing the visitor to focus on the building's surroundings, rather than the building itself."

https://www.archdaily.com/541409/battelle-darby-creek-metro-park-nature-center-designgroup?ad_medium=gallery

PRECEDENT STUDY

BERNHEIM ARBORETUM

CLERMONT, KY
6,400 SF

"Nestled into a wooded ridgeline between the plant nursery and an open prairie, the center takes cues from the surrounding forest to become at once unique and at home in this place. Pergolas, trellises and arbors gather the landscape at the perimeter. A simple post-and-beam structure of reclaimed and sustainably harvested woods – including cypress planks salvaged from pickle barrels – echo the rhythms of the trees and frame views of the surroundings. Like the forest of which it's a part, the building captures light, water and air to the benefit of the surrounding landscape.

Much of the roof is vegetated, producing oxygen and absorbing rainwater while photovoltaics produce on-site energy. Ponds collect rainwater for reuse and provide visual, acoustic, and thermal comfort. Geothermal heating and cooling creates a quiet environment and connects the building to the earth. The visitor center design represents a magical opportunity – the design of a building like a tree."

https://hga.com/projects/westwood-hills-nature-center/

PRECEDENT STUDY

WESTWOOD HILLS NATURE CENTER

ST. LOUIS, MO
2,700 SF

"Westwood Hills Nature Center (WHNC) is a 160-acre nature park featuring prairie, forest and marsh areas, with trails and an educational center. WHNC sought to replace their small, aging facility with a new building whose overarching purpose and vision is connecting people to nature. HGA's site design expands an existing specimen prairie, creates an outdoor classroom space on the site of the old building, and provides expanded parking for visitors to the new facility. The building forms an experiential and informational threshold to the site. Together, the architectural and site design serve to reinforce visitors' connection to their landscape."

https://mcdonoughpartners.com/projects/visitor-center-bernheim-arboretum-and-research-forest/

PRECEDENT STUDY

NATURE CENTER HINDSGAVL

MIDDELFART, DENMARK
4,850 SF

"Nature Centre Hindsgavl frames the outdoor life of the Hindsgavl Nature Reserve and is designed as a state-of-the-art building in terms of energy efficient architecture.Nature Centre Hindsgavl is designed as a sustainable activity and outdoor centre that conveys the captivating natural and cultural history of the Hindsgavl Nature Reserve, including Hindsgavl Castle. In addition to teaching, exhibition and office functions, the centre houses a number of facilities for scouts, school children and other visitors who enjoy the outdoor life.

The centre is designed as an inspiring site for a wide range of indoor and outdoor activities. The design of the building supports the outdoor life in all kinds of weather, all hours of the day. For instance, the building literally grows out of the terrain and has a vantage point on the roof which is covered with vegetation and grass, planted over a waterproofing membrane. From the vantage point visitors can enjoy a panoramic view of the scenic surroundings. The building design thus provides an inspiring activity spot for the many aspects of outdoor life by interacting with the surrounding landscape and reinforcing the relation between indoors and outdoors."

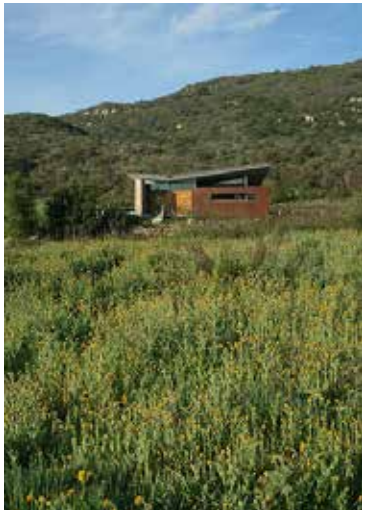
https://www.archdaily.com/339866/nature-centre-hindsgavl-aart-architechts?ad_medium=gallery

PRECEDENT STUDY

NIX NATURE CENTER

IRVINE, CA
3,600 SF

"Roesling Nakamura Terada Architects, Inc. (RNT) was selected by the County of Orange to design a 3,600 SF Nature Center located at the entrance to Laguna Coast Wilderness Park. The County worked closely with RNT and project stakeholders to develop a design that utilizes passive energy savings features and would create a unique destination within the park. The nonprofit Nature Center is one of the first public structures in Southern California to use rammed earth to passively heat and cool the interior of the building. The design goals were to provide a portal to nature that educates visitors, and to restore a site that had been altered by fire and previous uses. It is designed to tell the story of the Laguna Coast Wilderness Park – a sensitive, natural open-space preserve that is located between the rapidly growing communities of Irvine and the City of Laguna Beach."



https://www.rntarchitects.com/nix-nature-center

PRECEDENT STUDY

VIEWING TOWERS + BIRD BLINDS

PRECEDENT STUDY
SHELTERS + CABINS

On-site caretaker
Ancillary structures / restrooms

ZIONSVILLE
PARKS & RECREATION