

CONFLUENCE DISCOVERY PARK 2030 MASTER PLAN

ALLEGHENY ARBORETUM
AT INDIANA UNIVERSITY OF PENNSYLVANIA



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Prepared by Andropogon Associates, Ltd.
with contributions from Biohabitats, Inc.; Civil & Environmental Consultants, Inc.; and GBBN
May 2019 - *DRAFT*



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1 INTRODUCTION

VISION STATEMENT

CONFLUENCE DISCOVERY PARK
IS PENNSYLVANIA'S PREMIER DEMONSTRATION SITE
FOR TRANSFORMING POST-INDUSTRIAL LANDSCAPES INTO
BEAUTIFUL, ECOLOGICALLY-RICH LEARNING ENVIRONMENTS.





Dr. Jerry L. Pickering - Andropogon

LETTER FROM THE ALLEGHENY ARBORETUM BOARD CHAIR

Greetings. We are excited to present the Allegheny Arboretum at Indiana University of Pennsylvania's *Confluence Discovery Park 2030 Master Plan* as an expression of our vision of education, stewardship, sanctuary, and community.

Education has been the primary goal of the Allegheny Arboretum since its inception. The creation of the Confluence Discovery Park—as an expansion of Allegheny Arboretum's open space network—will provide the arboretum and greater IUP community with multiple avenues for fostering new educational opportunities, not only for our students, but for all who visit the park.

The *Confluence Discovery Park 2030 Master Plan* aspires to turn a degraded, industrial floodplain site with an eroding stream system into a healthy and beautiful landscape with restored streams, new ponds, riparian forests, mesic meadows,

and naturalized plantings. Its restored water bodies will provide beauty, habitat, learning opportunities, and artful rainwater management. Its trails, boardwalks, pavilions, and visitor center will support education and exploration, as well as respite for those who visit the Indiana, Pennsylvania region. The Confluence Discovery Park will serve as an outdoor classroom and laboratory for various programs at IUP and at community schools. The Confluence Discovery Park also occupies a strategically important gateway to the university and the Indiana community. Once complete, the amenity will increase development values for adjacent properties and act as an economic stimulus to the area.

The conversion of an industrial brownfield site into a multi-use, educational facility will result in a transformational change for IUP, the Indiana community, and the region. The name Confluence Discovery Park not only reflects the educational opportunity for

students to discover and learn, but will also provide people of all ages who visit the park the opportunity to discover and learn about the environment and community in which we live.

Dr. Jerry L. Pickering
Allegheny Arboretum Board Chair
Indiana University of Pennsylvania

EXECUTIVE SUMMARY

Allegheny Arboretum Mission:

“To provide a learning environment that will advance our global understanding of temperate forests, cultivate an aesthetic appreciation for regional flora of the Allegheny Plateau, and demonstrate practical applications of woody plant materials to modify and mitigate local environmental conditions.”¹

Confluence Discovery Park Mission:

“To transform a historically flooded, abandoned, industrial parcel into a multi-use and aesthetically attractive property that occupies a strategically important gateway to the university and the Indiana community.”²

MASTER PLAN OVERVIEW

Indiana University of Pennsylvania (IUP) has advanced excellence in academics and research within Indiana, PA since 1875. Today, the university looks ahead to envision the future of Confluence Discovery Park—a 39-acre, post-industrial landscape at the heart of IUP’s campus—as an expansion of the university’s Allegheny Arboretum; a new gateway to IUP’s Main Campus; and most importantly, an academic, community, and ecological asset.

In 2018, IUP engaged in a master planning process with the Philadelphia-based landscape architecture and ecological-planning firm Andropogon Associates, in partnership with Biohabitats, Civil & Environmental Consultants, and GBBN. Together, the group reviewed past planning documents, solicited input from stakeholders, and then reimagined Confluence Discovery Park as a multi-faceted amenity space.

The resulting *Confluence Discovery Park 2030 Master Plan* leverages strategic,

physical improvements (including accessible trails and an Allegheny Arboretum Visitor Center); ecological restoration; land management; rainwater management; educational and research opportunities; and community engagement. Additionally, the master plan proposes a construction phasing strategy and an Opinion of Probable Cost, which together, approximate the resources that will be required to implement Confluence Discovery Park over time.

This visionary master plan will work in tandem with Allegheny Arboretum’s forthcoming Management Operations and Business Plan. The latter will provide information about organizational structure, programming, and staffing, as well as financial projections. Together, these two documents will create a comprehensive framework that will guide the stewardship of Confluence Discovery Park’s natural and built environments through 2030 and beyond.

1. Indiana University of Pennsylvania (2018a)
2. Confluence Discovery Park Steering Committee (2019b)

MASTER PLAN GOALS

The *Confluence Discovery Park 2030 Master Plan* aims to:

- **Restore** ecological health and ecosystem-services functioning
- **Foster** new curricular integration and research opportunities
- **Create** a shared, amenity space for the university and community
- **Construct** Confluence Discovery Park through a phased approach
- **Demonstrate** innovative remediation and land restoration techniques
- **Celebrate** the confluence of water, academia, and community
- **Catalyze** local open space restoration, sustainable development, and economic development

KEY RECOMMENDATIONS

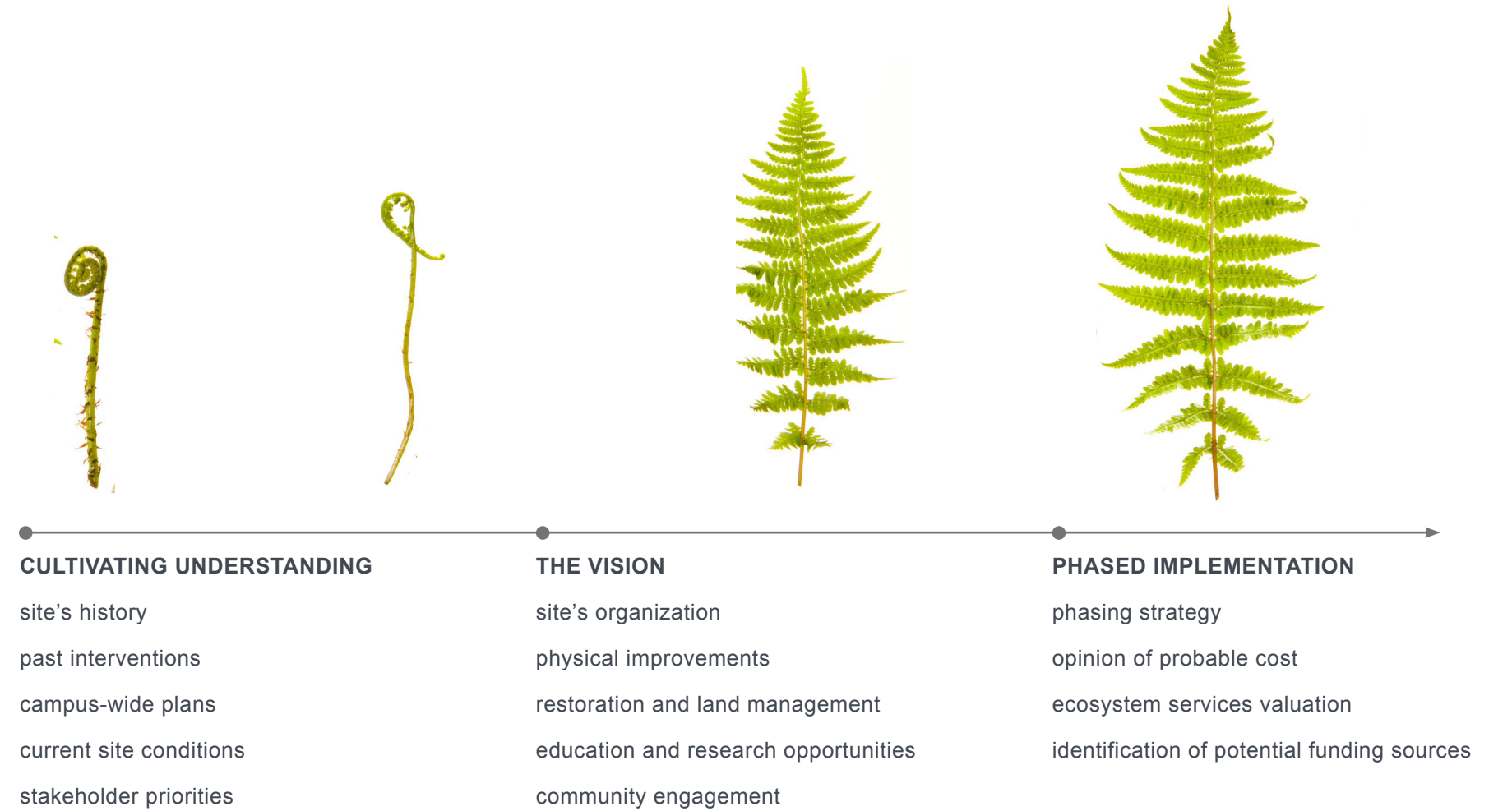
- Use this master plan to inform a Management, Education Program, and Operations Business Plan.
- Use this master plan to seek funding for implementation.
- Hire an executive director, horticultural director, and educational coordinator for Allegheny Arboretum.
- Leverage regenerative remediation, ecological restoration, and field research to differentiate Confluence Discovery Park from peer arboreta and attract regional visitors.
- Cultivate a beautiful, ecologically-rich, open space resource for the benefit of IUP and the community.
- Use green infrastructure to mitigate site-wide and downstream flooding.
- Coordinate education and research opportunities with faculty and students before, during, and after master plan implementation.

MASTER PLANNING PROCESS

Master planning is a dynamic, inclusive process in which an organization's stakeholders collaboratively envision a site's future physical development. Decisions during the master planning process respond to the organization's mission and vision, stakeholder needs, and the site's opportunities and constraints. The result is a visionary document that uses graphics and narrative to guide a process of transformation for the benefit of current and future generations.

The *Confluence Discovery Park 2030 Master Plan* was developed through a three step process: 1) Cultivating understanding

of the site's history, past interventions and campus-wide plans, current site conditions, and stakeholder priorities; 2) Developing a vision for the site's organization, physical improvements, restoration and land management, education and research opportunities, and community engagement; and 3) Outlining a phased, implementation strategy with a corresponding Opinion of Probable Cost, ecosystem services valuation, and identification of potential funding sources. The resulting document will help IUP implement its vision for Confluence Discovery Park by 2030.



PROJECT TEAM

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ADDITIONAL ACKNOWLEDGMENTS

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Donors to the Allegheny Arboretum

Thank you to all past and future donors to the Allegheny Arboretum, with whom the Arboretum's vision will be achieved.



2 CULTIVATING UNDERSTANDING



Steering Committee & Master Planning Team representatives on site - Andropogon

THE UNDERSTANDING PROCESS

Indiana University of Pennsylvania (IUP) demonstrates extensive experience with long-range campus planning. Recent plans include the 2009 *Long-Range Campus Facilities Master Plan* (with updates in 2011, 2014, and 2017), the 2011 *Arboretum Concept Overlay*, various community plans and natural resources inventories, and most recently, the 2018 *IUP Stormwater Master Plan*. IUP has successfully implemented portions of each plan, with a continual eye toward improving the physical environment, campus experience, and community relations.

The *Confluence Discovery Park 2030 Master Plan* will dovetail with these previous plans in order to advance IUP's existing objectives while also offering new goals. To establish these goals and a corresponding vision for Confluence Discovery Park, the Master Planning Team embarked on the first step in the master planning

process: cultivating understanding. This process enabled the Master Planning Team and IUP representatives to thoroughly grasp Confluence Discovery Park's history, existing conditions, and desired improvements. Specific methods for cultivating understanding included archival research; historic aerial analysis; review of past interventions and reports; site inventory and analysis using remote mapping, drone flyover, geomorphic survey, site visits, sampling, and lab analysis; and stakeholder surveys and interviews.

The most resilient designs stem from "reading the landscape," and so the Master Planning Team therefore engaged extensively in understanding the physical landscape and its regional context. The following pages highlight the most relevant findings from this process. Additional information can be found in Appendices B-E.

OPPORTUNITIES & CONSTRAINTS SUMMARY

CONFLUENCE DISCOVERY PARK OPPORTUNITIES

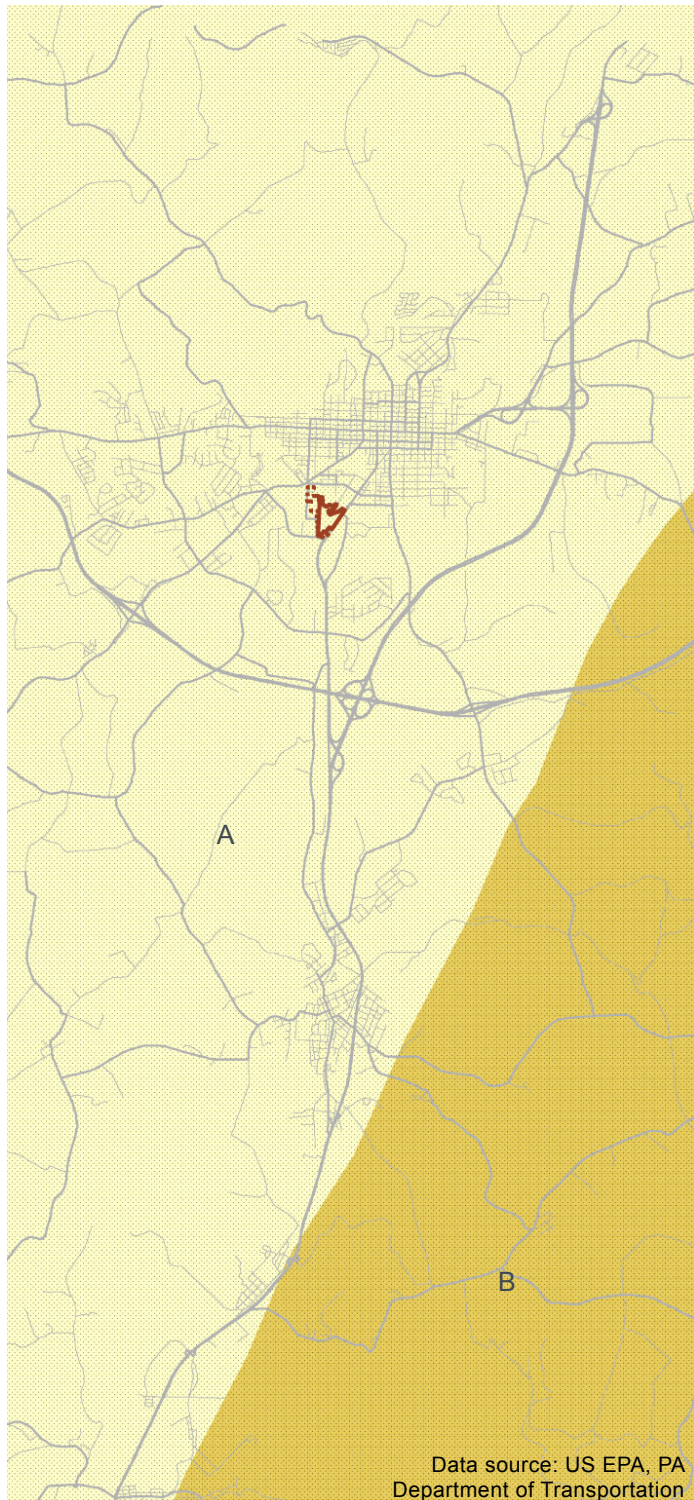
- Leverage regenerative remediation, ecological restoration, and field research to differentiate Confluence Discovery Park from peer arboreta and attract regional visitors
- Create a new gateway to IUP's campus proper
- Provide a beautiful, functional, open space resource that complements the surrounding green space network
- Enhance local biodiversity, habitat value, and ecosystem services
- Enhance habitat connectivity for targeted species
- Use programming to engage the IUP, local, and regional communities
- Engage in curricular integration and research using outdoor classrooms, living laboratories, and permanent research plots

- Leverage on-site remediation as an educational and research experience
- Use green infrastructure to mitigate site-wide and downstream flooding
- Engage in stream reclamation and restore its connection to the floodplain to increase aquatic and riparian ecological function
- Protect and expand the existing wetland
- Plan for periodic flooding and celebrate the change in appearance
- Provide multi-modal access points and circulation that connects to surrounding networks
- Increase connectivity between fragmented, open spaces within Confluence Discovery Park
- Accommodate a potential location for an Allegheny Arboretum visitor center

CONFLUENCE DISCOVERY PARK CONSTRAINTS

- Existing site contaminants may pose the appearance of health risks to people (through direct contact) and wildlife (through consumption/bioaccumulation) and may impact vegetation health
- Existing contamination soil cap continues to cause crown dieback in existing, mature trees
- Soil depth above underlying brownfield cap will continue to limit vegetation diversity and growth
- High invasive-species pressure threatens native species and wildlife
- Invasive plant species, lack of young trees, and deer browsing will cause forest and meadow health decline without management
- Limited soil depth and damaged soil microbiome

- Poor water quality and presence of thermal loading
- Lack of micro-topography
- Flooding may periodically restrict site use
- Limited land area above the floodplain limits the location of new buildings and temporary uses, such as car parking
- Shallow water table and bedrock will impact building construction
- Existing, natural features (e.g. wetland) impede integration of a cross-connection roadway
- Context of urbanized watershed will constrain aquatic and terrestrial habitat potential on site
- Wetland expansion will limit future site development
- Brownfield cleanup covenants prohibit the development of occupied dwellings



Data source: US EPA, PA Department of Transportation

ECOREGIONS

Ecoregions are geographic regions with shared ecosystems that are identified by “analyzing patterns of biotic and abiotic phenomena... [including] geology, landforms, soils, vegetation, climate, land use, wildlife, and hydrology.”⁵ Examining ecoregions can result in a robust understanding of an area’s “natural state,” as well as how a site’s environmental condition relates to that of typical landscapes within the ecoregion.

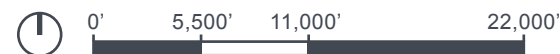
Confluence Discovery Park is located within the Pittsburgh Low Plateau (ecoregion 70.c) in the far eastern foothills of the unglaciated, dissected, Western Allegheny Plateau (ecoregion 70). The Pittsburgh Low Plateau is a part of the western Appalachian piedmont. This area is typified

by Appalachian hills that are less forested than the nearby higher ridge and valley regions. The forests here are mostly oak-dominant Eastern Temperate Forests, with some areas of Mixed Mesophytic Forest. Farming is common within this ecoregion in areas where slopes and soils are manageable, particularly for dairy. Oil wells, gas fields and coal mining are widespread, and have left major swaths of the landscape bare and degraded. The U.S. Environmental Protection Agency describes the ecoregion, as having “rounded hills, narrow valleys, fluvial terraces, entrenched rivers, general farming, landslides, and bituminous coal mining.”

5. U.S. Environmental Protection Agency (2016)

LEVEL V ECOREGIONS

- A Pittsburgh Low Plateau
- B Uplands and Valleys of Mixed Land Use



HYDROLOGY

Confluence Discovery Park falls within the Two Lick Creek Sub-Watershed, which surrounds Indiana County and extends eastward, past Penn Run, and south to Homer City. This sizable sub-watershed is part of the larger Kiskiminetas-Conemaugh River Watershed, which flows into the Ohio River Basin. Confluence Discovery Park is therefore hydrologically connected to larger downstream waterways, to Pittsburgh, PA and beyond.

IUP’s Long-Range Facilities Master Plan notes that the U.S. Environmental Protection Agency issued both watersheds Total

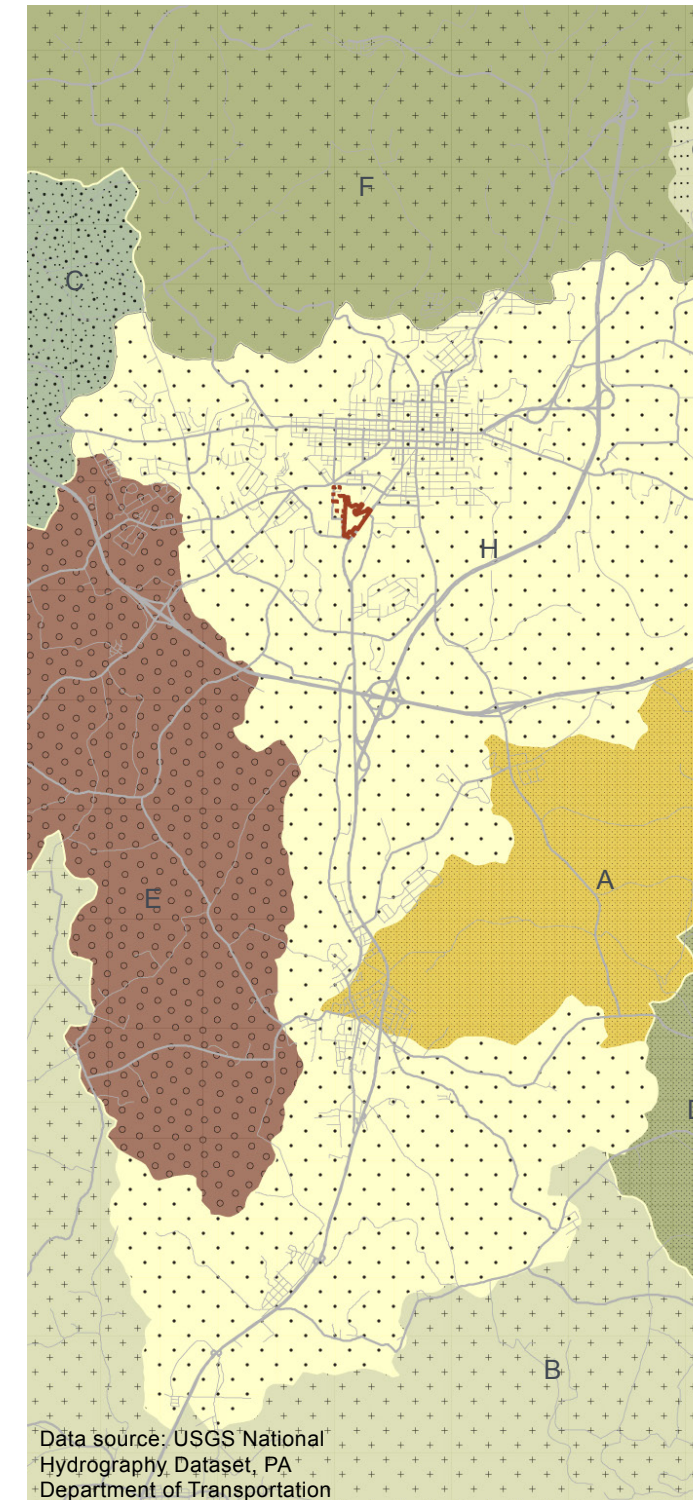
Maximum Daily Load reduction targets, due to high concentrations of pollutants in the watersheds related to acid mine drainage and rainwater runoff.³ IUP’s impermeable surfaces—buildings and parking areas—contribute to the rainwater runoff in these watersheds, as well as riverine flooding that occurs in local streams.⁴ Opportunity therefore exists to reduce this contribution through strategic rainwater management improvements within Confluence Discovery Park.

3. Entech Engineering, Inc. (2018)

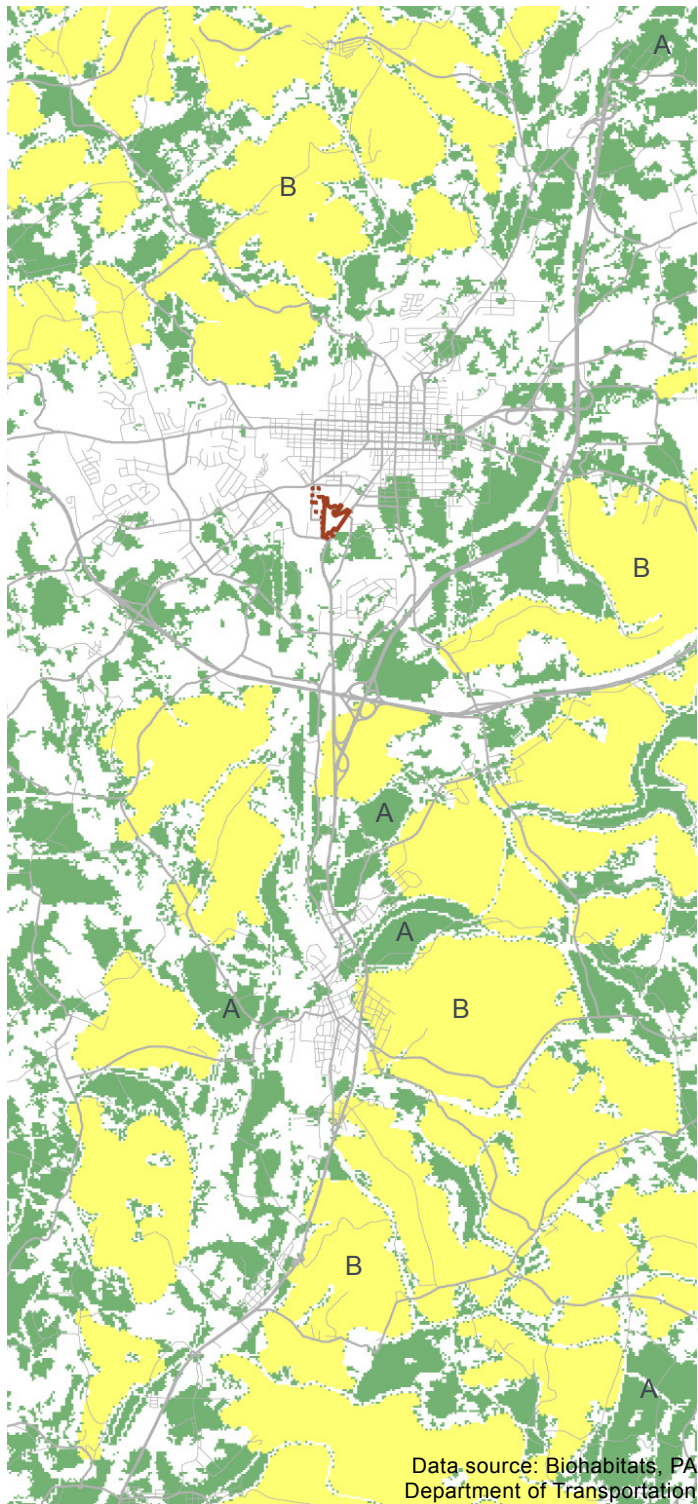
4. Lennon, Smith, Souleret Engineering, Inc. (2018)

SUB-WATERSHEDS

- A Yellow Creek
- B Backlick Creek
- C Crooked Creek-Sugar Run
- D Brush Creek
- E Cherry Run
- F Crooked Creek-Mitchell Run
- G Crooked Creek-Pine Run
- H Two Lick Creek



Data source: USGS National Hydrography Dataset, PA Department of Transportation



Data source: Biohabitats, PA Department of Transportation

HABITAT CONNECTIVITY

Large, intact habitat cores are important for wildlife connectivity within the region. For Confluence Discovery Park's existing conditions analysis, the Master Planning Team defined "habitat cores" as intact forest of 100 acres or more, uninterrupted by roads or other gaps. Confluence Discovery Park is approximately 6,500 feet from the closest habitat core to the north, and 8,000 feet from the closest habitat core to the south. However, some important habitat fragments to the south of Confluence Discovery Park

remain. In this context, habitat fragments serve an important ecological function as "stepping stones" for wildlife traveling between habitat cores. IUP's South Woods provide an important habitat fragment with some proximity to regional-habitat cores. Increasing stream and riparian-forest connectivity to the South Woods, along Stoney Run, presents an opportunity for Confluence Discovery Park to support local habitat connectivity.

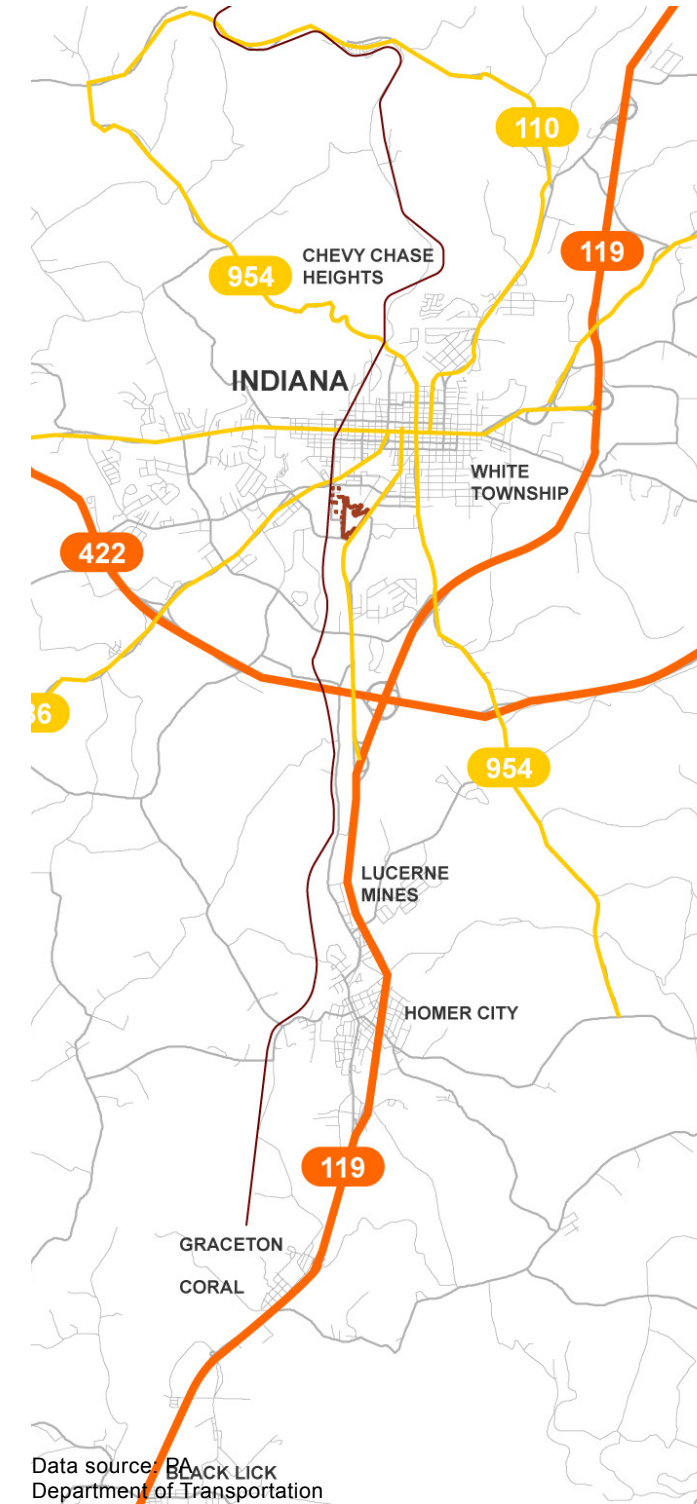
- A Habitat fragments
- B Intact habitat cores



REGIONAL ACCESS

IUP lies less than 1-mile from the U.S. Routes 422–119 interchange, and at the convergence of multiple state highways. This makes Confluence Discovery Park regionally accessible by car, as well as by Greyhound Bus. No passenger rail lines exist nearby. The county's public transit authority—IndiGO—maintains many bus routes, including Routes 3, 4, 10, and 12, which each run directly past Confluence Discovery Park. Additionally, a 10-mile long multi-use trail, called the Hoodlebug Trail, brings cyclists and runners from Blairsville, PA into Indiana, along the edge of Confluence Discovery Park.

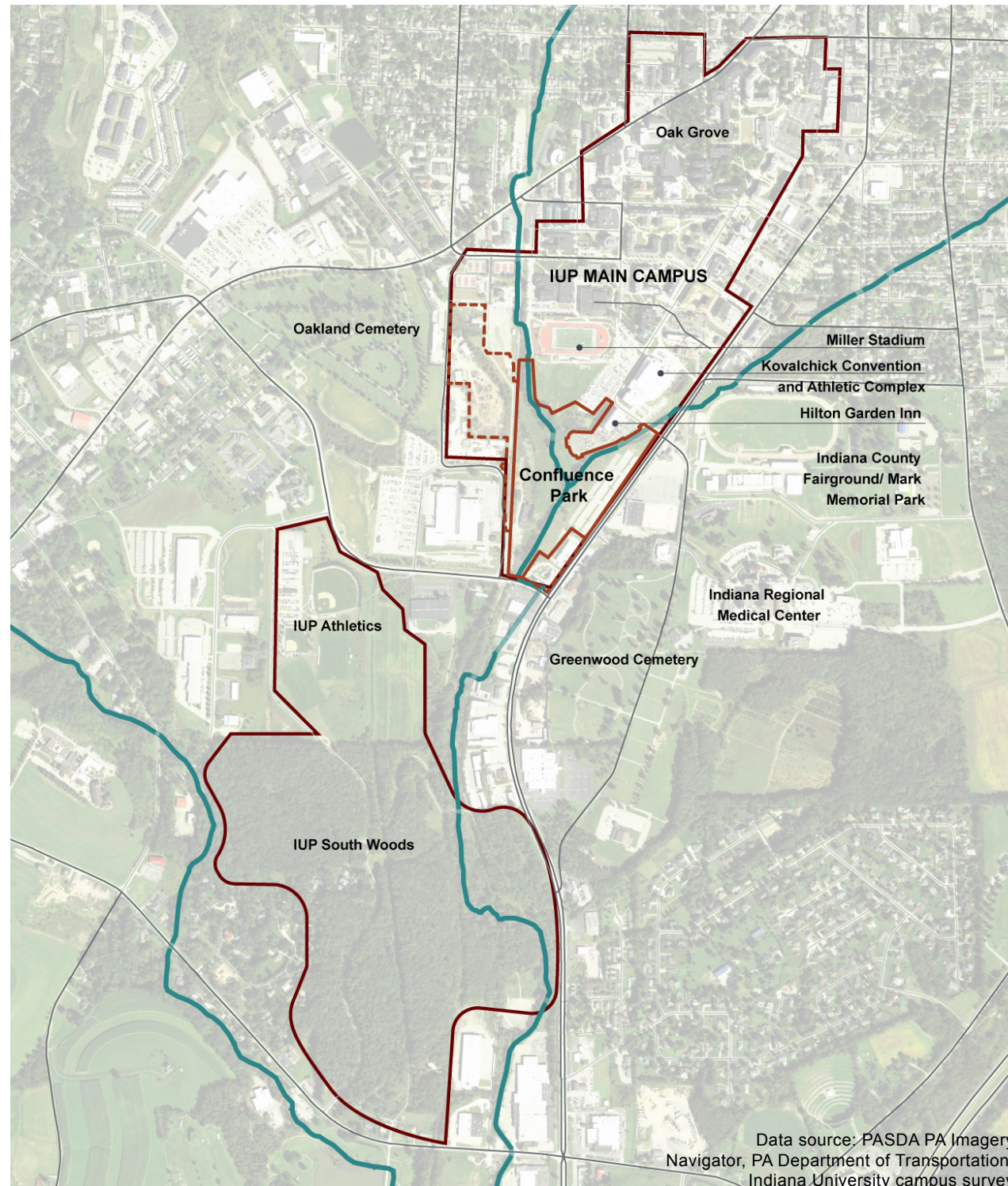
- Railroad
- State road
- Local road



Data source: PA Department of Transportation

SITE CONTEXT

Confluence Discovery Park is located at the heart of IUP's campus, southwest of Indiana's central business district. The 39-acre site's name aptly describes the amenity's location, which is at the confluence of three streams (see Understanding the Current Site) as well as various land uses and cover types. These include academic and mixed-use to the north; industrial and commercial immediately to the east, west, and south; and a mix of public open space, agricultural, and residential farther to the east, west, and south. This rich context offers Confluence Discovery Park potential physical and programmatic linkages to the surrounding university and community.



HISTORIC USE & OWNERSHIP

Indiana County's rich, cultural history dates back to 1000-1500 A.D., when native peoples established villages and began farming. Based on archaeological and anthropological findings, researchers from IUP estimate that the county was home to 20% of the Late Prehistoric villages in western PA. These researchers have found evidence of peoples specifically from the Monongahela culture in the southern half of the county, which is where the city of Indiana lies.⁶

European settlers established a trading post in nearby Shelocta, PA in 1727 to take advantage of the Kittanning Path, a Native American trail that ran near U.S. Route 422⁷, less than 1-mile southwest of Confluence Discovery Park. Given that many Native American villages in this county were located near streams and rivers, it's reasonable to assume that Monongahelas were present in or near Confluence Discovery Park. However, no archaeological evidence of this has yet been found. The 1760s brought more settlers, and with that, degradation of

dense forests across western PA⁸.

By the 1850s, the Pennsylvania Railroad Company completed its first rail line in Indiana County.⁹ It's unclear whether this is the rail line that bisects Confluence Discovery Park between the railroad tracks and Stoney Run as an intersection where multiple rail lines converged.¹⁰ This area of the site experienced continued use for passenger rail, mine transportation rail, and steel storage by the Kovalchick Corporation through the mid-1980s.¹¹

The portion of the site between Stoney Run and Wayne Avenue has contained mixed-use and commercial businesses since 1930. Multiple parcels existed there, including an area used by the Kovalchick Corporation for storage of rail and mining equipment. Two existing buildings in Confluence Discovery Park's southwest corner were built in 1961

to support a scrap yard, and in 1981, Beck Machine Company purchased the property for machine repair and chrome-plating activities. In 2014, IUP purchased this property and the environmental contaminants therein.¹²

- 6. Holmes & Chiarulli (2012)
- 7. Indiana County Center for Economic Operations (2015)
- 8. Holmes & Chiarulli (2012)
- 9. Indiana County Center for Economic Operations (2015)
- 10. Allegheny Arboretum Board (2017)
- 11. Allegheny Arboretum Board (2017)
- 12. Allegheny Arboretum Board (2017)



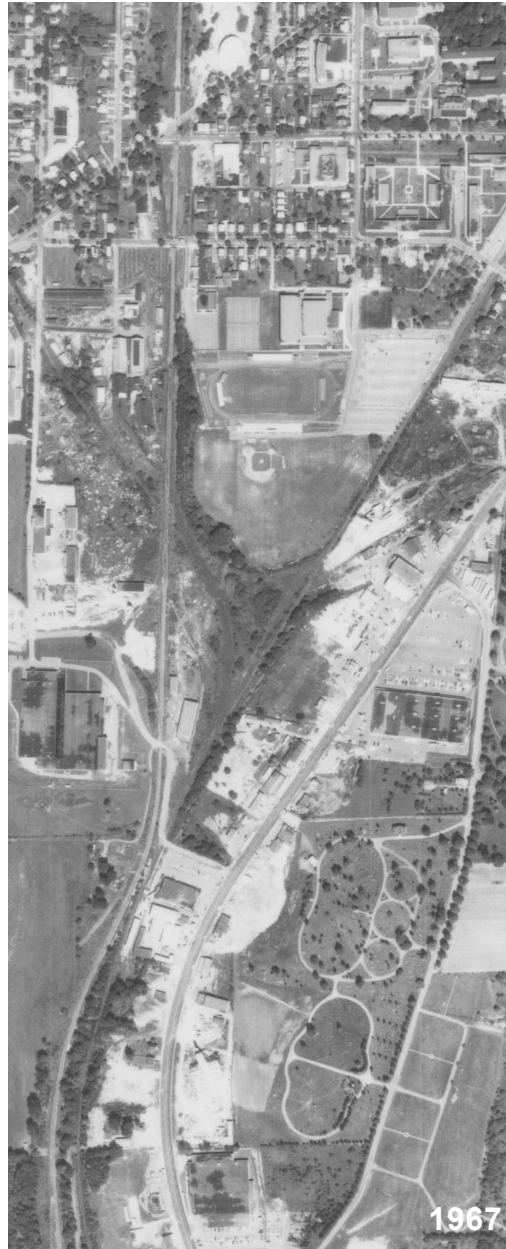
Data source: PASDA PA Imagery Navigator, PA Department of Transportation, Indiana University campus survey



1939



1957



1967



1993



2005



2008



2010



2015

Indiana Historical Aerial Photo Index

Google Earth

REMEDIATION

The site accrued contaminants from industrial and commercial use for more than a century. A 2014 environmental report by Mountain Research notes coal combustion byproducts, heavy metals (namely arsenic and lead), metal oxides, metal particles, polycyclic aromatic hydrocarbons, petroleum products, PCB's, and chlorinated solvents. The report states that, "contaminants have impacted surface soil and shallow groundwater within the property. Coal, coal cinders, and construction debris were used in the past to construct existing land surfaces. Runoff from exposed ground has carried coal cinders into local surface water systems."¹³

Site remediation over the years has included:

- Soil and rail ballast impacted by lead and benzene at concentrations that exceeded Site Specific Standards were excavated and removed for off-site disposal.
- Iron rust particles deposited by former steel rail and plate stockpile

operations were excavated and removed for off-site disposal.

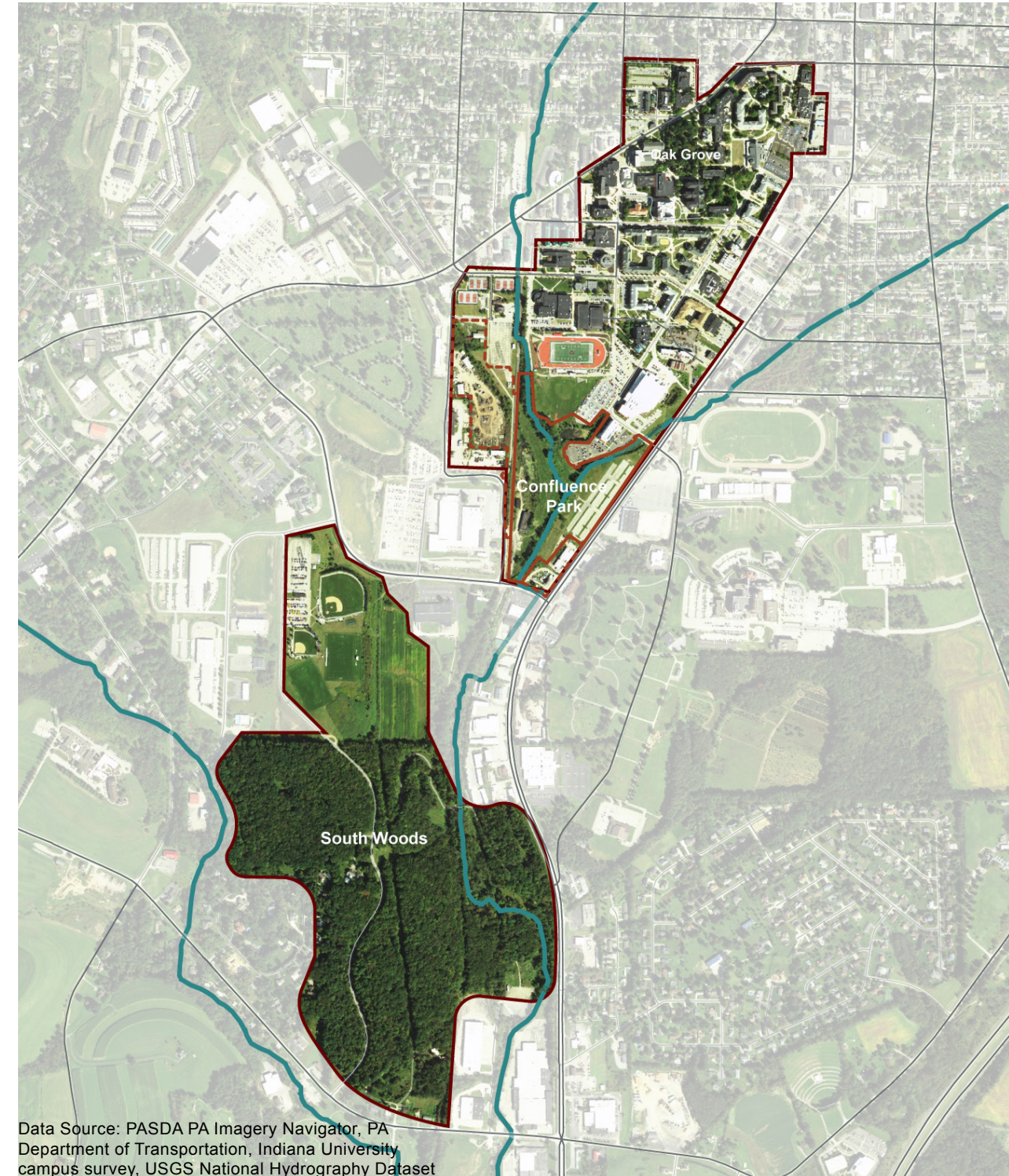
- Soil excavated during utility and building construction was reused within the area to fill depressions and establish surface grades to eliminate ponding and reduce stormwater infiltration.
- Former rail beds and associated coal cinder fill were left in place, based on site investigation findings that conditions met Non-Residential Direct Contact and Soil to Groundwater Statewide Health Standards.
- Soil cover was placed over the former rail beds and soil reuse areas as engineering controls to achieve Site Specific Standards by eliminating potential exposure pathways.¹⁴

13. Mountain Research, LLC (2014)

14. Mountain Research, LLC (2014)



Existing site - Andropogon



Data Source: PASDA PA Imagery Navigator, PA Department of Transportation, Indiana University campus survey, USGS National Hydrography Dataset

CAMPUS-AS-ARBORETUM (2000)



Since 2000, IUP's 354-acre campus proper has been considered an arboretum. Allegheny Arboretum, as it's known, originally focused on woody-plant identification, with a goal of expanding the arboretum's breadth and purpose to benefit the university and regional community. In 2005 the Allegheny Arboretum officially became part of IUP, under the management of the Vice President of Administration and Finance. An Arboretum Board formed to guide the development and expansion, and ensure continued success of the arboretum. Long-range plans proposed developing Confluence Park and providing connections to IUP's other large green spaces.

The Allegheny Arboretum's mission is: "To provide a learning environment that will advance our global understanding of temperate forests, cultivate an aesthetic appreciation for regional flora of the Allegheny Plateau, and demonstrate practical applications of woody plant materials to modify and mitigate local environmental conditions."¹⁵ The Arboretum

aims to achieve five goals in concert with this mission:

1. Provide a diverse, well-maintained, and well-documented collection of woody plants hardy to the Allegheny Plateau.
2. Demonstrate the aesthetic, environmental, and functional application of woody plants hardy to the Allegheny Plateau.
3. Establish "green linkages" between the community and the university.
4. Design an outdoor learning environment that will invite use by the general public, visitors, and Indiana University of Pennsylvania, as well as by other educational institutions.
5. Utilize existing and proposed facilities, both community and campus, wherever possible to minimize the initial cost of development.¹⁶

15. Indiana University of Pennsylvania (2018a)

16. Indiana University of Pennsylvania (2018a)



UNIVERSITY LONG RANGE FACILITIES MASTER PLAN (2011)

The *Confluence Discovery Park 2030 Master Plan* must align with IUP's *Long-Range Facilities Master Plan*, which envisions IUP's physical development through 2030 in concert with the *University Strategic Plan*. The primary area for coordination lies directly south of Miller Stadium. The *Long-Range Facilities Master Plan* proposes building an indoor, practice field house; relocating the existing practice fields; and building a new surface parking lot. The plan also proposes a new roadway that would connect Pratt Drive and Willow Avenue at Maple Street. Including the land directly west of the stadium in the *Confluence Discovery Park 2030 Master Plan* could be desirable, however, IUP's athletic and roadway expansion needs may limit arboretum-related development. Any new impervious development for athletics may also require stormwater management basins, etc. within this area.



ARBORETUM CONCEPT OVERLAY (2011)

The same year that IUP published the *Long-Range Facilities Master Plan*, the Arboretum Committee published the *Arboretum Concept Overlay* in 2011. This report reinforced the goals and objectives outlined during the arboretum's initiation and established three main green spaces within the arboretum: Oak Grove and Sutton Quadrangle, The Confluence (which later became Confluence Discovery Park), and South Woods.

The *Arboretum Concept Overlay* envisioned Confluence Discovery Park as a “21st century Arboretum [that] takes center stage at the new primary entry point to campus and the Kovalchick Complex from Wayne Avenue.” In addition to providing an important gateway to campus, the plan anticipated that “restored creeks, new ponds, riparian forests, mesic meadows and naturalized plantings will create a unique and stunning entry impression. Its natural and created water bodies provide beauty, habitat, learning opportunities, and artful stormwater management. The Confluence's paths, boardwalks and pavilions support

exploration and respite; its planting of native and adapted species celebrate the richness and beauty of our regions' flora.”

The *Arboretum Concept Overlay* also identified three new pedestrian connections, termed “Arboretum Ways,” intended to link the three zones. The first Arboretum Way—the existing Hoodlebug Trail—would link the South Woods to the central campus. A proposed North Arboretum Way could link the western side of campus from Confluence Discovery Park, while an East Arboretum Way could link Confluence Discovery Park to the Oak Grove and northern campus. The report also proposes extending Pratt Drive into Confluence Discovery Park to connect with S. 13th Street, as well as extending Pratt Drive to 12th Street.

The report identified Confluence Discovery Park as the Allegheny Arboretum's geographic and programmatic linchpin, due to the site's central, prominent location. The report framed Confluence Discovery Park

as a transformational landscape that, due to its location, could also become an important gateway for IUP and the community. To achieve this vision, the *Arboretum Concept Overlay* proposes the following program:

- IUP Welcome Center combined with an arboretum visitors center
- Teaching and research destinations
- Stormwater management restoration and new features
- Trails of various types and materials with nodes
- Demolition of the two existing buildings
- Restored woodlands, wetlands, meadows, and drainage ways
- New gardens and plantings



The *Arboretum Concept Overlay* also proposed a design and development timeline. Phase One (2011–2016) consists of developing the Confluence Discovery Park Master Plan, completed by May 2019. Phase Two (2018–2020) consists of the implementation of the Arboretum Welcome Center and the proposed University Visitors Center. Phase Three (through 2030) is for construction of the essential elements of the arboretum with installation of the connecting pedestrian corridor's other features.

The *Arboretum Concept Overlay* contained three key recommendations, which are quite relevant to the *Confluence Discovery Park 2030 Master Plan*:

1. Select an Arboretum Director, “Face of Arboretum”
2. Create a fundraising component, “Friends of the Arboretum”
3. Develop a master plan – Phase I, Confluence and Welcome Center Zone



INDIANA CAMPUS LONG RANGE FACILITIES MASTER PLAN REVISION/UPDATE (2017)

Effective master plans remain flexible, so as to adapt to changing needs over time. The *Long Range Facilities Master Plan* is therefore aptly updated every three years, until a full update becomes necessary. This was the case in 2014, and then again in 2017, when IUP released the *Indiana Campus Long Range Facilities Master Plan Revision/Update*. The *Confluence Discovery Park 2030 Master Plan* will influence this document further, which could trigger the need for an amendment or additional update.



- | | |
|---|---|
| <ul style="list-style-type: none"> (A) Repurpose Pratt Hall (B) Academic Commons Construction (C) Davis Hall <ul style="list-style-type: none"> • Relocate Child Care • Demolition (D) Ackerman Repurpose or Demolition (E) Sutton Hall East Lawn & Fountain (G) Allegheny Arboretum KCAK Site Design & Construction | <ul style="list-style-type: none"> (H) Update, Renovate, or Repurpose <ul style="list-style-type: none"> • Stouffer Hall • Zink Hall • Johnson Hall • Sprowls Hall • Pierce Hall (I) Athletic Improvements Phases 3-6 (J) 12th Street Extension - Maple Street KCAC (K) Pratt Drive Extension - KCAC to Rose Street (L) Stadium Parking Garage (M) West Campus Entrance / Maple St. Improvements |
|---|---|

IUP STORMWATER MASTER PLAN (2018)

- AREAS OF CONCERN
- Pratt Drive Mains
 - Robertshaw Complex
 - Basin 4
 - Stoney Run / Confluence Park



In 2018 IUP published its *Stormwater Master Plan* in order to, “develop a series of goals and accompanying objectives to ensure responsible management of stormwater and to reduce the University’s stormwater impacts.”¹⁸ The plan included a detailed inventory of existing stormwater impacts throughout the campus and focused on four goals:

- Work to reduce harm to people and property caused by stormwater
- Promote the health of local streams and maintain sufficient quantity and quality of water
- Approach stormwater management in a way that is compliant with anticipated municipal and state regulations for sustainable development
- Develop and maintain facilities and programs consistent with the University’s and community’s character ¹⁹

The plan identified the Confluence Discovery Park region as one of four “areas of concern” that require stormwater improvement. Specifically, the plan notes this area’s riverine flooding, stream bank erosion, and sedimentation. The plan lists stream bank restoration within Confluence Discovery Park as a targeted project for completion by 2025 with an estimated \$1.17 million cumulative cost. Projected benefits include stream bank stabilization, infiltration, filtration, and thermal mitigation.

18. Entech Engineering, Inc. (2018)
19. Entech Engineering, Inc. (2018)



Birdwatching - Janet Kegg

ALLEGHENY ARBORETUM BOARD'S PREVIOUS PROJECT GOALS

The Allegheny Arboretum Board supports various campus-wide initiatives that could benefit Confluence Discovery Park, including designating locations for outdoor sculpture, enhancing a digital and printed tree-tour guide, incorporating memorial plaques on benches, providing interpretive signage, and planting additional trees. The Board also focuses on community outreach in order to educate and inspire IUP leadership, neighbors, and regional lawmakers.

In its 2016-2017 annual report, the Board describes Confluence Discovery Park as a landscape with currently-unrealized potential. “The Confluence Discovery Park concept aspires to turn a degraded

industrial floodplain site with an eroding stream system into a healthy and beautiful stream network with restored floodplain, new ponds, riparian forests, mesic meadows, and naturalized plantings,” says the report, echoing IUP’s *2011 Arboretum Concept Overlay*, “Its natural and modified water bodies will provide beauty, habitat, learning opportunities, and artful stormwater management.”²⁰ The report additionally describes Confluence Discovery Park as an outdoor classroom and laboratory, for use by IUP and the community, and an economic development driver.

20. Allegheny Arboretum Board (2017)

SITE EXTENTS

Confluence Discovery Park's 39-acre site aggregates two adjacent landscapes that lie on either side of the rail line, cradled between S. 13th Street and Wayne Avenue. The site is additionally bordered by Rose Street to the south, Pratt Drive to the northeast, Miller Stadium to the north, and S. Fisher Avenue to the northwest.



Biohabitats



Biohabitats






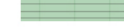


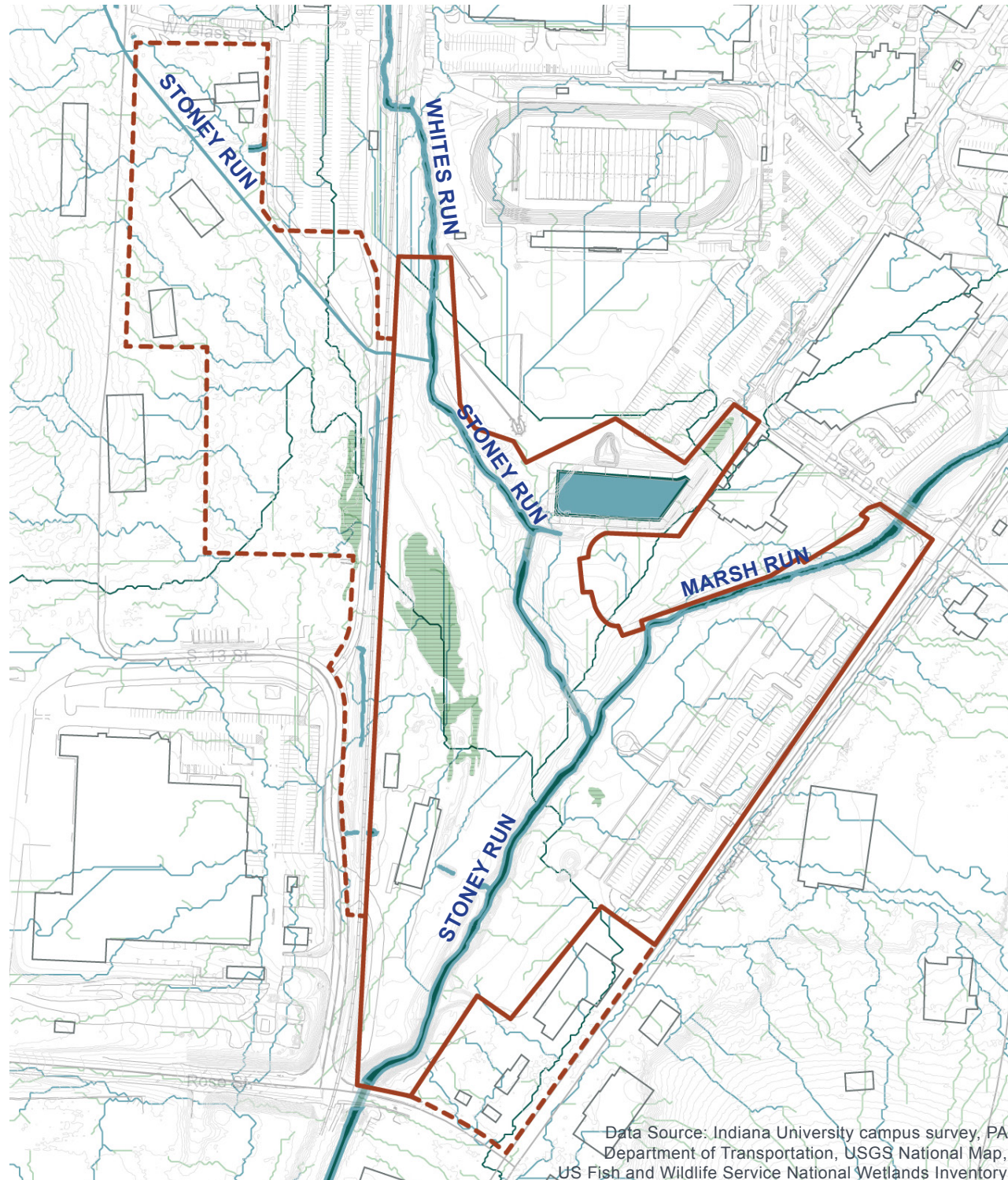
Biohabitats



Biohabitats

STREAMS & FLOW PATHS

-  Low surface flow
-  Medium surface flow
-  High surface flow
-  Stream
-  Wetland
-  Retention pond



Data Source: Indiana University campus survey, PA Department of Transportation, USGS National Map, US Fish and Wildlife Service National Wetlands Inventory

HYDROLOGICAL SYSTEMS

Three perennial streams²¹—Stoney Run, Whites Run, and Marsh Run—converge within Confluence Discovery Park and exit the site to the south together, as Stoney Run. Stream disturbance and upland development throughout the site’s history have resulted in poor stream morphology and health. The hydrology of Stoney Run, west of the railway, has been manipulated over time, and appears today partially as a swale or perennial stream with some wetland characteristics.

Today, the streams are regularly inundated during storm events (this is characterized as “flashy” flow), and as a result, the banks are steeper and less stable than those of healthier streams. The streams’ flow paths are naturally migrating, which will cause the stream banks to erode further and could potentially expose contaminated soil located beneath the site’s two-foot-thick, clean soil cap and also violate requirements to maintain the cap vegetation and soil integrity.

Erosion-caused dispersal of contaminants is a potential threat to Confluence Discovery Park (as well as downstream waterways) because the stream banks and bed are unstable and the site is prone to flooding, which occurred most recently in 2017.²² Most of the site occupies the 100-year floodplain, as currently designated by FEMA. These areas have a 1% chance of flooding each year, whereas smaller portions of the site that fall within the 500-year floodplain have a 0.2% chance of flooding each year. In November 2017, Lennon, Smith, Souleret Engineers, Inc. proposed a substantial FEMA map revision (later revised March 2018) that would reduce restrictions posed by the FEMA floodplain and floodway. FEMA has not yet approved this revision. (See Appendices D, F, & G)

HYDROLOGIC OPPORTUNITIES


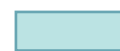

- Manage rainwater and mitigate flood-risk
- Restore stream and daylight perennial stream west of railway
- Update FEMA flood map with reduced floodplain and floodway delineation

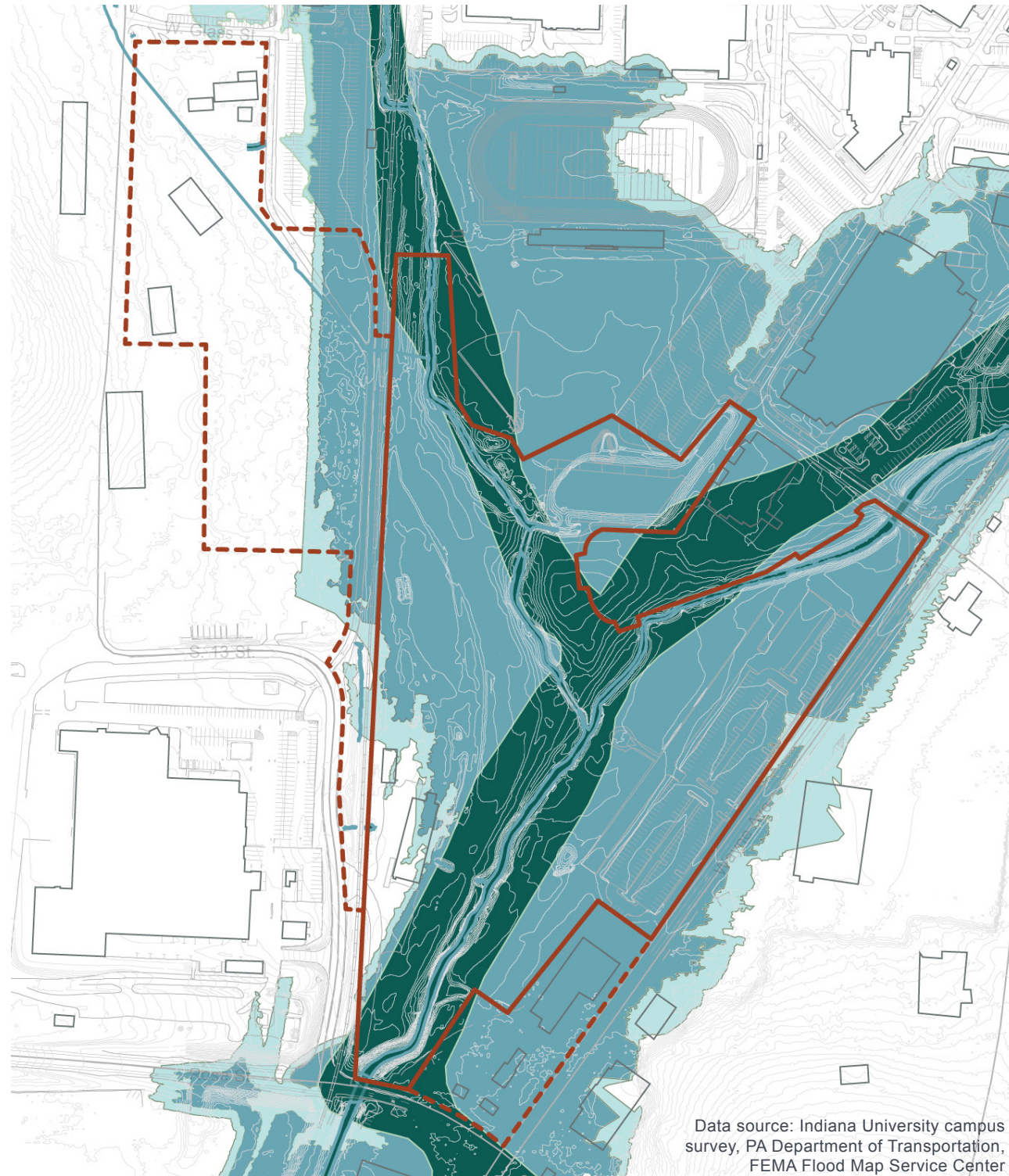
HYDROLOGIC CONSTRAINTS

- Shallow water table within 2 meters (6.6 feet) of the ground surface²³
- Local, state, and federal permitting required for encroachment within floodway

21. Lennon, Smith, Souleret Engineering, Inc. (2018)
 22. Allegheny Arboretum Board (2017)
 23. Allegheny Arboretum Board (2017)





FLOOD RISK

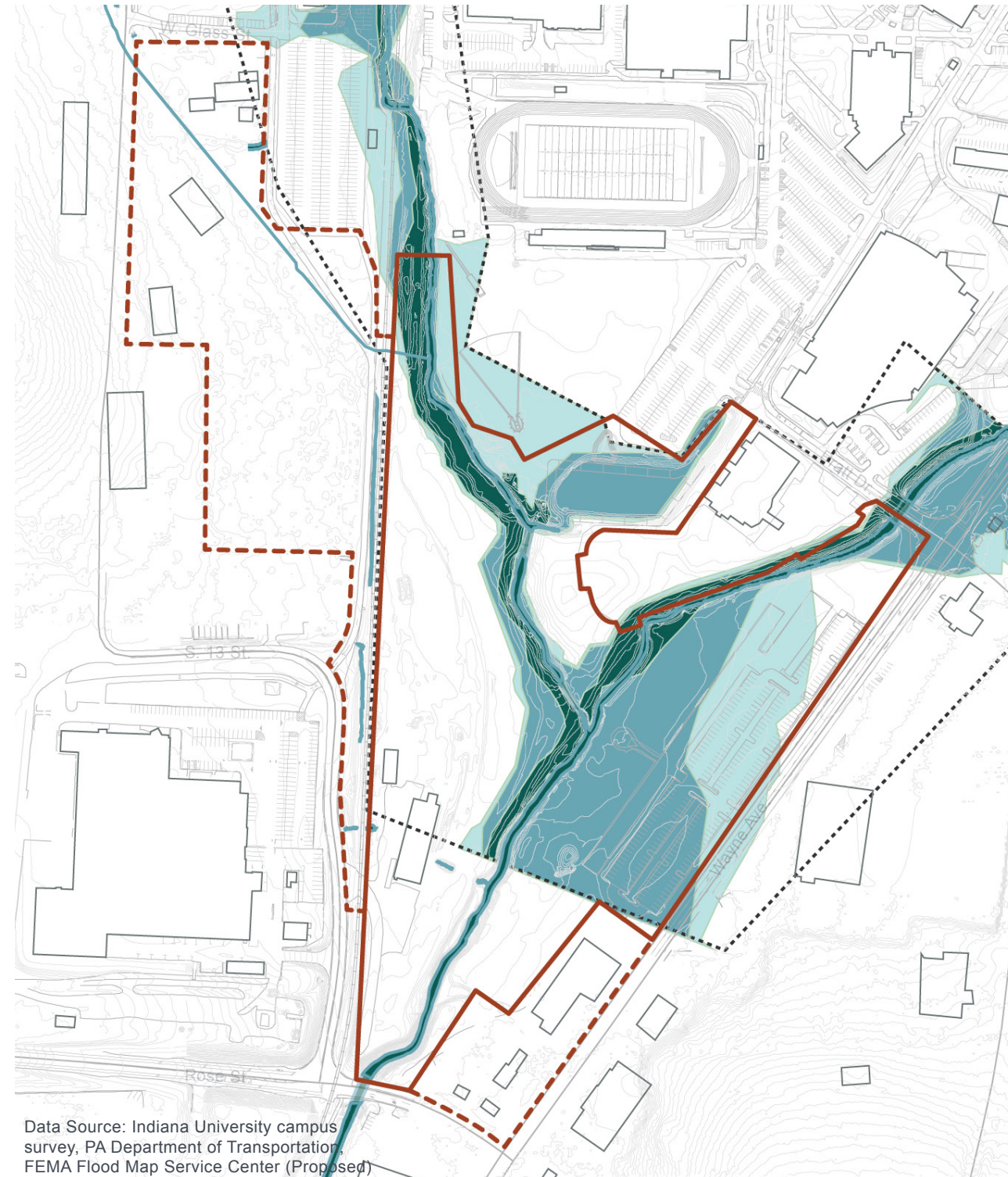
-  FEMA floodway
-  FEMA 100-year floodplain boundary
-  FEMA 500-year floodplain boundary



Data source: Indiana University campus survey, PA Department of Transportation, FEMA Flood Map Service Center

FLOOD RISK

-  Proposed floodway
-  Proposed 100-year floodplain boundary
-  Proposed 500-year floodplain boundary
-  Limit of Study



Data Source: Indiana University campus survey, PA Department of Transportation, FEMA Flood Map Service Center (Proposed)

REMEDIATION ZONES

Confluence Discovery Park's historic land use introduced contamination to the brownfield site, which was remediated through removal and disposal of structures and contaminated soils from 2007-2009. A two-foot-thick, clean soil cap was also installed, which must be either maintained with soil and plants or replaced with pavement. Soil cap erosion greater than 6-inches deep must be repaired. The Pennsylvania Department of Environmental Protection (PADEP) approved the remediation effort by recording an Environmental Covenant in 2011.²⁴

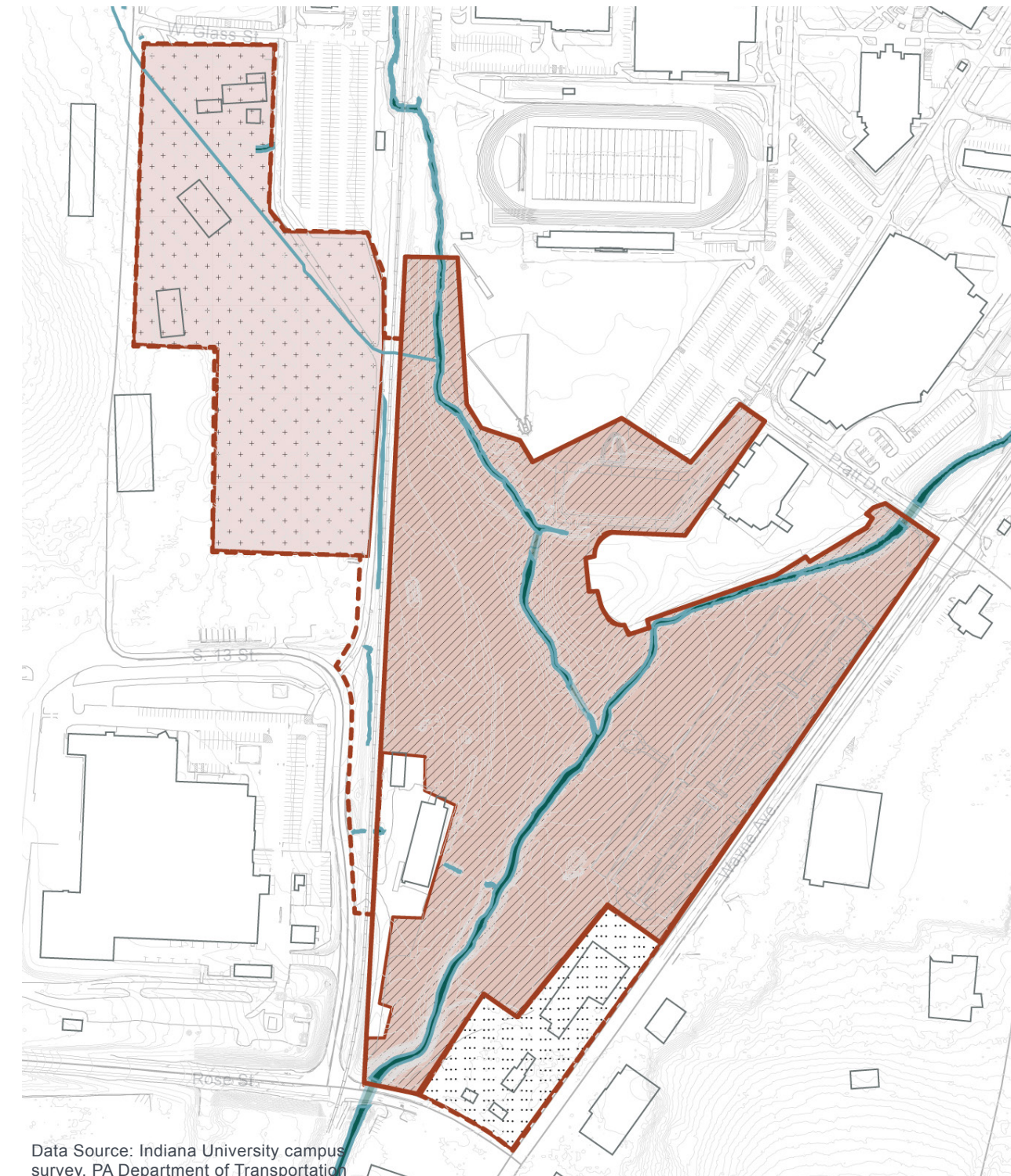
Investigations between 1990 and 2006 within the brownfield tested soil, sediment, and groundwater samples for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), Target Analyte List (TAL) Metals, and polychlorinated biphenyls (PCBs). Contaminants exceeding the Act 2 Statewide Health Standards within the study area included benzene, benzo(a)pyrene, dibenzo(a,h)anthracene, thallium, lead, arsenic, and iron. Testing in 2013 on the Beck Machinery site, which is on the

western edge of the property and outside the Act 2 brownfield parcel additionally found elevated arsenic in the soil, as well as metals (antimony, iron, and manganese) in the groundwater.²⁵

Substantial brownfield development considerations exist, regardless of whether the site is left in its current condition or if earthwork activities are undertaken for site improvements. Considerations include soil cap maintenance requirements and PADEP-approval requirements for subsurface activities. Any proposed site management, excavation, and construction activities will need to meet requirements of the site's 2009 Post Remediation Care Plan and 2011 Environmental Covenant.


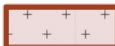

24. Civil & Environmental Consultants, Inc. (2018)

25. Civil & Environmental Consultants, Inc. (2018)



Data Source: Indiana University campus survey, PA Department of Transportation

REMEDIATION ZONES

-  2007-2009
-  2019-2020
-  Proposed future area



SPATIAL ECOLOGY

Various portions of Confluence Discovery Park contain a unique spatial ecology, as determined by their abiotic conditions, species composition, potential functions, and disturbance histories. This inventory and analysis identifies nine of these zones within the Confluence Discovery Park between the railroad tracks and Wayne Avenue: Stoney Run to Whites Run, Whites Run and Stoney Run North of Retention Pond, Retention Pond, Stoney Run South of Retention Pond, Marsh Run to Stoney Run, Stoney Run to Rose Street, Dense Tree Stand East of Industrial Building, Mesic Meadow, and Wetland. Existing ecological health and habitat suitability—which are fairly degraded—will likely impact the design and management of these zones. See the Technical Appendices that accompany this master plan, which include a full report.

ECOLOGICAL OPPORTUNITIES

- Restore and maintain varied habitat types
- Reconnect stream to floodplain
- Stabilize stream banks
- Manage nutrient loading
- Mitigate thermal loading within streams and retention pond
- Manage invasive plant species
- Enhance vegetated canopy, understory, and herbaceous layers
- Strengthen ecosystem functioning within and between spatial ecology zones
- Increase stream and wooded riparian edge connectivity to the South Woods, along Stoney Run, to support local habitat connectivity

ECOLOGICAL CONSTRAINTS

- High amount of impervious surface in watershed
- Lack of stream and floodplain connectivity
- Narrow riparian buffer with streambank erosion and invasive species pressure
- Limited soil depth and damaged soil ecology
- Capped brownfields within historic floodplain
- Poor water quality and presence of thermal loading
- Lack of micro-topography



EXISTING VEGETATION

- A Wet meadow
- B Wetland
- C Mesic meadow
- D Wooded riparian corridor
- E Emergent vegetation



SITE CIRCULATION & ACCESS

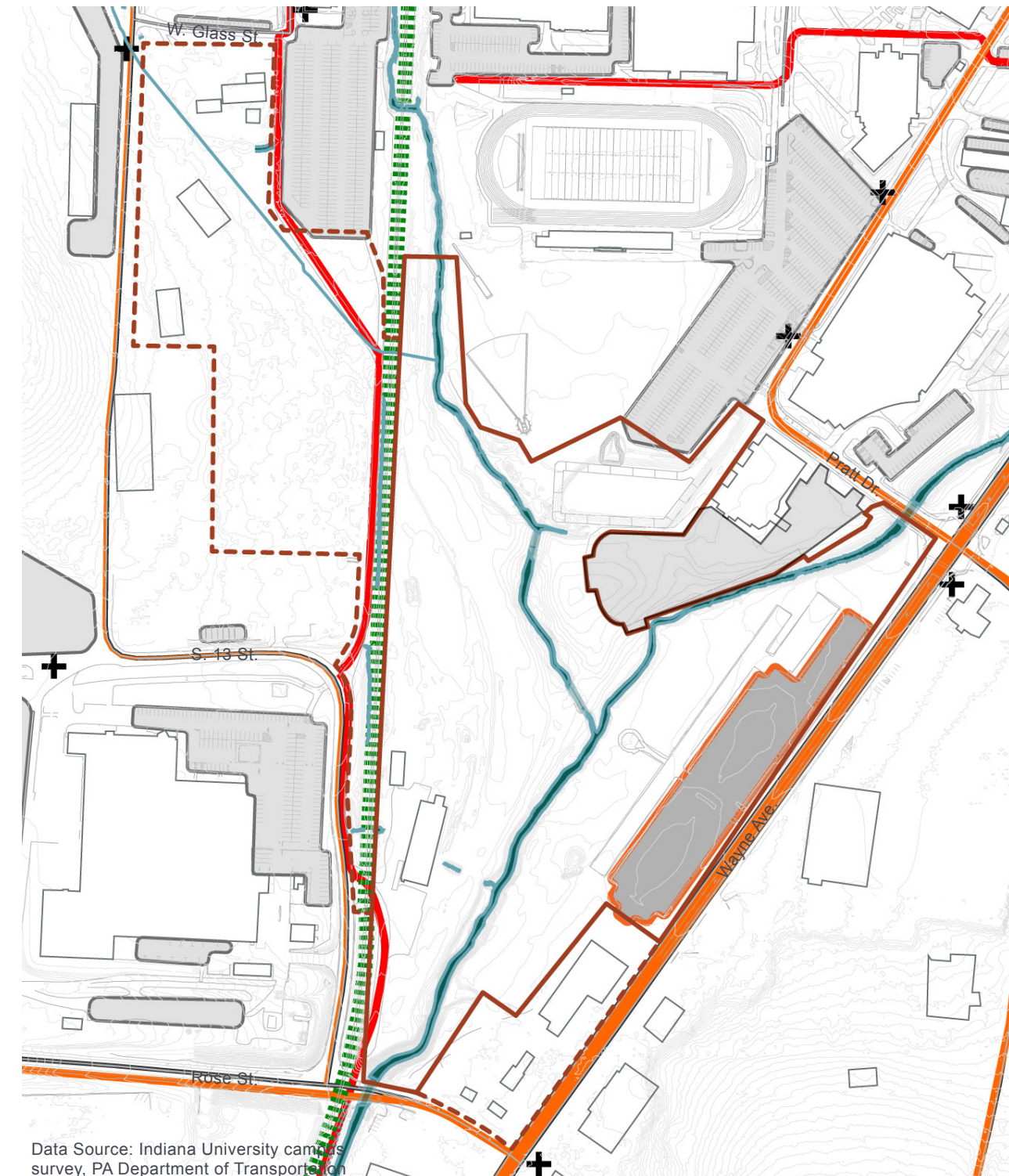
Confluence Discovery Park is currently surrounded by parking lots and circulation routes, some of which pass through or project into the parkland. Five different roads border the site, ranging from service roads to the vehicular arterial, Wayne Avenue. More than five IndiGO bus stops lie along the roads abutting Confluence Discovery Park. The multi-use Hoodlebug Trail cuts through Confluence Discovery Park in the north-south direction and functions as a critical-recreation and bicycle-commuting connection extending southward. A large parking lot along Wayne Avenue was built in 2011 and expanded by 2015, but is reportedly underutilized. Another sizable parking lot, which services the hotel and was built in 2016, extends toward the heart of Confluence Discovery Park. In aggregate, these parking lots possess a significant footprint and both occupy the 100-year floodplain according to the current FEMA delineation. The hotel lot additionally occupies the floodway almost in its entirety. None of these circulation routes nor parking areas provide a formal access point to Confluence Discovery Park.

CIRCULATION OPPORTUNITIES

- Provide formal, multi-modal access points to Confluence Discovery Park
- Create a multi-use connection across Confluence Discovery Park that connects the Hoodlebug Trail to Pratt Drive
- Remove or reduce the scale of the parking area along Wayne Avenue (to increase area of green space and rainwater management)
- Relocate part of the hotel parking area to a future parking garage (to return the heart of Confluence Discovery Park to green space and enhance rainwater management within the floodway)

CIRCULATION CONSTRAINTS

- A multi-use connection from the Hoodlebug Trail to Pratt Drive could require relocating or modifying the hotel's existing retention basin
- Extending Pratt Drive to S. 13th Street (as proposed in the 2011 Arboretum Concept Overlay) would cut through Confluence Discovery Park's existing wetlands and could contribute to further rainwater management problems



Data Source: Indiana University campus survey, PA Department of Transportation



EXISTING SITE CIRCULATION

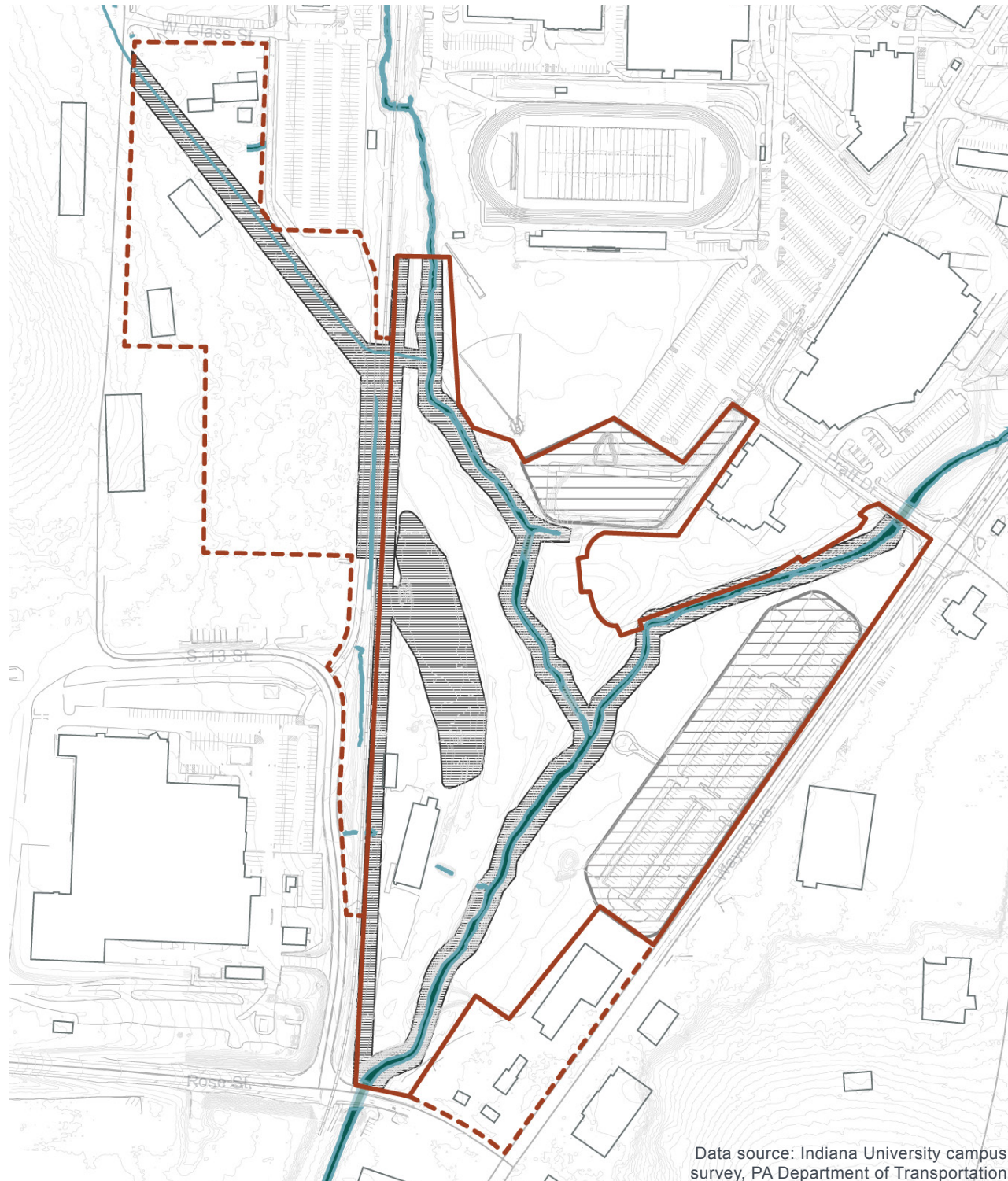
- Parking within the Park
- Parking beyond the Park
- Road
- ⋮ Rail line
- Multi-use path
- ⊕ Public bus stop



SITE FRAGMENTATION

Various manmade and natural elements divide Confluence Discovery Park into a series of sliver-shaped parcels. Most notably, the active rail line and adjacent Hoodlebug Trail separate the site's western section from its larger eastern portion. The rail line, in particular, creates not just a visual barrier, but also a barrier to access while long trains move through the site. The three streams that converge within Confluence Discovery Park further subdivide the site. The surrounding, wooded riparian corridor and steep, eroded banks inhibit stream crossing, thereby further fragmenting the site. Any new stream crossings, such as for pedestrian bridges, would need to be permitted by PADEP/ USACE. Lastly, the parking areas along Wayne Avenue and at the hotel further compress Confluence Discovery Park's remaining green space and wildlife habitat.



-  Stream, wetland, rail line
-  New parking area, steep slope

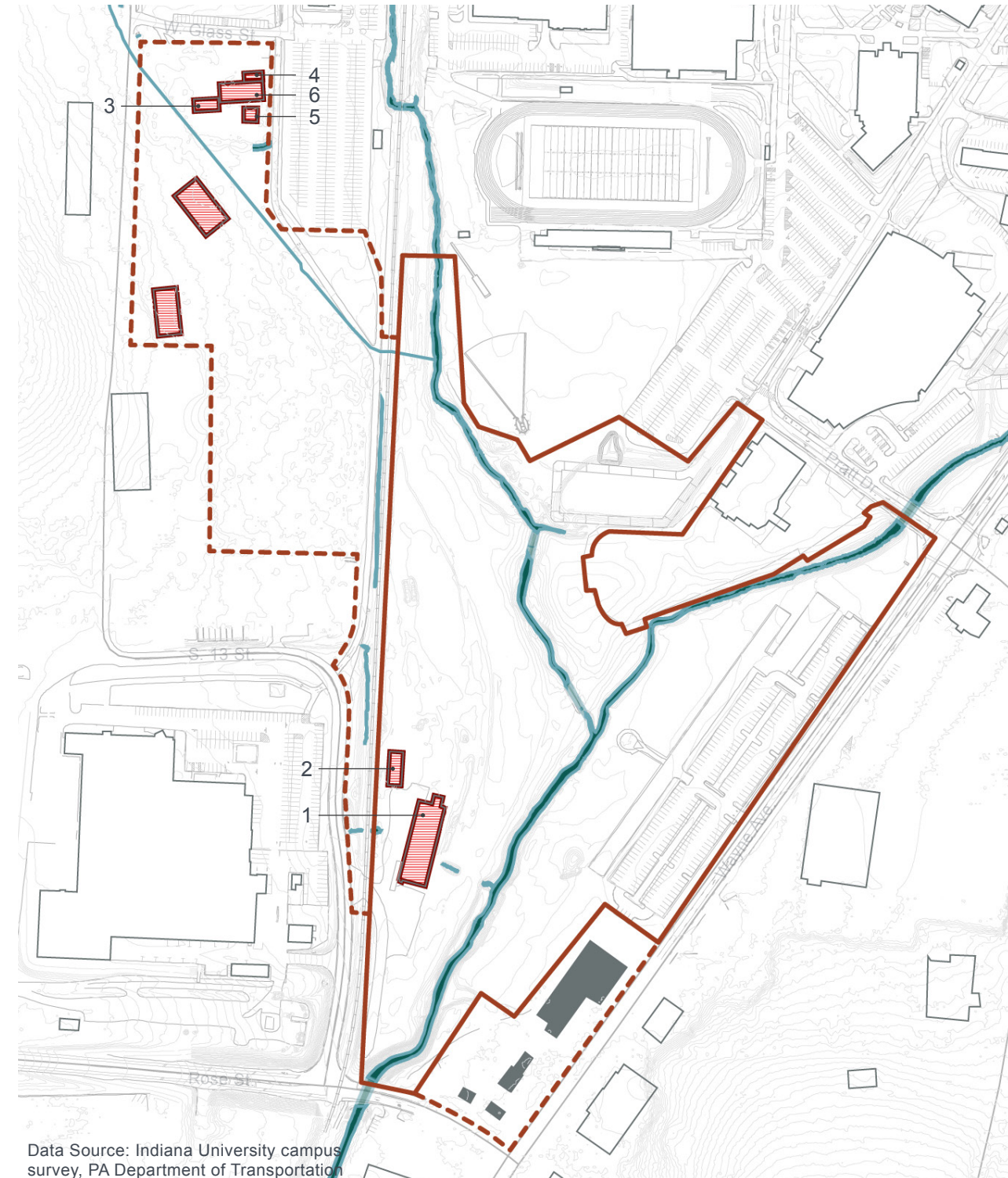


Data source: Indiana University campus survey, PA Department of Transportation

BUILDINGS & STRUCTURES

Confluence Discovery Park contains eight existing buildings and structures: two vacant, industrial buildings in the southwest corner (built in 1961); five industrial buildings/structures in the northwest corner (date unknown); and a hotel in the northeast corner (built in 2016). The Master Planning Team assessed the structural properties and re-use potential of the industrial buildings in the southwest corner, to determine their suitability for a University Welcome Center and/or Arboretum Visitor Center. See Appendix D and the Technical Appendices that accompany this master plan, which include a full report.

-  Building/structure in use
-  Vacant building/structure



Data Source: Indiana University campus survey, PA Department of Transportation

UNDERSTANDING STAKEHOLDER PRIORITIES

DESIRED PROGRAM

Understanding Confluence Discovery Park's desired program is as equally important as analyzing the landscape's physical character. The Master Planning Team therefore administered a survey to the Allegheny Arboretum Steering Committee, which represents IUP, the surrounding community, and local government representatives/the city planning commission. The Committee's leading, programmatic priorities for site infrastructure centered on multi-modal circulation, ecological restoration, and education/research infrastructure. Top priorities for building infrastructure addressed communication/interpretive signage; maintenance and office space; and visitor amenities. Leading priorities for operations and maintenance involved solidifying arboretum leadership, land management training, and community engagement. See Appendix C for the results.

INSTITUTIONAL GOALS

The Committee's programmatic priorities, paired with the site's history, indicate that Confluence Discovery Park's character will be a welcome compliment to that of the state's other arboreta. Opportunities for regenerative remediation, ecological restoration, and field research will help Confluence Discovery Park stand out and could attract visitors from the region. Due to its location, Confluence Discovery Park will also provide an important gateway to IUP's Main Campus and the community.

EDUCATIONAL & RESEARCH GOALS

Education and research are primary goals of the Allegheny Arboretum²⁶, and as such, these priorities extend to Confluence Discovery Park. Significant opportunity and excitement exists for curricular integration and field research within the amenity space. Supporting infrastructure could range in formality from outdoor classrooms to living

laboratories to permanent research plots. IUP's academic departments most likely to conduct field research within Confluence Discovery Park are Ornithology, Biology, Geography, Environmental Engineering, Environmental Planning, and Geoscience, while others—including Art, Communications Media, Education, Sustainability, and Social Sciences—expressed interest in non-research, curricular integration.²⁷

COMMUNITY GOALS

The Committee and supporting documents produced by IUP indicate that the community's most important goals for Confluence Discovery Park are access and engagement. Once built, the park could also become a catalyst for ecological restoration, sustainable redevelopment, and economic development in the city and region.

OPERATIONAL & MANAGEMENT GOALS

Operations and management are core to Confluence Discovery Park's success. Adaptive management is the process of recording, assessing, and adjusting management practices in order to improve their effectiveness over time. This practice can help IUP achieve its landscape vision for Confluence Discovery Park by recording information that can be easily accessed and understood by new management personnel, thereby building knowledge over time and making efforts more effective and efficient. Each area of the park will likely require a unique adaptive management approach, and the effort involved may change over time as the site's restored ecosystems evolve. The Board's priorities involving leadership, land management training, and community engagement can all enhance an adaptive management approach.

PRELIMINARY RECOMMENDATIONS

1. Carefully consider the site's hydrologic regime and take measures to reduce rainwater runoff on-site and upstream.

2. Restore stream banks and stream beds to manage stormwater flows within physically and biologically stable configurations that resist erosion, support a robust riparian plant community, and enhance the beauty and diversity of Confluence Discovery Park.
3. Follow local, state, and federal regulations for brownfield development.
4. Restore site-appropriate, local habitat types and enhance biodiversity.
5. Reduce the site's visual and physical fragmentation.
6. Build a new University Welcome Center and/or Allegheny Arboretum Visitor Center.
7. Acquire the adjacent parcels along S. 13th Street and at the intersection of Wayne Avenue and Rose Street.

26. Allegheny Arboretum Board (2017)

27. Allegheny Arboretum Academic Committee (2019)



Ecological restoration



Field research - Andropogon



Nest box building - Bevel Furniture Woodworking

A lush green forest floor with large-leafed plants and fallen logs. The scene is filled with vibrant green foliage, including large-leafed plants in the foreground and a dense canopy of trees in the background. Two large, weathered logs lie horizontally across the middle ground, adding texture and depth to the scene. The lighting is soft and natural, highlighting the various shades of green.

3 THE VISION

MASTER PLAN SUMMARY

The *Confluence Discovery Park 2030 Master Plan* lays the groundwork for transforming a contaminated, post-industrial landscape into an ecological, academic, and community resource. The plan envisions a vibrant, ecologically-rich open space that functions as a living laboratory and natural respite.

In addition to academic and social benefits, Confluence Discovery Park will provide vital ecosystem services, including rainwater management, carbon sequestration, urban heat island effect mitigation, habitat provision, and biophilic exposure for visitors. Adaptive land management will guide Confluence Discovery Park's restored habitats as they mature and become increasingly resilient over time.



Stewardship Garage
Stewardship Office

Meadow monitoring plots
Bird blind

Research nursery with deer fence
Bird blind

Meadow monitoring plots

Outdoor classroom
North Wetland

Outdoor classroom
Confluence Wetland

Wetland boardwalk

Overlook Pavilion / outdoor classroom

Pollinator Meadow

Wet meadow

Bird blinds

Outdoor classroom

Allegheny Arboretum Visitor Center
(with green roof & solar array)

Multi-use path

South Wetland

Welcome signage

North gathering
entrance

Frog Pond

Welcome signage
Vernal pool

Eco-lawn

Successional forest

Wooded riparian corridor

Permeable overflow
parking area

Existing parking lot

Restored stream

Bus drop-off

East gathering
entrance

Pedestrian bridge (typ.)

ADA-accessible stream
access



STEWARDSHIP HUB



VISITOR HUB

HYDROLOGIC ARMATURE

SITE ORGANIZATION

Confluence Discovery Park will be organized around two activity hubs containing buildings and other physical infrastructure. These hubs will support visitors and Allegheny Arboretum staff before and/or after they are immersed in Confluence Discovery Park's landscape.

VISITOR HUB

Toward the southern end of the park, the Visitor Hub will provide a main destination for class orientation, a meeting point for community engagement, and a venue for events. The Allegheny Arboretum Visitor Center will function as the vibrant heart of this hub, with diverse programming indoors and a surrounding landscape that supports gathering, outdoor learning, and discovery. The Wetland Boardwalk and connecting, ADA-accessible trails, will allow visitors to easily explore Confluence Discovery Park's diverse habitats, within close proximity to the Allegheny Arboretum Visitor Center.

STEWARDSHIP HUB

At the northern end of the park, the Stewardship Hub will provide a home base for the Allegheny Arboretum's operations and land management activities. This zone will support offices, vehicular and equipment storage, material stockpiles, with easy access to the rest of Confluence Discovery Park via the trail system and surrounding roads. The hub will also provide gathering space and potentially office space for faculty and students.

HYDROLOGIC ARMATURE

The activity hubs will be woven together by a second, organizing element: hydrology. The restored streams flowing through Confluence Discovery Park will provide an armature that organizes the surrounding, natural environments. The riparian corridor, wetlands, wet meadows, mesic meadows, and successional forest are in large part

defined by their hydrologic regime, or "moisture content." As visitors move through these habitats to learn, relax, exercise, or be immersed in nature, this armature will help them navigate the landscape and feel a sense of place within each habitat.

MESIC MEADOW



- Parking area
- Bike rack
- Stewardship garage
- Stewardship office
- Pedestrian bridge - ADA accessible
- Multi-use path
- Restored stream
- Meadow monitoring plots
- Bird blind
- Research nursery with deer fence
- Bird blind
- Railway crossing
- Meadow monitoring plots
- Wet meadow
- North Wetland
- Outdoor classroom
- Wetland boardwalk



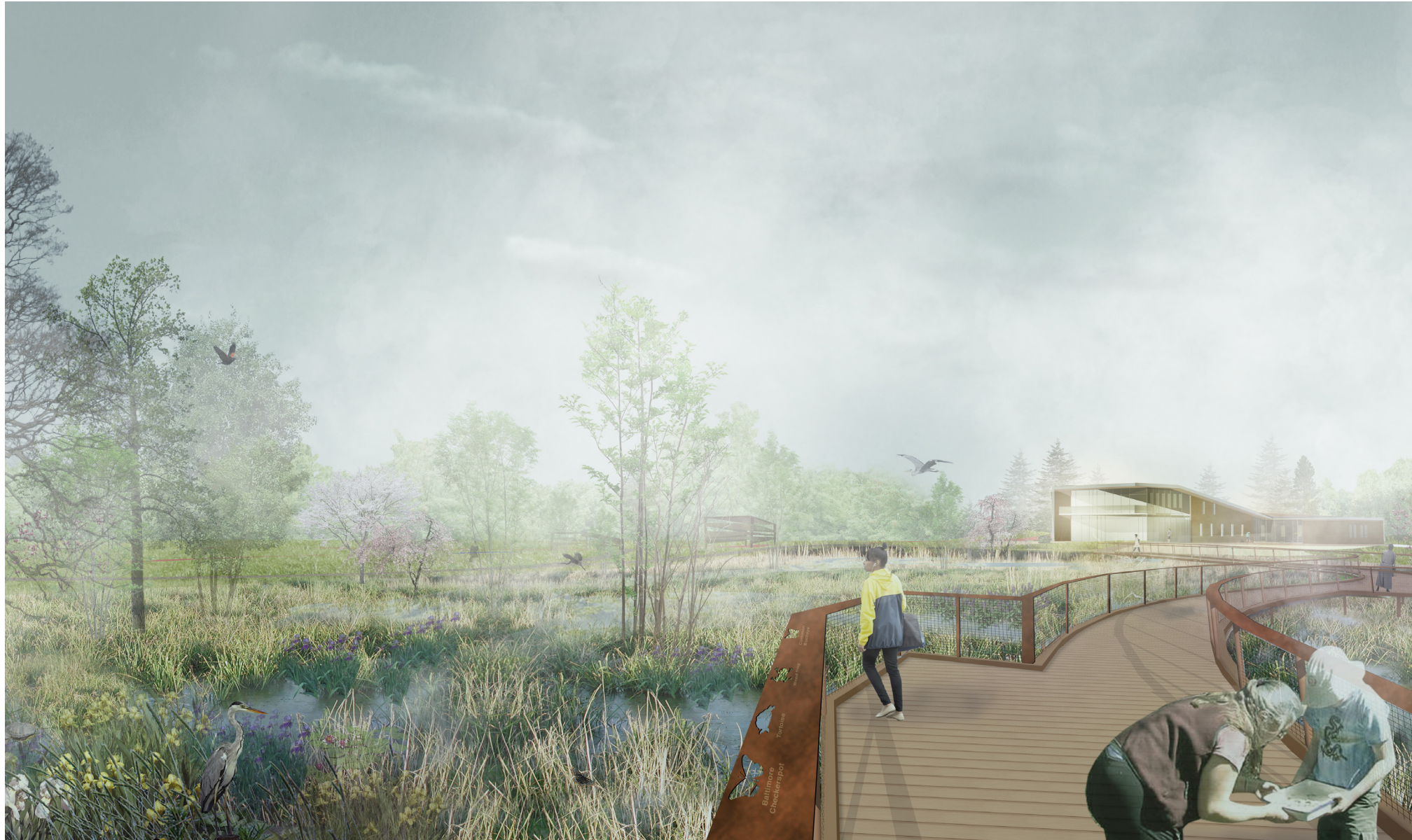
OVERLOOK PAVILION



- Restored stream
- Railway crossing
- North gathering entrance
- Frog pond
- Pollinator meadow
- Outdoor classroom
- Pedestrian bridge
- Wooded riparian corridor
- Vernal pool
- Christmas tree display area
- Permeable overflow parking area
- Overlook Pavilion / outdoor classroom
- Eco-lawn
- Wet meadow
- Pedestrian bridge
- Confluence Wetland
- Wetland Boardwalk



WETLAND BOARDWALK



BUILDINGS & STRUCTURES

ALLEGHENY ARBORETUM VISITOR CENTER

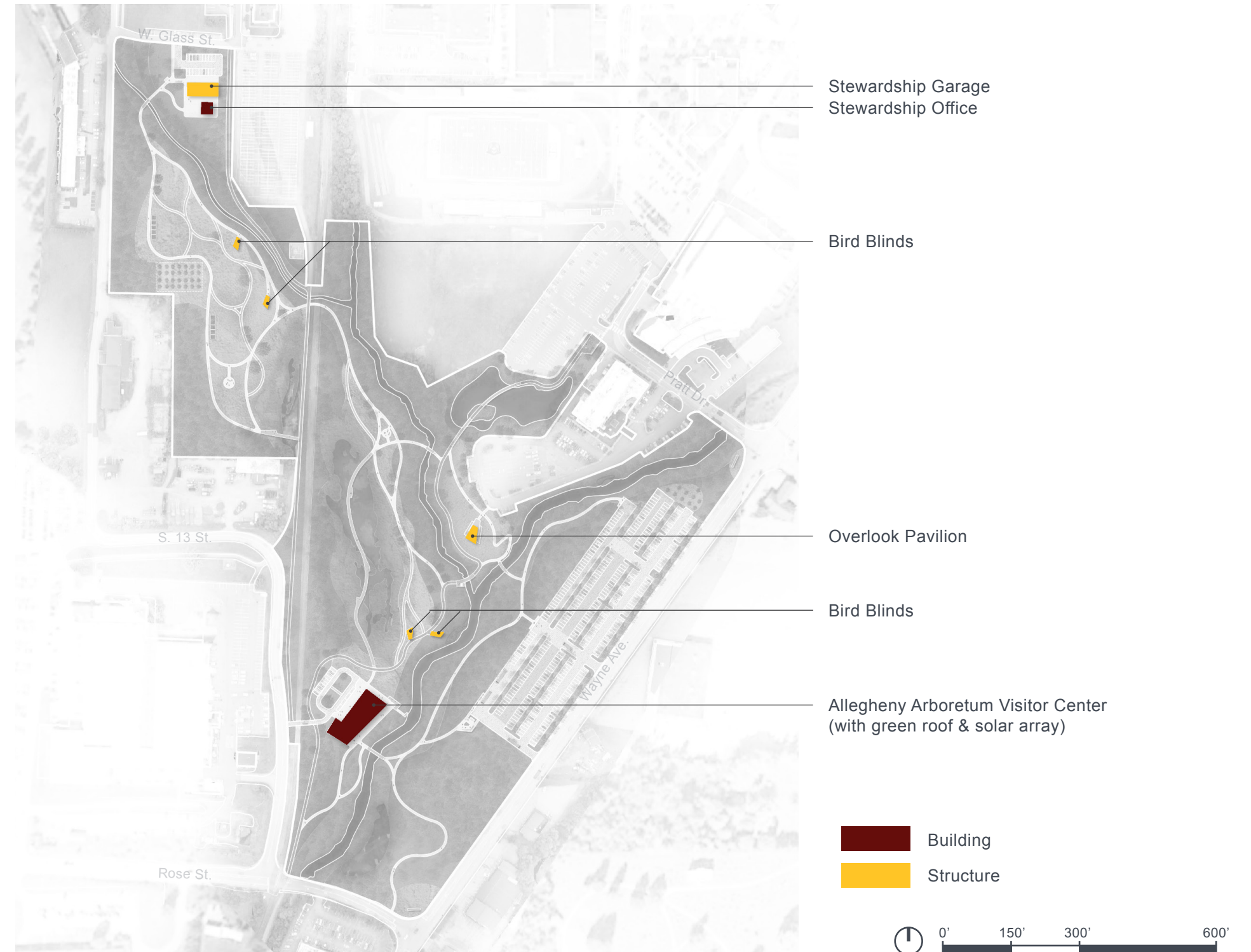
Located at the confluence of multiple habitat types, the Allegheny Arboretum Visitor Center will serve as a major destination within Confluence Discovery Park. This 5,500-square-foot building will welcome visitors from IUP and the community, while serving the Allegheny Arboretum at large. The Allegheny Arboretum Visitor Center will be accessible by foot (via hiking trail), bike (via multi-use path), car (with parking in a small, adjacent lot; the Wayne Ave. parking lot; or across S. 13th Street during large events), or bus (from a drop-off at the Wayne Ave. parking lot). Like many other, successful arboreta visitor centers, this building will contain a reception / information desk; multi-use, flex space that includes art exhibit / gallery space; gift shop; Arboretum Café; catering kitchen (to enable event rentals for revenue generation); Arboretum Executive Director's office; three support offices; small conference room; staff break room; bathrooms (including a single-stall,

gender-neutral bathroom with a shower); storage (including research-equipment lockers and bins for students' coats); custodial closet; and mechanical room (see Appendix H for the conceptual floor plan). The building's design will gain inspiration from its adjacencies—including the mesic meadow and wooded riparian corridor—while a sloping roof rises toward the north to take advantage of passive solar heating and views of the Confluence Wetland below. Building features that demonstrate sustainable design could include:

- 3,000-square-feet of photovoltaic panels clipped to the roof surface, to generate 90-kilowatts of energy
- A small vegetated roof, to manage rainwater and provide educational opportunities
- Light tubes, to supply natural light to the building core
- Operable windows, to allow fresh air indoors

- Rain barrels or rain gardens, to manage rainwater while providing educational opportunities.

The building is envisioned as immersed in the landscape, employing natural materials—including wood siding; a standing-seam, metal roof; and high-performance, bird-protection glass—and providing research opportunities in water conservation, green roofs, and other sustainable practices. Sustainability goals could help the Allegheny Arboretum Visitor Center achieve high performance, while also inspiring visitors and attracting potential donors. These goals could include LEED-certification, SITES-certification, net-zero energy use, or 100% rainwater collection and re-use.



Stewardship Garage
Stewardship Office

Bird Blinds

Overlook Pavilion

Bird Blinds

Allegheny Arboretum Visitor Center
(with green roof & solar array)

Building
Structure





Omega Center for Sustainable Living - OCSI, BNIM Architects



Pocono Environmental Education Center - Nic Lehoux, Strunk Albert Engineering



Omega Center for Sustainable Living - OCSI, BNIM Architects

Space	Size (sf)	Qty.	Total (sf)
Reception	100	1	100
Café	400	1	400
Offices	120	5	600
Conference Room (12 people)	350	1	350
Restrooms	300	2	600
Gender-Neutral Restroom with Shower	120	1	120
Catering Kitchen	300	1	300
Storage	250	1	250
Event Space	1,200	1	1,200
Gallery / Exhibit Space	650	1	650
Janitor	100	1	100
Staff Break Room	200	1	200
Mechanical	100	1	100
Gift Shop	100	1	100
Circulation / Corridor	350	1	350
Total			5,420



Allegheny Arboretum Visitor Center conceptual rendering - GBBN Architects



Pavilion in Des Moines, IA - Jerry Pickering



Bird Blind - Andropogon



Quintessa Pavilion - Matthew Williams, Walker Warner Architects

STEWARDSHIP OFFICE

An existing building, west of the railway, will be repurposed as the Stewardship Office, pending an architectural building evaluation. This building will function as Allegheny Arboretum's operation and maintenance epicenter, and a home-base for the arboretum's Horticultural Director and staff. The Stewardship Office will contain the Horticultural Director's office, a conference room, a bathroom, and indoor storage. Other support infrastructure—such as a staff break room, lockers, showers, and changing area—will not be needed at this location, as they currently exist nearby in the Robertshaw Building. This building will also provide outdoor gathering space, and potentially some office space, for faculty and students.

STEWARDSHIP GARAGE

An existing building next to the proposed Stewardship Office will be repurposed as the

Stewardship Garage. The existing, attached shed structure will be removed. This building will house maintenance vehicles and equipment. Material stockpiles for maintenance use will be nearby if needed.

OVERLOOK PAVILION

The Overlook Pavilion will be a covered, open-air structure that provides framed views of adjacent natural areas. Flexible seating and writing surfaces will support outdoor coursework, while also providing space for picnicking and quiet contemplation. A small, storage area will protect equipment from exposure to the elements. The pavilion will have the capacity to accommodate 24 people, which is the largest class size that is expected to visit Confluence Discovery Park.¹ An adjacent, spill-out area will support larger groups that choose to occupy the Overlook Pavilion area. The structure itself will contain electrical wiring; internet capabilities; a solar-powered, equipment charging station; a weather station; and

IUP's standard lightning-warning device system. Additionally, the structure will be grounded with lightning protection for use as an emergency shelter during electrical storms.

WILDLIFE BLINDS

Two clusters of wildlife blinds will allow everyone from ornithology students and birder hobbyists to view wildlife at close range. Each cluster will accommodate a total of 24 people, with two blinds facing the Pollinator Meadow and two facing the wetland. Cross-curricular opportunities between IUP's Departments of Biology and Art exist for designing and building these wildlife blinds.

1. Allegheny Arboretum Academic Committee (2019)

SITE AMENITIES

SOCIAL SPACES

Two social spaces within Confluence Discovery Park will be designed to withstand heavy use. A hardscape plaza adjacent to the Allegheny Arboretum Visitor Center will accommodate school groups unloading from buses and people gathering for events at Confluence Discovery Park. Flexible seating (i.e. moveable tables and chairs) will allow the space to be arranged to meet various needs, and design accommodation for an event tent could additionally be considered for this location. A second gathering area will provide spill-out space at the Overlook Pavilion. This smaller hardscape area will be perched overlooking the confluence of Stoney Run and Marsh Run with meadow and wetland beyond.

OUTDOOR CLASSROOMS

Three outdoor classrooms, embedded throughout the landscape, will foster outdoor learning at Confluence Discovery Park. The Overlook Pavilion will provide a fourth outdoor classroom location. These destinations are meant to provide flexible use, including group discussion, quiet reflection, direct instruction, and debriefing. Community members from IUP and the neighborhood will be welcome to enjoy these natural oases. Each outdoor classroom will provide seating for 24 people, while varying in shape, materiality (e.g. stone seating, wood benches), and surrounding habitat type (e.g. meadow, forest). One outdoor classroom will be located within close proximity to the Allegheny Arboretum Visitor Center to accommodate groups arriving from the campus proper or by bus. Together with the Overlook Pavilion, the intimate gathering spaces at Confluence Discovery Park will support 96-100 people at a given time. This number is intended to accommodate the average grade size of local, primary and

secondary schools, which the Allegheny Arboretum Academic Committee anticipates will conduct class trips at Confluence Discovery Park. ²

RESEARCH PLOTS

Designated research plots will allow students from Biology and other departments to conduct field monitoring. Locations where this type of research is desired—such as the mesic meadow—will accommodate experimental plots, control plots, and their replicates. The plots will be accessible to the public, but will be demarcated with signage so that the public and stewardship personnel know what activities are and are not permitted in these areas.

2. Allegheny Arboretum Academic Committee (2019)



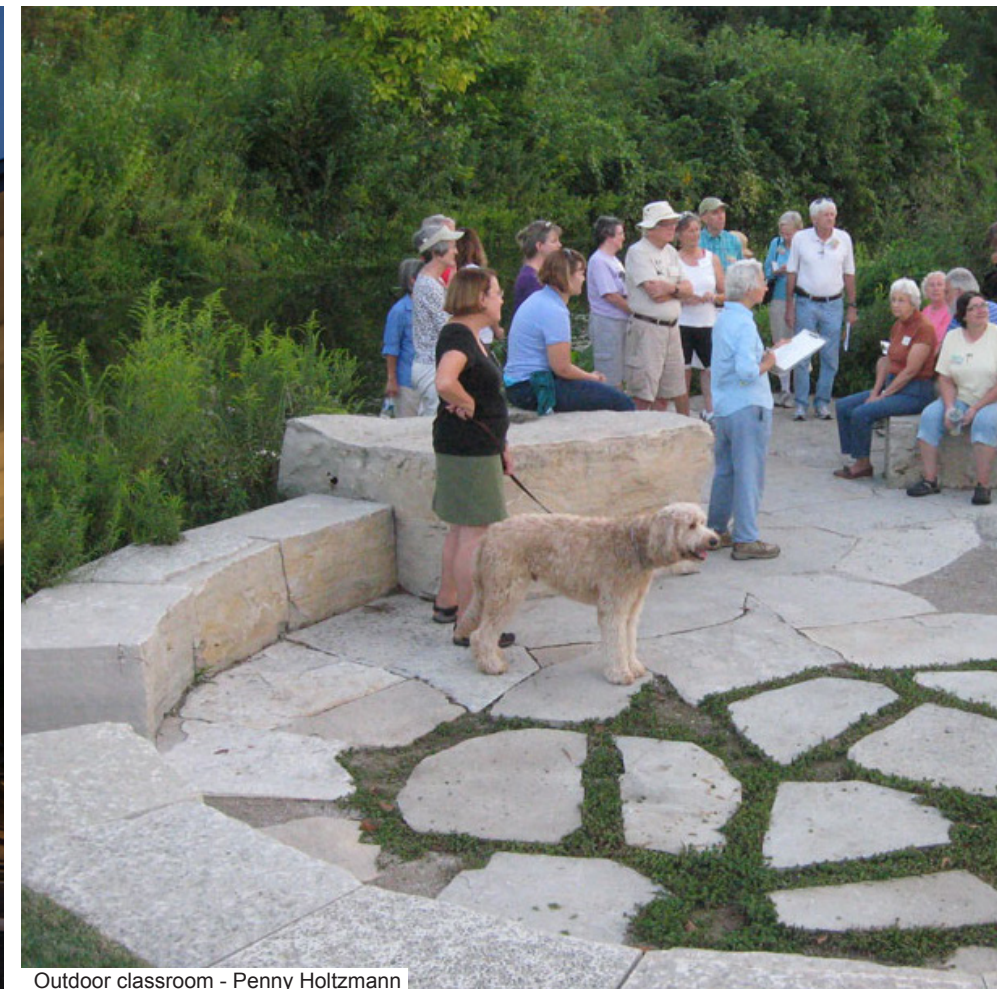
Wetland boardwalk - BASE Landscape Architects



Plaza - OJB Landscape Architecture



Terraced seating - Bohlin Cywinski Jackson



Outdoor classroom - Penny Holtzmann



Wayfinding & interpretive signage



Research plots - Andropogon

CIRCULATION & PARKING

GATEWAYS & WAYFINDING

One primary gateway to Confluence Discovery Park will be located on S. 13th Street, at the entry to the Allegheny Arboretum Visitor Center. Lined with trees and other native plantings that offer seasonal interest, this vibrant entry point will stand out from the stark, surrounding landscape. A second will be located at the terminus of Pratt Drive, which will be used particularly by IUP students and faculty arriving by foot or bicycle. Appropriately-branded, entry signage will let visitors know that they have arrived at Confluence Discovery Park, a part of Allegheny Arboretum and IUP. Secondary gateways, also containing signage, will be located in the following locations:

- Wayne Avenue parking lot entry
- Hoodlebug Trail entry near the intersection of Rose Street and S. 13th Street
- Hoodlebug Trail entry near the bend

in S. 13th Street

- Hoodlebug Trail entry near the path that is directly west of Miller Stadium

Some of these gateways are away from main roads. In these instances, directional signage will be necessary to direct pedestrians, cyclists, and vehicles to Confluence Discovery Park. This is particularly true for IUP's students and staff who are approaching on foot or by bike from the campus proper.

PEDESTRIAN

Hierarchy within a pedestrian circulation system can support intrinsic wayfinding and help people move through a landscape in an intentional way. Confluence Discovery Park will contain four pedestrian circulation typologies: multi-use path, boardwalk, typical trail, and meadow trail. The first three will be designed to accommodate light

maintenance and emergency vehicles (i.e. utility vehicle):

- Multi-use path: An 8'-wide, asphalt surface that connects to the adjoining Hoodlebug Trail system. Slopes will be fully-accessible to wheelchairs, strollers, and bikes, and the pavement marking and signage will complement the Hoodlebug Trail design guidelines.
- Boardwalk: An 8'-wide carpentry structure that provides access over wet areas, including wet meadow, wetlands, and stream crossings. Slopes and edge conditions will be fully-accessible to wheelchairs and strollers. Each structure will be designed and built to be minimally impactful to the sensitive, underlying ecosystems, and in compliance with local, state, federal regulations.
- Typical trail: A 6'-wide, aggregate surface that provides access



throughout Confluence Discovery Park. The surface will be stabilized in areas prone to flooding and designed to direct runoff appropriately.

- Meadow trail: A 6'-wide mown path that provides access through less-traveled parts of the mesic meadow, such as to research plots. The path's location may change locations annually as needed.

BICYCLE

Commuters and recreational cyclists will be able to ride through Confluence Discovery Park on the multi-use trail, which connects to the Hoodlebug Trail (see Pedestrian section). Bike racks at the Allegheny Arboretum


- Primary gateway
- Secondary gateway

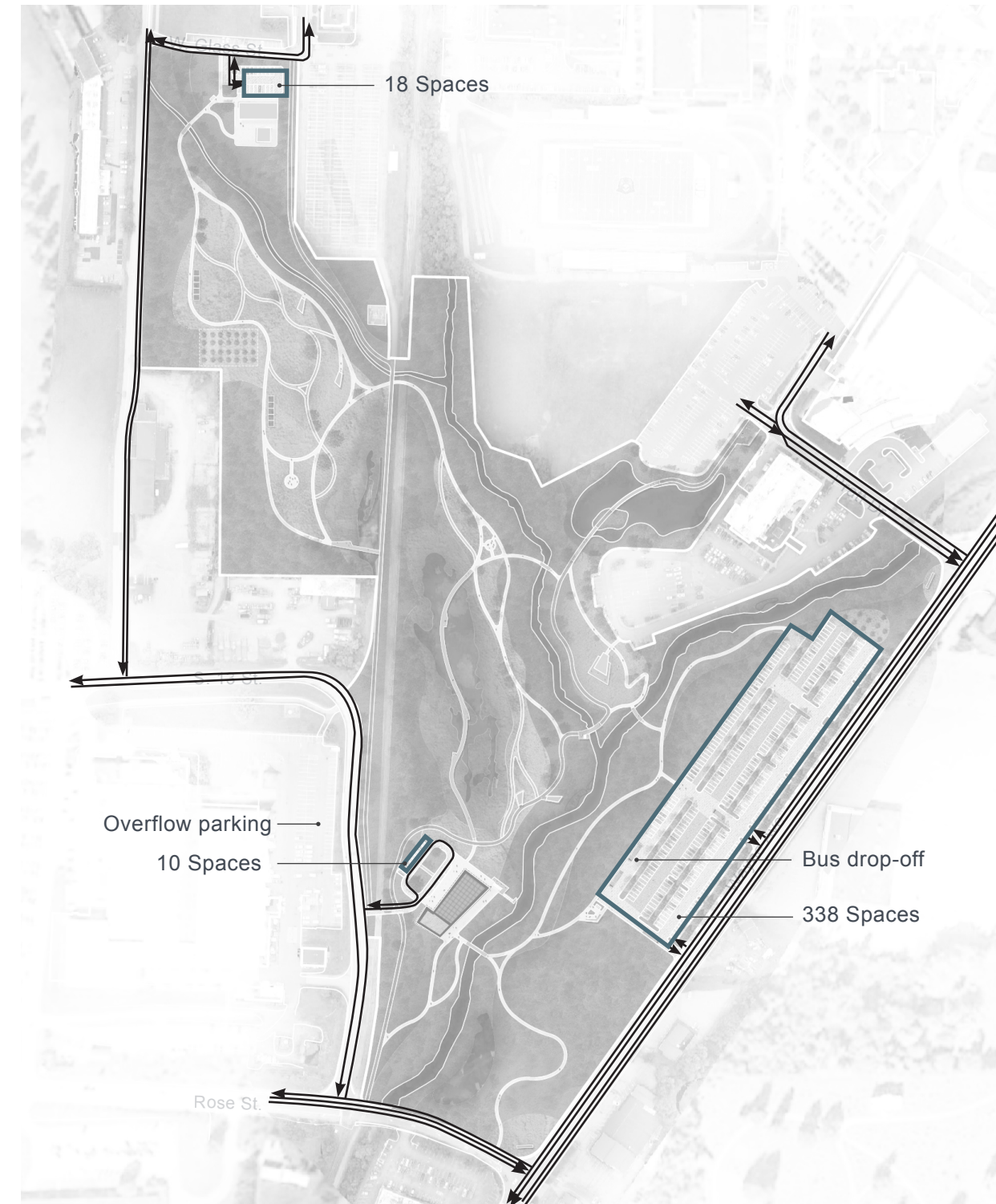


Visitor Center, Wayne Ave Parking Lot, and the northern end of Confluence Discovery Park—accommodating a total of 20 bikes—will allow visitors a secure place to leave their bikes so that they can enjoy the natural area on foot. Signage and a material change at adjoining trails will remind cyclists that bikes are not permitted elsewhere in Confluence Discovery Park.³

VEHICULAR



Visitors will be able to enter Confluence Discovery Park with their vehicles at two locations. The existing Wayne Avenue parking lot will remain, although it will be modified by: 1) Replacing portions with reinforced lawn, intended for overflow

-  Multi-use path - 8' wide
-  Boardwalk - 8' wide
-  Typical trail - 6' wide
-  Meadow trail - 6' wide



parking; 2) De-paving sections and inserting rain gardens; or 3) De-paving sections and inserting planted islands and shade trees. Visitors will also be welcome to enter off of S. 13th Street, to access the drop-off and 10-car parking lot at the Allegheny Arboretum Visitor Center. Overflow parking for large events will be available across S. 13th Street at the existing Robertshaw Building. Handicapped parking will be provided at both the Visitor Center and Wayne Avenue parking lot locations. A third vehicular entrance, on W. Glass Street, will provide Allegheny Arboretum staff access to the Stewardship Hub. Staff's personal and work vehicles may be parked here, in marked or unmarked parking spaces. Utility vehicles will be able to access Confluence Discovery Park's trail system from this point.

3. Allegheny Arboretum Academic Committee (2019)

-  Direction of vehicular travel
-  Vehicular parking area



WATERSHED RESTORATION

GOALS & STRATEGIES

1. Restore watershed hydrology
2. Improve stream connectivity
3. Restore wetland connectivity and expand footprint
4. Enhance riparian buffer
5. Improve water quality
6. Retain existing, large-diameter trees as snag habitat

STRATEGIES

1. Reduce impervious cover on-site and beyond
2. Reroute stream and widen floodway to slow flow velocity and erosion, stabilize stream channel, and provide reliable benthic (i.e. stream bottom) habitat
3. Consider raising channel invert to create broader connected floodplain

4. Present concept to widen culverted, Stony Run outlet to reduce flooding of buildings/street and enable wildlife movement under Rose Street
5. Create 50'-min. wooded buffer on each side of upper Stony Run and Whites Run, and 75'-min. wooded buffer on each side of lower Stony Run and Marsh Run to reduce thermal loading
6. Provide stormwater treatment of any new impervious cover
7. Use streambank vegetation to slow and filter overland flow
8. Hold rainwater in soil and plant high-transpiration plant species to decrease volume of rainwater that leaves site
9. Create hydraulic and habitat variability in stream channel (e.g. pools, riffles)

RAINWATER MANAGEMENT

Flashy stream flow at Confluence Discovery

Park contributes to stream bank erosion, scouring, increased turbidity, poor substrate for macroinvertebrates and fish, low dissolved oxygen, low aquifer recharge, and flooding. Stream bank erosion is additionally problematic at Confluence Discovery Park, due to the existing brownfield soil cap that serves as a barrier to underlying contamination and must be maintained to its full depth.

While restoring watershed health requires a watershed-scale initiative, a comprehensive site strategy within Confluence Discovery Park can help improve stream health and water quality, while reducing flood risk. This strategy relies on soil and vegetation to slow, detain, and reduce the volume of rainwater that enters the stream and flows downstream. This can be achieved by minimizing impervious surfaces; treating stormwater where it falls using green infrastructure (e.g. rain gardens, green roofs, pervious pavement); hydrologically connecting and/or expanding wetlands; and designing streams to respond appropriately to large storm events.



Stream restoration



Wetland restoration



Meadow restoration



Riparian corridor tree planting



Rain garden



Invasive species management



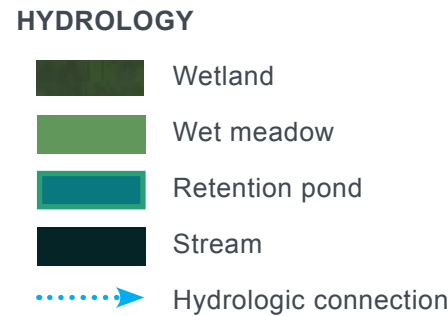
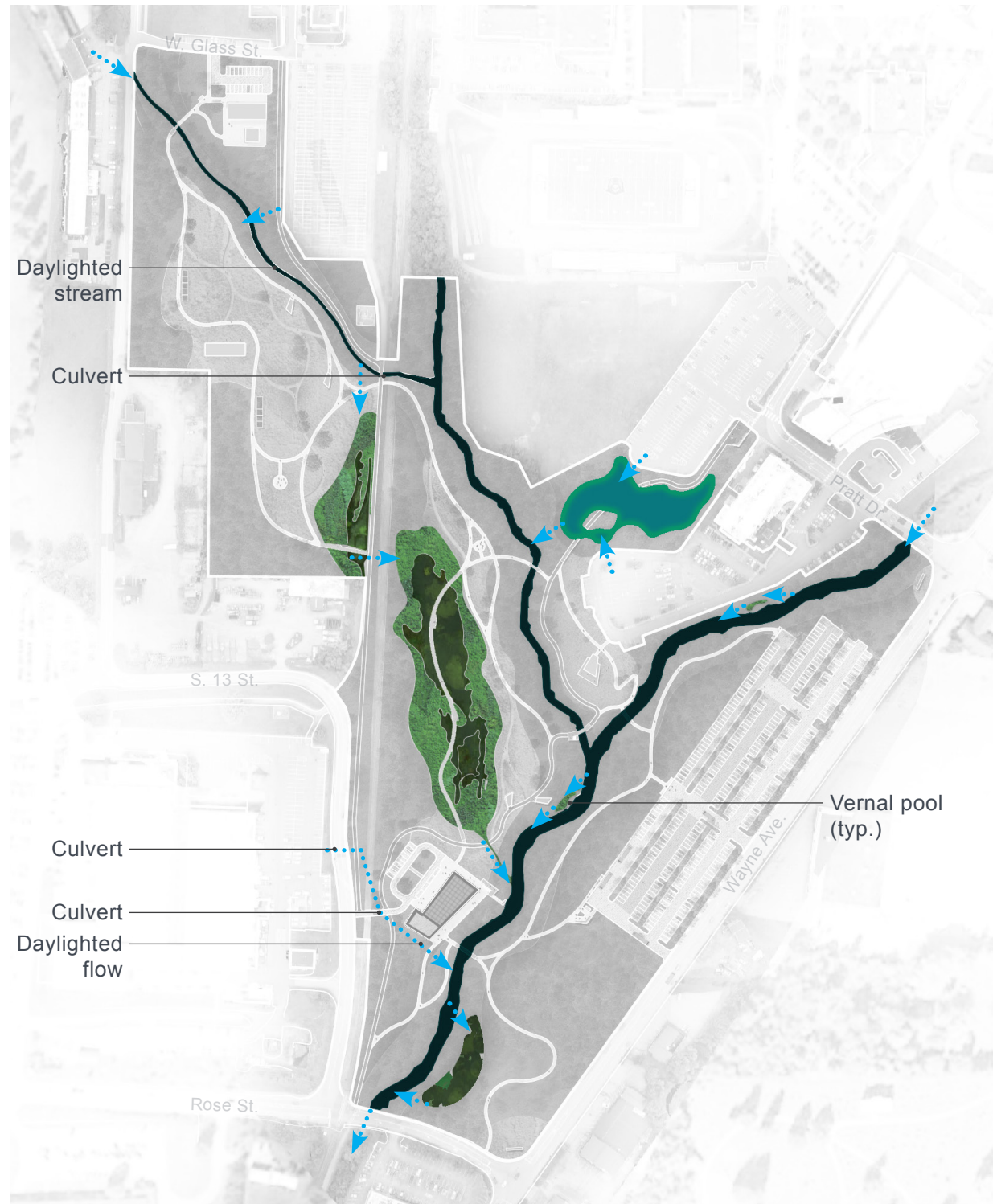
Green roof



Permeable pedestrian pavement



Permeable vehicular pavement



ECOLOGICAL RESTORATION

GOALS

1. Enhance ecosystem resilience
2. Restore soil to support native plant species
3. Diversify habitat at multiple scales
4. Demonstrate best restoration practices

STRATEGIES

1. Remove existing invasive species using mechanical and/or chemical means (that do not harm aquatic wildlife), as needed
2. Use cut brownfield soil to build topography then add wood chips (to build soil mass and organic matter), labile carbon (to support fungal communities), and biochar (to hold metals)
3. Plant cover crops on bare soil to keep soil cool, thereby deterring invasives
4. Exclude deer where possible to promote native, herbaceous plant growth

5. Select plant species that offer food sources and refuge to targeted wildlife species throughout the year
6. Understand the restoration timeline and shifting land management requirements for each ecosystem

HABITAT ZONES

The site's varied hydrology supports diverse habitat types. Restoration efforts will therefore gain inspiration from four reference plant communities (using the Pennsylvania Natural Heritage Program designations⁴) that are native to the area and appropriate for varied conditions throughout the site.

Sycamore Floodplain Forest is appropriate for small-to-medium size streams in this part of PA, and as such, for the riparian corridor throughout Confluence Discovery Park. The dominant tree species is *Platanus occidentalis* (Sycamore), with tree species such as *Acer negundo* (Boxelder) and *Acer saccharinum* (Silver Maple) also present.

Slightly upland from the stream, Oak-Mixed Hardwood Floodplain Forest will add important habitat value as it matures over time. Key plant species are *Quercus bicolor* (Swamp White Oak) and *Quercus palustris* (Pin Oak), with other hardwoods such as *Acer rubrum* (Red Maple) and *Nyssa sylvatica* (Blackgum) included. Tussock Sedge Marsh provides inspiration for the restored wetlands, with flowering perennials added for enhanced seasonal interest and habitat diversity. Key species include various *Carex* (Sedge) species, *Calamagrostis canadensis* (Canada Bluejoint), and *Scirpus cyperinus* (Wool Grass). Rather than looking to a specific reference community, the wet meadow will be structured like an ecotone between the Tussock Sedge Marsh and Mesic Meadow. The Mesic Meadow itself references the Floodplain Meadows of PA. It will feature diverse grasses and perennials, with pollinator associations that include the Indian Skipper, Swarthy Skipper, Silvery Checkerspot, and bees. See Appendix G.

4. Zimmerman et al. (2012)

REFERENCE PLANT COMMUNITIES

- Sycamore Floodplain Forest
- Tussock Sedge Marsh
- Wet Meadow
- Mesic Meadow
- Oak-Mixed Hardwood Floodplain Forest
- Eco Lawn



Wissahickon Valley Park
Restoration Planting - Andropogon



Mesic meadow year three - Larry Weaner



Meadow mowing - Larry Weaner



Mesic meadow, summer - Larry Weaner

ADAPTIVE LAND MANAGEMENT

GOALS

1. Prevent meadow succession in zones designated as “meadow” in the Confluence Discovery Park 2030 Master Plan
2. Guide forest succession
3. Study landscape management practices and treatments to evaluate outcomes
4. Demonstrate sustainable stewardship practices
5. Target focal wildlife species

ADAPTIVE MANAGEMENT

Adaptive management is the process of recording, assessing, and adjusting management practices in order to improve their effectiveness over time. Adaptive management can help Confluence Discovery Park achieve its landscape vision by recording information that can be





easily accessed and understood by new stewardship personnel, thereby building knowledge over time and increasing the effectiveness of management efforts. This process could rely upon:

- Mechanical tools – Equipment used for management in familiar and new ways
- Digital tools – Such as iPads in the field that help record real-time information
- Cultural shifts – That welcome technology and understand how land management activities are orchestrated with visitor and wildlife needs
- Operational shifts – That train or attract personnel with necessary skills, recalculate labor hours, and leverage new practices (e.g. periodic trail/area closures) as a management tool

Confluence Discovery Park’s biggest hurdles in achieving adaptive management success are: 1) Soil building; 2) Native plant establishment; 3) Deer herbivory; and 4) Invasive plant species management. Best practices should be used to build soil and establish native vegetation from seed and live plants. Stewardship personnel, in partnership with IUP’s academic departments, should track and document the effectiveness of any methods used over time. Heavy deer browse in the region continues to deplete biodiversity and harm ecological health, particularly in forest and woodland edge ecosystems. Grass-dominant habitats, such as meadows, are less susceptible to deer browse. Efforts to manage invasive species before they spread seed will be essential.



ADAPTIVE MANAGEMENT

-  Reforestation
-  Guided forest succession
-  Arrested succession
-  Annual mowing



MANAGEMENT EFFORT & BIODIVERSITY

The management effort at Confluence Discovery Park will decrease over time as maturing habitats become increasingly established and resilient over time. As vegetation matures and self-propagates, improved habitat structure and function will increasingly attract wildlife over time. With proper stewardship, the relationship between land management and biodiversity, is therefore inversely proportional over time.

FOCAL WILDLIFE SPECIES

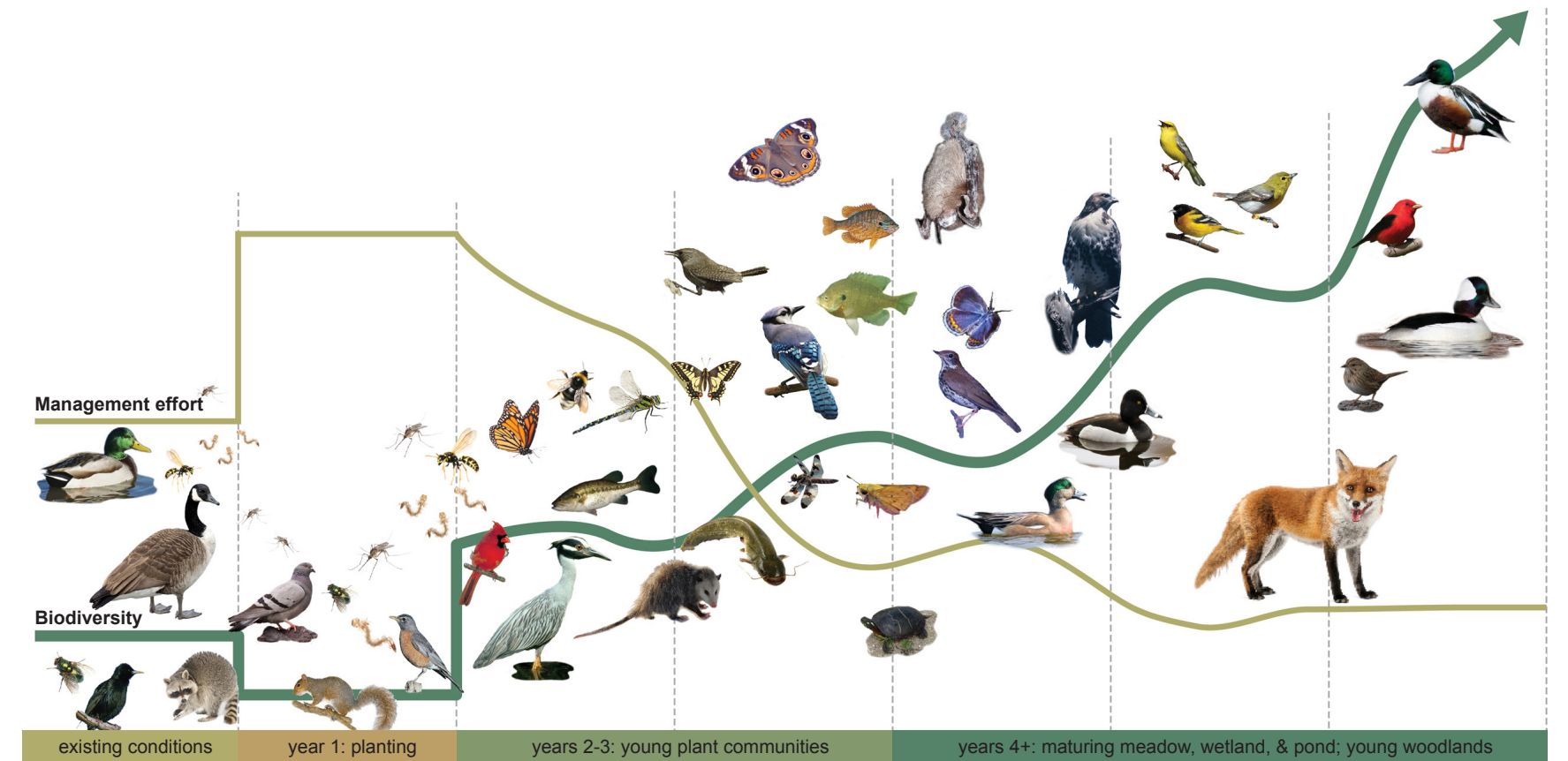
Focal wildlife species can help to identify urban habitat issues, to better understand the wildlife potential of existing and proposed habitats in Confluence Discovery Park, and to guide design and management recommendations. The focal species listed in Appendix G are representative of a diversity of habitats and species groups found in Indiana County. This approach emphasizes

community variability and a diversity of habitat needs, acknowledging that other individual species in these ecological zones may have specific, varying or conflicting needs. Integrating focal species needs into the planning process provides important environmental education, stewardship, amenity, and quality of life benefits for the greater community.

The Confluence Discovery Park site is planned to include meadow, floodplain forest, wetland, and stream habitats. Each have unique potential to support animal species assemblages, and the close proximity of each habitat could create a significant amount of biodiversity in one site. However, each habitat represented will be relatively small in acreage, and surrounding development creates a barrier to mobility for many species. Thus area-sensitive species, and species intolerant of moving through urban or suburban conditions to reach the site will not be likely to be supported. Additionally, stream water quality and hydraulics are a major factor in habitat-

fauna relationships, and are dependent on watershed-wide conditions, which can only be partially influenced by actions taken on site.

Meadow habitat is becoming increasingly rare in Indiana County, as abandoned fields are either becoming forest or developed land uses. Wetlands are also considered imperiled habitat in Pennsylvania. Therefore, these habitats, and the wildlife that they might support, could be an important restoration opportunity and unique recreation experience.



MANAGEMENT EFFORT & BIODIVERSITY

Relationship diagram - Biohabitats & Andropogon

MANAGEMENT STRATEGIES

RIPARIAN CORRIDOR & STREAM RESTORATION

- Establish stable, vegetated banks with remarkably lower erosive forces (sheer stress). The stable, gravelly stream bed will have the capacity to support a stable community of aquatic macroinvertebrates, which are essential to a self-sustaining fish community
- Monitor stream stage and flow conditions over time and use findings to inform future management strategies and to provide context to biological studies at IUP

MEADOW ESTABLISHMENT

- Maintain clean soil cap per Brownfield requirements
- Manage invasive plant species
- Prepare soil as needed
- Seed with biodiverse mix of site-appropriate, native grasses and forbs
- Add drifts of forbs as live plants for added seasonal interest
- Remove invasive species each year before they produce seeds
- Mow annually or, if allowed, practice controlled burning every 3-5 years to control invasive species, deter woody plant succession, and increase soil carbon sequestration
- Monitor conditions over time and use findings to inform future management strategies

SUCCESSIONAL FOREST ESTABLISHMENT

- Establish meadow as described previously, with the addition of restoration-stock trees
- Do not mow or practice controlled burning
- Allow additional, native-woody plants to establish
- Remove invasive species each year before they produce seeds
- Plant a continuous, layered woodland edge to diversify bird habitat and shade the forest core
- Supplement planting in event of large disturbance to out-compete invasive species
- Shade “hot spots” to prevent invasive species and maximize habitat value
- Monitor conditions over time and use findings to inform future management strategies

BIOREMEDIATION

- Plant native, fast-growing, water-loving plants with proven ability to biodegrade TCE groundwater contaminants, such as Eastern Cottonwood
- Conduct longitudinal monitoring of groundwater and soil pore water to document phytoremediation
- Monitor conditions over time and use findings to inform future management strategies

POND RESTORATION

- The site’s existing detention pond (Basin #4) is designed in a conventional manner to receive and store runoff from an approximate 12.7-acre drainage area. IUP reports that the detention pond is not operating as intended.
- By reimagining this as a more dynamic system with a natural shape and shallow, aquatic shelf, the new “Frog Pond” can enhance hydrologic and ecosystem functioning while offering research opportunities.

RESIDENTIAL DEMONSTRATION IDEAS

Confluence Discovery Park offers the opportunity to demonstrate sustainable practices that anyone could implement at home. Some of these practices could be observed passively at Confluence Discovery Park, while others could perhaps be paired with interpretive signage to more directly educate visitors. Possible demonstration ideas include:

- Eco-lawn & sustainable lawn care
- Gardening for wildlife
- Managing stormwater
- Supporting reptiles & amphibians
- Protecting pollinators
- Composting
- Increasing the urban canopy
- Sheltering native wildlife
- Feeding native birds & insects
- Establishing & managing meadows
- Controlling invasive species

ESTABLISHMENT TRAJECTORIES

RIPARIAN CORRIDOR

Confluence Discovery Park's stream restoration requires significant realignment of the watercourse in order to slow the rate of flow and create varied habitats for wildlife. During the realignment process, opportunity exists to keep some of the existing stream areas intact in order to: 1) Preserve mature, streambank trees that, although in decline from the existing soil cap, will provide important snag habitat; and 2) Provide depressions that can function as vernal pools.

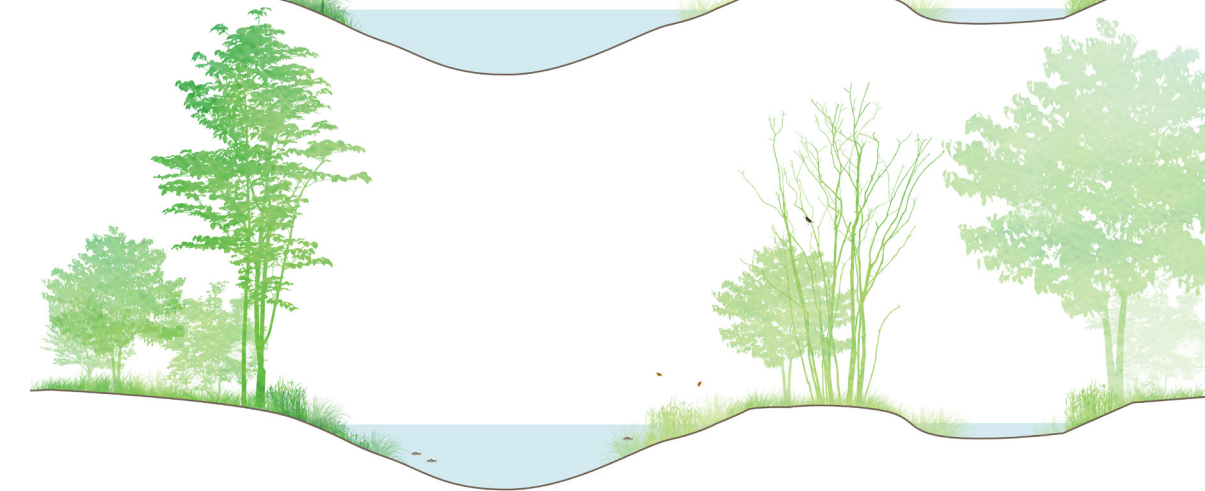
New riparian corridor plantings will be small, some may even be restoration stock. This vegetation will mature and diversify over time with adaptive management, while also stabilizing the streambanks.



YEAR 1



YEAR 10



YEAR 30



STREAM

VERNAL POOL

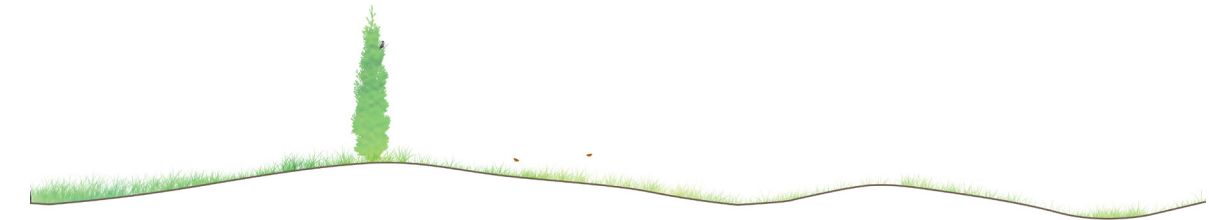
MEADOW

The mesic meadows will establish more quickly than most other plant communities at Confluence Discovery Park. This is because the community composition is almost entirely herbaceous, and the plants will take only 3-5 years to mature into a robust cover.

Sparse woody plantings will provide important perches, food sources, and points of respite for native wildlife. These areas will expand and densify slightly over time to create small “islands” of refuge. Berries—such as from *Ilex verticillata* (Winterberry)—will act as an important food source within these islands. These areas should be managed for invasives, while the rest of the mesic meadow areas will be mowed or burned (if allowed) to control invasives and deter woody plant growth.



YEAR 1



YEAR 10



YEAR 30



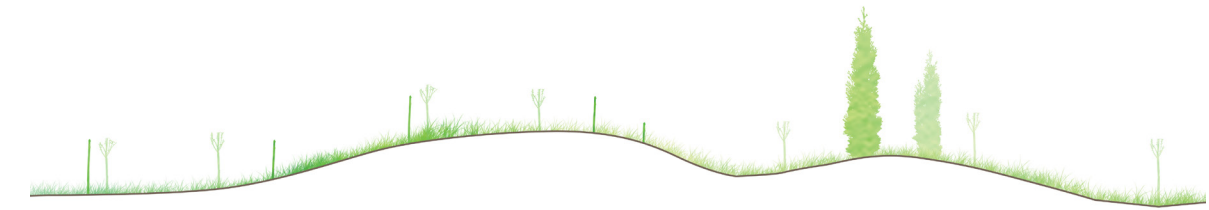
SUCCESSIONAL FOREST

Much of Confluence Discovery Park will develop into forest over time. This is a long, dynamic process. The landscape will initially appear as an open meadow with small, restoration-stock trees. As the trees mature and more woody plants begin to establish, a woodland will emerge. Over time, the woodland will succeed into forest.

The successional process of meadow becoming forest will occur over a generation. This transition will play a key role in the educational and experiential qualities of Confluence Discovery Park, while providing a unique demonstration for natural processes within the Allegheny Plateau and beyond.



YEAR 1



YEAR 10



YEAR 30



EDUCATIONAL & RESEARCH OPPORTUNITIES

The *Confluence Discovery Park 2030 Master Plan* lays the groundwork for field research and non-research, curricular integration by accommodating the specific needs of IUP professors. Some of these professors already utilize the Confluence Discovery Park area for field research with students, and so the master plan buildout will provide these groups and others with the unique opportunity to observe how design, construction, and stewardship can transform a post-industrial site into a thriving, living laboratory that performs vital ecosystem services and community benefits.



Phipps Conservatory & Botanical Gardens - Paul G. Wiegman, Andropogon



- Stream crossing with in-situ stream monitoring equipment
- Meadow monitoring plots
- Bird blind
- Research nursery with deer fence
- Bird blind
- Meadow monitoring plots
- Outdoor classroom
- Frog Pond
- Stream crossing with in-situ stream monitoring equipment
- Overlook Pavilion
- Stream crossing with in-situ stream monitoring equipment
- Bird blinds
- Allegheny Arboretum Visitor Center (with green roof & solar array)
- Outdoor classroom (with ADA stream access)
- Stream crossing with in-situ stream monitoring equipment

RESEARCH INFRASTRUCTURE



FIELD RESEARCH

The *Confluence Discovery Park 2030 Master Plan* accommodates the specific research needs of six academic programs: Ornithology, Biology, Geography, Environmental Engineering, Environmental Planning, and Geoscience.⁵ Focus areas for field research include:

- Wildlife surveys – of birds, fish, and insects
- Vegetation sampling – in wetlands, meadows, and successional forest
- Phytoremediation monitoring
- Surface drainage monitoring
- Wetland identification and delineation mapping
- Stream monitoring – including water quality, stream profile mapping, and sediment deposition analysis

Approximately half of the studies are expected to be longitudinal, meaning that the

same variables will be repeatedly observed over a period of time. This valuable research design allows for the study of change over time in the environment. Some studies will likely span before and after construction. Others will compare Confluence Discovery Park to other areas of the campus, such as the South Woods.

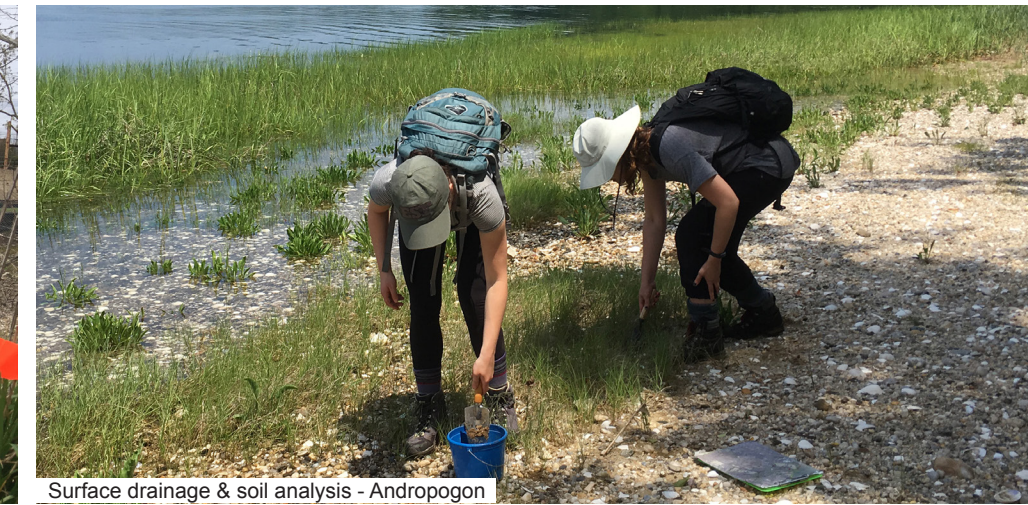
Integrating critical infrastructure into Confluence Discovery Park will support planned research efforts while accommodating future studies that have not yet been conceived. This includes minor infrastructure like hose bibs; permanent monitoring markers (e.g. for survey benchmarks and quadrat plots); in-situ, stream-monitoring equipment (with solar panels, data loggers, and flow meters); and writing surfaces. More significant infrastructure includes wildlife blinds (at the wetlands and meadows); outdoor classrooms, a pavilion, and research nursery (see Physical Improvements section). Strategic ecosystem-access points, particularly along the riparian corridor, will

support a variety of studies while allowing professors and students of all physical abilities to reach key locations.

5. Allegheny Arboretum Academic Committee (2019)



Vegetation sampling - Andropogon



Surface drainage & soil analysis - Andropogon



Wildlife surveys - Brian Hansen



Phytoremediation monitoring - Andropogon



Stream monitoring - Andropogon

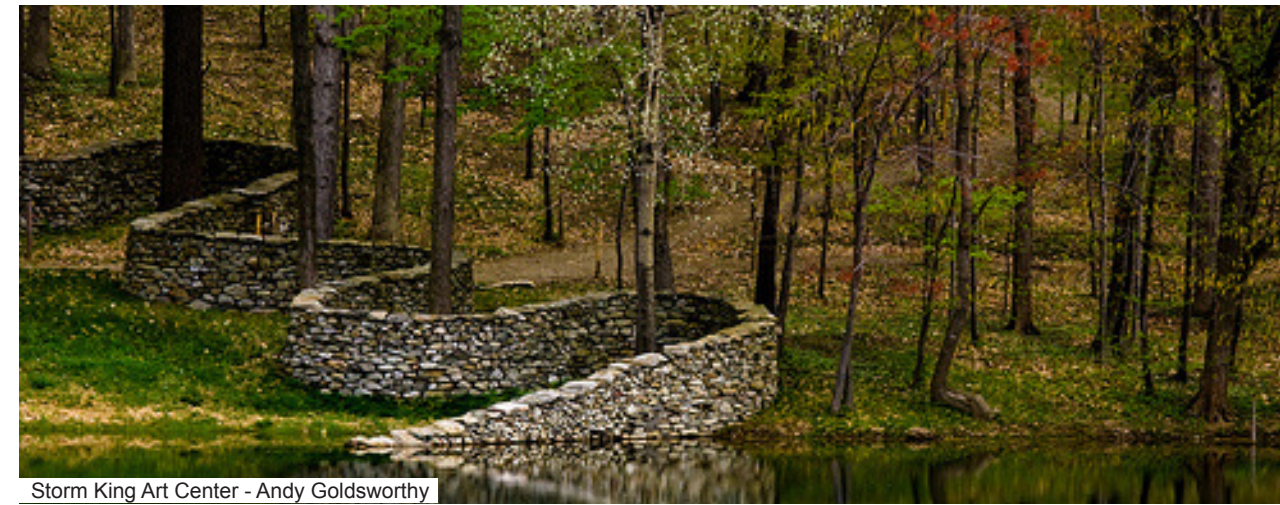
NON-RESEARCH, CURRICULAR INTEGRATION

The master plan also supports curricular integration that is not related to research. Relevant programs/departments include: Art, Communications Media, Education, Sustainability, Environmental Engineering, Social Sciences, Regional Planning, Anthropology, Geoscience, and Biology.⁶ Supporting infrastructure includes sculpture sites, environmental-art intervention sites, interpretive signage, and bike racks. Additional infrastructure overlaps with that needed for field research, namely writing surfaces, outdoor classrooms, and a pavilion.

6. Allegheny Arboretum Academic Committee (2019)



PUBLIC ART LOCATIONS



Storm King Art Center - Andy Goldsworthy



Restoration planting - CRCL



Nest box building & bird watching - S. Arnfield

CROSS-CURRICULAR OPPORTUNITIES

Opportunities for cross-curricular collaboration also exist. These include collaborative efforts between the Biology and Art departments; tree growth investigations paired with Woodworking / Fabrication classes; and a joint effort between the Ornithology and Woodworking programs to build nest boxes for target bird species that are likely to occupy Confluence Discovery Park.

COMMUNITY ENGAGEMENT

Confluence Discovery Park will function as a community asset in addition to serving IUP. This shared-resource is centrally-located in the Indiana borough, within 1-mile of most residences. It will be easy for community members to walk, bike, take a bus, or drive to Confluence Discovery Park from their homes, or to pass through as they're commuting on the Hoodlebug Trail.

Some of the Allegheny Arboretum's existing activities will expand into Confluence Discovery Park. These could include woody plant identification labeling, Tree Tour Guide, Virtual Tour, American Chestnut Project, and possibly WalkWorks. It's unlikely that Art in the Arboretum will have a presence in Confluence Discovery Park, although the Art Department and Allegheny Arboretum Academic Committee have expressed interest in outdoor sculpture, environmental art interventions, and an indoor gallery space at the Allegheny Arboretum Visitor Center.⁷ Confluence Discovery Park will additionally offer the community opportunities to run, hike, bird

watch, picnic, and take educational tours in a beautiful, natural setting. Others could be interested in engaging in stewardship activities, such as high school, community-service clubs; local garden clubs; and local non-profit organizations.

The Confluence Discovery Park Steering Committee anticipates that the balance of use between the community and IUP will range from 50:50 to 60:40.⁸ During summer months, when school is out of session, Confluence Discovery Park will be used primarily by the community. This shared-use will aim to enhance relations between IUP and the community.

7. Allegheny Arboretum Academic Committee (2019)

8. Confluence Discovery Park Steering Committee (2019)



Forest Park, Deer Lake Restoration Area - Penny Holtzmann

4 PHASED IMPLEMENTATION

IMPLEMENTATION GOALS

1. Utilize a diversity of funding mechanisms.
2. Apply for permits for the entire site at once.
3. Demonstrate best practices in design and construction.
4. Follow the master plan's phasing strategy and make well-informed adjustments when necessary.
5. Use the master plan to inform a Management, Operations, and Business Plan.



PHASING STRATEGY

In planning, phasing is a process by which a large construction project is divided into sequential stages of implementation. The master-plan-level, phasing strategy for Confluence Discovery Park is organized into five phases, intended to be completed in a specific order. The phases are strategically orchestrated to leverage funding opportunities, maximize efficient construction, and foster ecological health. Each phase consists of a group of projects, or “sub-phases,” that may be deployed in a flexible manner, meaning in any logical order within the phase. Ideally, all sub-phases within a phase should be completed before starting to implement the subsequent phase. This strategy will ensure that all sub-phases are successfully funded and built.

The phasing sequence is organized so that, to the greatest extent possible, newly implemented projects do not disrupt projects completed during previous phases. Sometimes a newly implemented project can even benefit a future project. For example, an upstream slow release basin

that is implemented before downstream improvements would allow the first portion of work to benefit the second. From a regulatory standpoint, some projects must occur in a certain sequence or in tandem with one another. Remediation, for example, must occur before other improvements can be implemented within an area, to comply with regulations. Constructability and performance similarly drive project sequence and the need for tandem projects. For example, rain gardens that treat the runoff from a new building or a cistern that collects water from a permeable parking lot should be installed together.

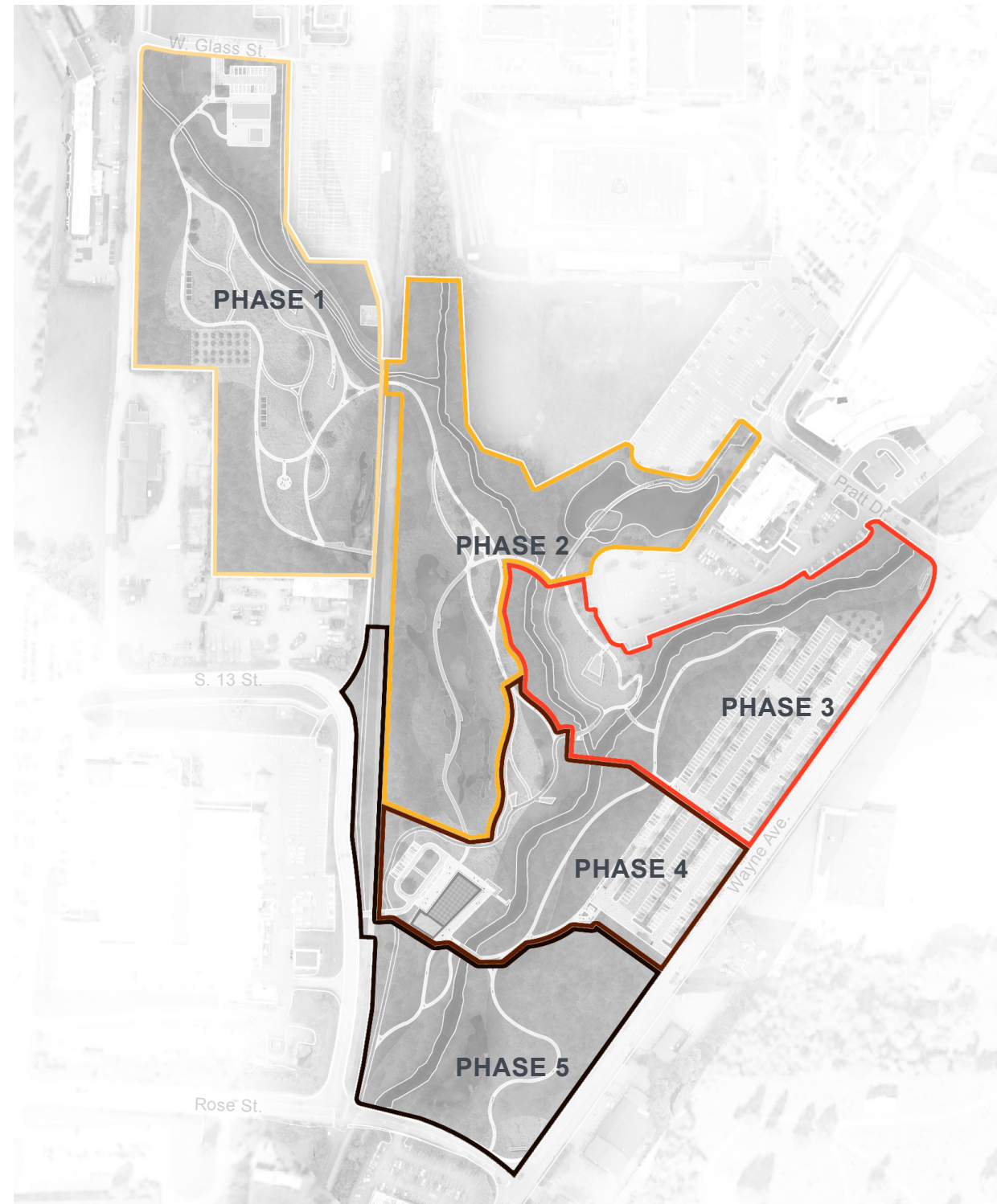
When considering the implementation of a phase or sub-phase out of sequence, consider the short- and long-term, economic and ecological implications of that decision. It is important to explain to perspective funders why their project might need to wait until others are completed. If significant funding opportunities present themselves, such as large grants, then flexibility and malleability in the phasing strategy should

be considered. For example, a restoration grant that would fund the entire stream restoration, or the whole section east or west of the railway, would present a significant opportunity that IUP should consider and carefully evaluate. Master plan-level phasing strategies typically change over time to meet the needs of the project.



PHASING PRINCIPLES

1. Prioritize contaminant remediation
2. Restore watercourses from upstream to downstream
3. Use excavated soil from stream restoration to create micro-topography
4. Cluster improvements for which fundraising is difficult and easy within a single phase
5. Design construction access routes that can easily transition into permanent improvements
6. Avoid redoing work whenever possible
7. Include design, engineering, cost estimation, and permitting for the whole site in Phase 1



PHASE 1

The Allegheny Arboretum sets the stage for future master plan improvements by prioritizing remediation, upstream restoration work, and the Stewardship Hub, which will help establish the new and restored ecosystems. This phase—which addresses the largest acreage of the buildout—will also provide amenities that embed education and research into the landscape.

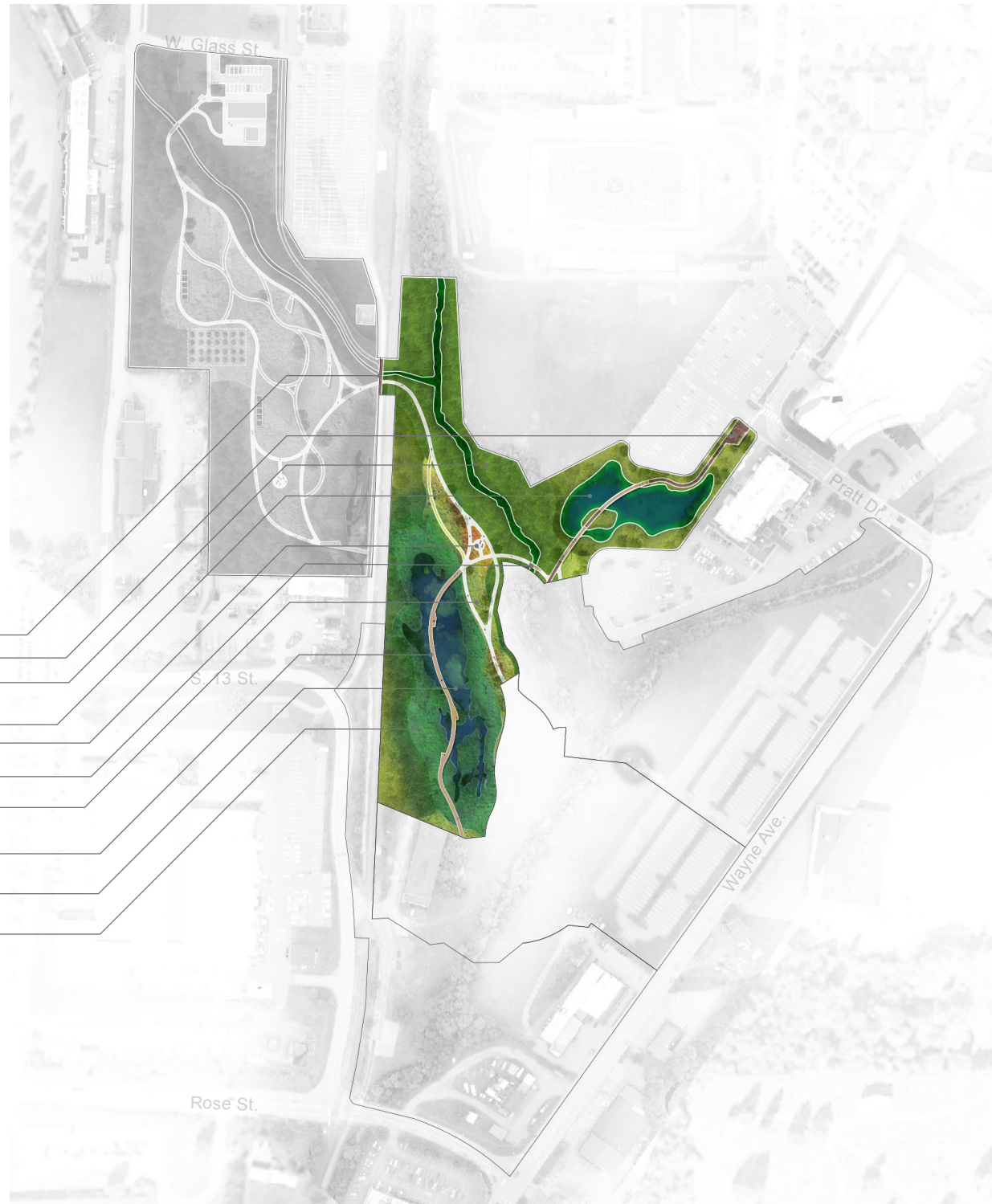
- Stewardship garage
- Stewardship office
- Pedestrian bridge
- Restored stream
- Bird blinds
- Meadow monitoring plots
- Research nursery with deer fence
- Meadow monitoring plots
- North Wetland
- Outdoor classroom
- Wetland boardwalk
- Wet meadow



PHASE 2

This phase will leverage excitement about wetland restoration, the Wetland Boardwalk, and the Frog Pond naturalization to simultaneously provide stream restoration and the establishment of the Pollinator Meadow and early-stage successional forest. Education will be further embedded into the landscape during this phase, through the construction of an additional outdoor classroom. An at-grade railway crossing will add critical connectivity for pedestrians and stewardship personnel.

- Rail crossing
- North gathering entrance
- Restored stream
- Frog Pond
- Outdoor classroom
- Pedestrian bridge
- Pollinator Meadow
- Wetland Boardwalk
- Confluence Wetland
- Wet meadow

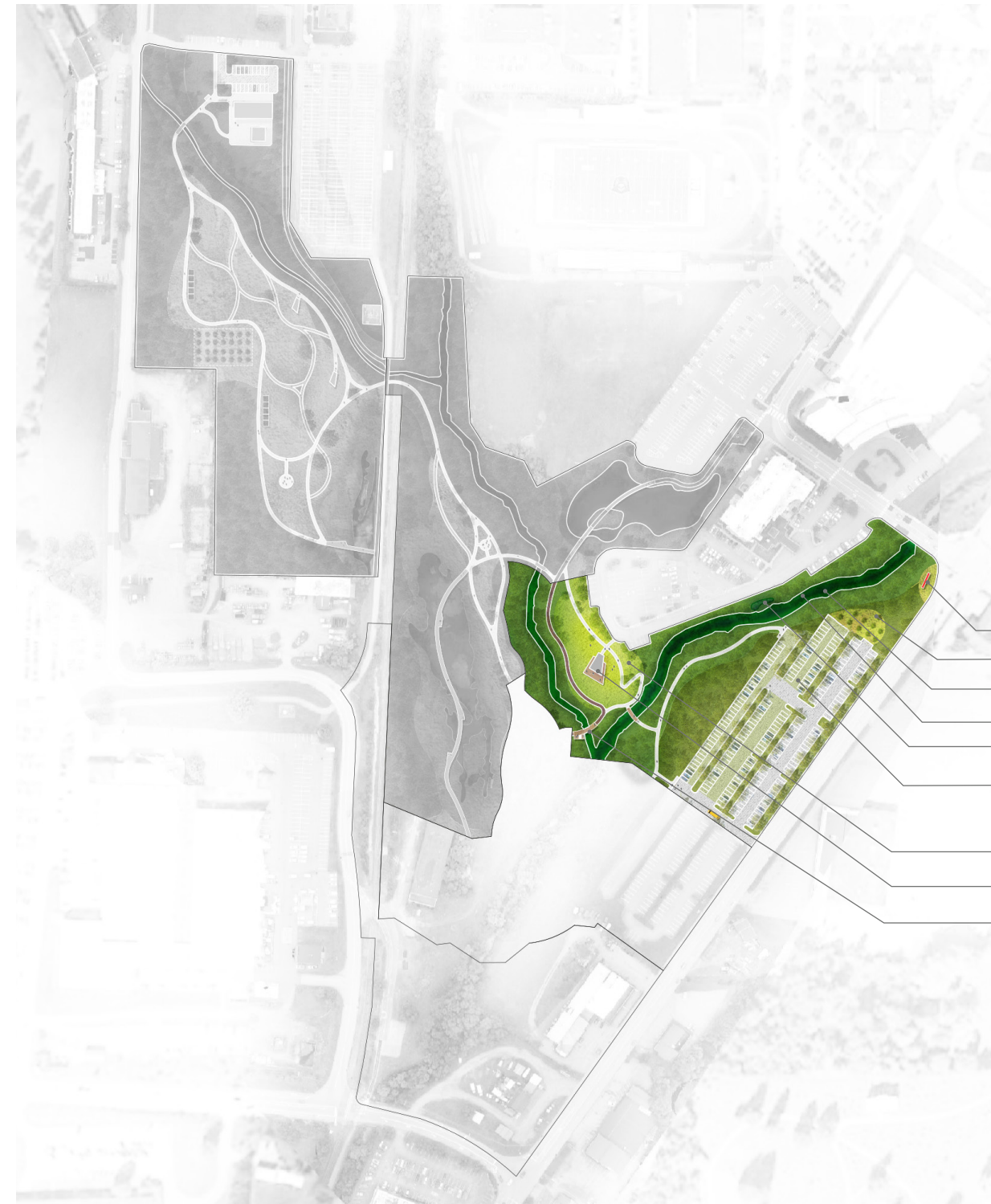


PHASE 3

The Overlook Pavilion will function as the geographic heart of Confluence Discovery Park. Funding for this amenity will be paired with stream restoration, successional forest establishment, new trails, "greening" improvements within the Wayne Avenue parking lot, and welcome signage at Wayne Avenue and Pratt Drive. This phase will also include the Christmas Tree Garden, which will celebrate Indiana's heritage as the country's "Christmas Tree Capital of the World,"¹ while demonstrating biodiversity.

1. Carnegie Museum of Natural History (2019)

- Welcome signage
- Christmas tree display area
- Wooded riparian corridor
- Restored stream
- Vernal pool
- Permeable overflow parking area
- Eco-lawn
- Overlook Pavilion / outdoor classroom
- Pedestrian bridge



PHASE 4

This phase contains the smallest acreage, but could be considered the most impactful portion of Confluence Discovery Park's buildout. The focal point of this phase—Allegheny Arboretum Visitor Center—aims to create excitement for the university and surrounding community, as well as for donors. This work will be grouped with stream restoration, universal stream access, successional forest establishment, new trails, and "greening" improvements within the Wayne Avenue parking lot.

- Pollinator Meadow
- Restored stream
- Bird blinds
- Bus drop-off
- Allegheny Arboretum Visitor Center
(with green roof & solar array)
- Outdoor classroom
- Pedestrian bridge
- East gathering entrance



PHASE 5

The final phase will complete the stream restoration and rainwater management improvements within the portion of the Confluence Discovery Park that is most subject to flooding. A new wetland, meadow, successional forest establishment, trails, and welcome signage at Wayne Avenue and Rose Street will complete Confluence Discovery Park's buildout.

- Multi-use path
- Wooded riparian corridor
- Restored stream
- South Wetland
- Successional forest
- Welcome signage



OPINION OF PROBABLE COST

The opinion of probable cost provides the master planning team's professional opinion of the likely cost to implement Confluence Discovery Park. This opinion is based on the number of phases outlined within this document and the components of each phase. The opinion includes likely values for permits; mobilization; material systems and labor (grouped together into unit costs); ecological restoration; early-stage land management; design/engineering/estimating contingency; and contractor overhead, profit, and fees. All probable costs are based on 2019 values and do not account for changes in market value or inflation.

When budgeting for each phase of work, the master planning team recommends that IUP either: 1) Solicits an additional, third party cost estimator; or 2) Hires a general contractor to provide a Guaranteed Maximum Price (GMP) for construction services, during the design phase. This approach will help to verify costs as the design unfolds in detail.

See Appendix I for the detailed opinion of probable cost table.



Streambank restoration - Andropogon

ECOSYSTEM SERVICES VALUATION

Confluence Discovery Park will provide beneficial, ecological functions for IUP and the broader community. The varied benefits that support human life and health are often described as ecosystem services, and they are grouped into three categories: provisioning, regulating, and cultural services.

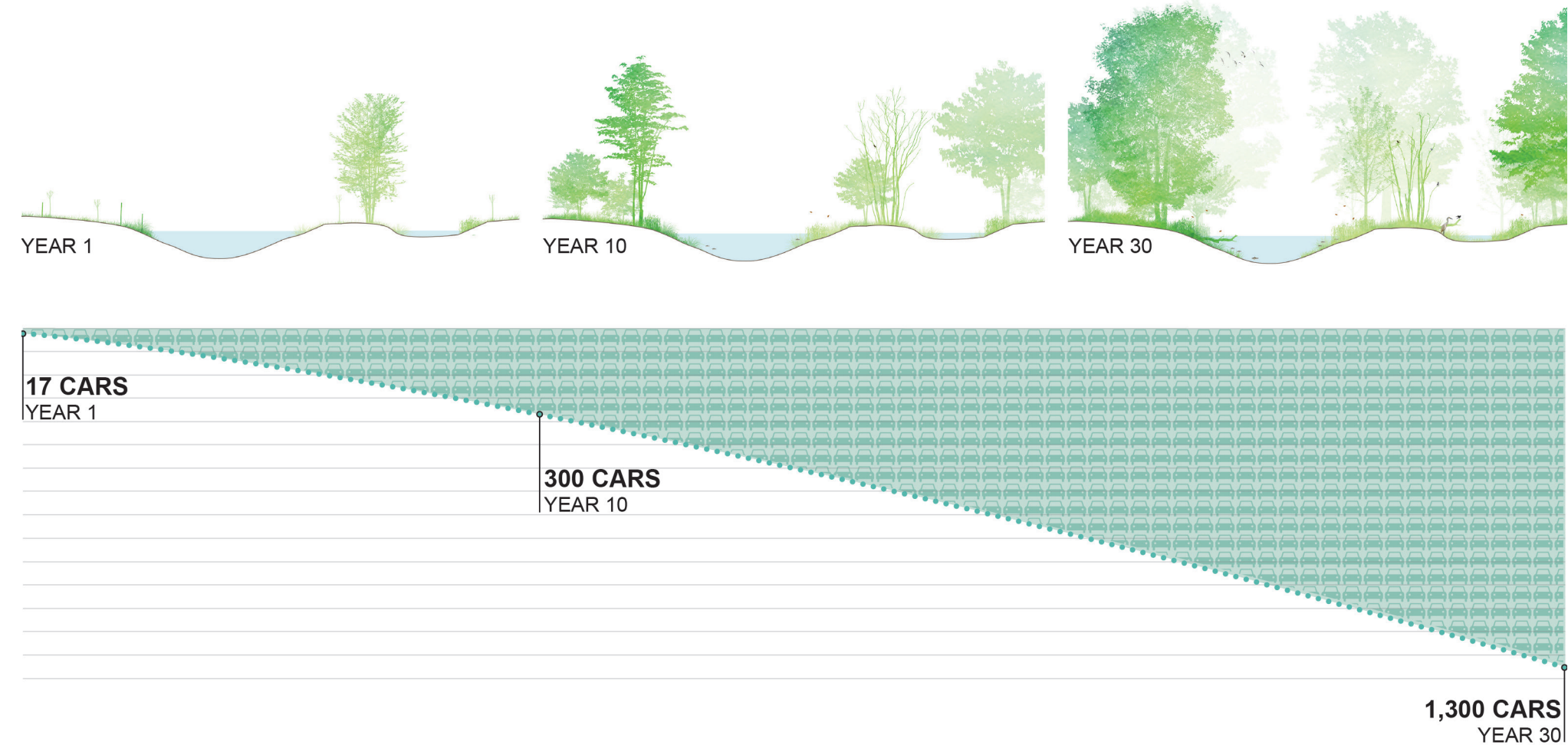
Provisioning services include the harvesting of products such as food, lumber, and medical resources, which is not particularly relevant to Confluence Discovery Park. The amenity would offer significant regulating services, include carbon sequestration (which helps regulate global climate), moderation of microclimate on site, purification of water and air, flood control, erosion prevention, and plant pollination. Confluence Discovery Park would also provide cultural services, including active and passive recreation for mental and physical health, tourism, scientific study, aesthetic inspiration for culture and art, and spiritual experience and sense of place. The amenity's healthy plant and animal populations, habitat, and

biodiversity will function as a foundation that supports all of these ecosystem services, while also providing intrinsic value of their own, beyond human-centric services.

The master planning team prepared an Opinion of Potential Ecosystem Service Values to project Confluence Discovery Park's environmental value. This was created to quantify a select sample of regulating ecosystem services for Confluence Discovery Park on a 30-year time horizon, based on the full master plan buildout. Potential carbon sequestration, avoided rainwater runoff, and air pollutant removal were quantified for forest-plant communities, and calculated for a potential dollar value benefit. Potential, annual, carbon-sequestration rates after 30 years of maturity were calculated for all plant communities, and for the potential dollar value benefit of that service. At 30 years of maturity, the plant communities of Confluence Discovery Park have the potential to sequester a volume of carbon annually that is equivalent to greenhouse

gas emissions from 90 passenger vehicles in one year, or the average energy use of 50 single-family homes in one year. This quantity of carbon sequestration could be considered an annual offset towards the carbon footprint of construction and management of the project site or sites elsewhere on IUP's campus.

Confluence Discovery Park will serve as an important resource for IUP, the community, and the regional ecosystem. Ecosystem services are one lens to consider and assess the benefits of the amenity, and quantification and potential dollar valuation of those services can give additional insight. Those metrics must also be considered along with the less quantifiable services, as the true value of the Confluence Discovery Park extends far beyond any particular service quantification or dollar valuation. (See Appendix J)



**30 YEAR CARBON STORAGE EQUIVALENCY
IN PASSENGER CAR ANNUAL EMISSIONS**

POTENTIAL FUNDING SOURCES

INCENTIVE PROGRAMS

Grant, loan, and rebate programs offer opportunities for the Confluence Discovery Park to access funds that do not need to be repaid. Some of these programs are administered by local authorities, while others stem from state or federal agencies. Incentive programs applicable to the Confluence Discovery Park's implementation largely address site evaluation, contaminant cleanup, restoration, site amenities, solar arrays, conservation, recreation, environmental education, and rainwater management. (See Appendix K)

FOUNDATION FUNDING

Charitable foundations present another source of potential funding for implementation. The PA-based William Penn Foundation, in particular, provides funding under the umbrellas of creative communities, great learning, and watershed protection. (See Appendix K)

NAMING RIGHTS

Many arboreta and public gardens leverage naming rights to raise capital for select projects – large and small. Confluence Discovery Park can follow suit by considering the following naming-rights opportunities:

- Allegheny Arboretum Visitor Center
- Rooms within the Allegheny Arboretum Visitor Center
- Overlook Pavilion
- Bird blinds
- Wetland Boardwalk
- Outdoor classrooms
- Entry plazas
- Frog Pond
- Meadows
- Wetlands
- Successional forests
- Research Nursery
- Memorial/celebratory tree plantings

- Benches
- Paver engraving in plaza

Establishing the value, or cost, of each opportunity before speaking with potential funders is essential in conveying information thoughtfully, accurately, and consistently. The value of smaller items, such as tree plantings, benches, and engravings, could even be included on the park's website.

For larger items, naming rights should only be given when the funding includes an endowment (see Endowment section). If a patron offers to fund the establishment of a meadow, for example, that generous gift necessitates an in-situ plaque or similar type of public recognition. If that or another patron funds the meadow's endowment (which would finance the habitat's operations and management for a predetermined number of years), then that patron should be awarded naming rights for the meadow. When engaging in naming rights, the Arboretum Executive Director and supporting leadership

should consider how name changes will impact identity and sense of place. For example, if the Allegheny Arboretum Visitor Center's name were to change to the Jane Smith Visitor Center, the purpose of the building and its affiliation with the Allegheny Arboretum could be jeopardized. All naming should strive to enhance, rather than detract from, the Allegheny Arboretum and Confluence Discovery Park's placemaking and respective missions. A better name may therefore be the Jane Smith Allegheny Arboretum Visitor Center.

ENDOWMENT

Peer arboreta and public gardens routinely leverage endowments to fund operations and management. These endowments are often project-specific. For example, the Morris Arboretum of the University of Pennsylvania raises funds for each project's capital costs, plus an additional 8% (on average) for each project's endowment. The endowment is invested by the University of Pennsylvania, but kept in a separate fund for each project. Of this 8%, 5% is typically used by the arboretum for operations and management of the project (an industry average), while the remaining 3% is reinvested. The arboretum requires that operations and management costs are estimated during each project's design phase, and if the anticipated project needs exceed 8%, then the arboretum will raise the endowment figure. For recent projects, the endowment has anticipated 20-years of operations and management, but in theory, the investment should continue to grow in perpetuity ².

Confluence Discovery Park should consider endowing various types of improvements. Design/construction projects, ecological restoration projects, and even positions can be endowed. This includes, but is not limited to, the Executive Director, Horticultural Director, and Education Director positions. Upon endowment, the title would change to the John Smith Executive Director, for example.

Endowments, in tandem with other funding mechanisms, can help the vision of Confluence Discovery Park become a reality. With careful planning and strategic partnerships, Confluence Discovery Park will become a university and community asset, regional destination, and environmental treasure for generations to come.

2. Meyer (2019)

5 APPENDICES



APPENDIX A

WORKS CITED

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APPENDIX B

ARCHIVAL DOCUMENT REVIEW

The Master Planning Team reviewed the following archival documents, provided by IUP, during the early stages of the master planning process:

- 2017 site survey
- Planning & zoning reports
- Cultural & historic reports
- Environmental reports
- Brownfield remediation reports
- Local and regional stormwater reports
- Wetland reports
- Utility reports
- Structural building reports
- Geo-technical engineering report

REGIONAL MAPPING

GEOLOGY & PHYSIOGRAPHY

Confluence Discovery Park lies within Appalachian Plateaus Province, which is a geologic formation that stretches from Alabama to New York. The area is typified by undulating landform, narrow valleys, and may include reclaimed land.¹ Seven bedrock types occur regionally, with the sedimentary, Glenshaw Formation dominating Indiana county and its surroundings. Within Indiana County, the elevation spans 1,680 feet, reaching as high as 2,340 feet.²

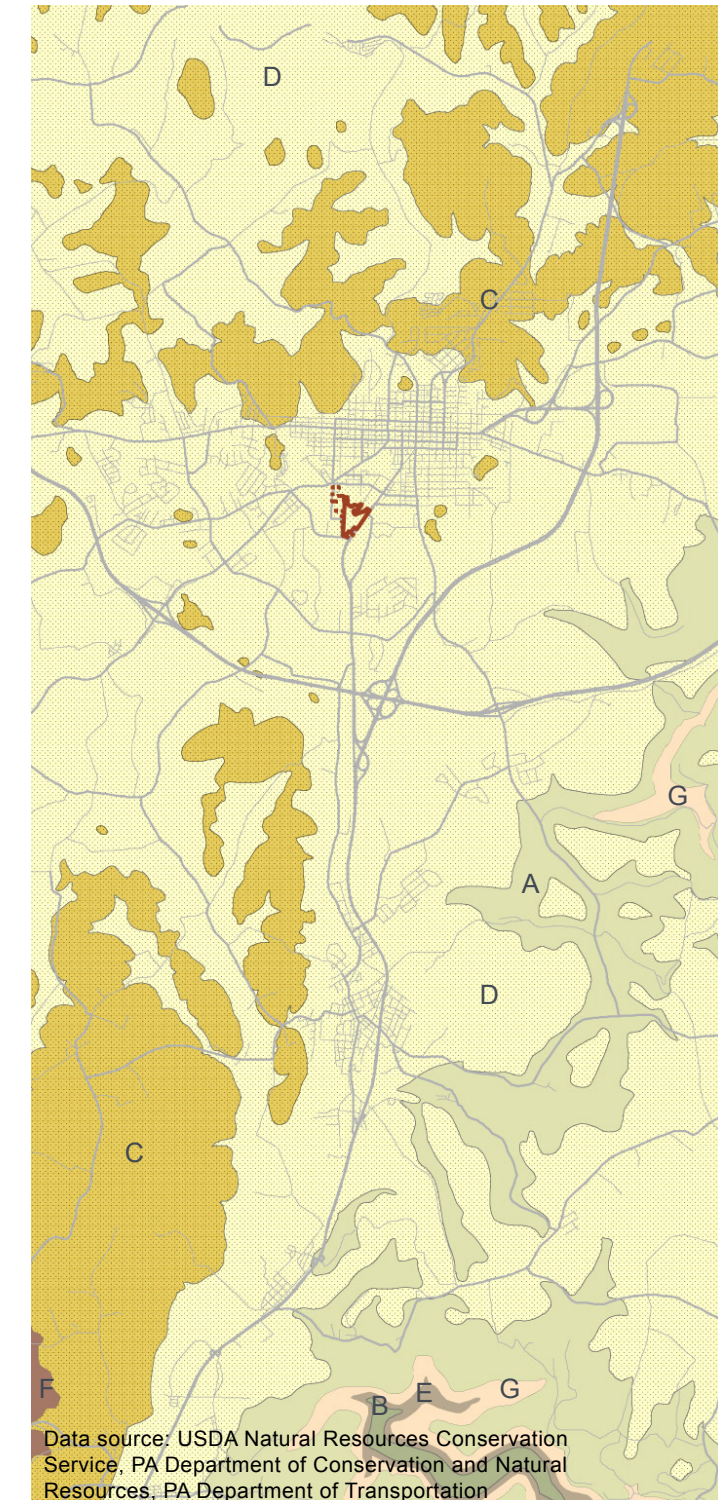
1. L. Robert Kimball & Associates (2007)

2. L. Robert Kimball & Associates (2007)

GEOLOGIC FORMATIONS

A	Allegheny Formation
B	Burgoon Sandstone
C	Casselman Formation
D	Glenshaw Formation

E	Mauch Chunk Formation
F	Monongahela Group
G	Pottsville Formation



Data source: USDA Natural Resources Conservation Service, PA Department of Conservation and Natural Resources, PA Department of Transportation

APPENDIX C

STAKEHOLDER SURVEYS

The Master Planning Team administered a digital survey to the Confluence Discovery Steering Committee in November 2018. Six out of the 12 committee members completed the survey (n=6). The following table shows the survey results along with weighted rankings for desired program related to site infrastructure, building infrastructure, and operations and maintenance at Confluence Discovery Park.

No.	Potential Program Item	Category	Sub-Category	Weighted Ranking	Ranking				Focus			
					High Priority	Medium Priority	Low Priority	Not Applicable	University Recreation	Community Recreation	University Benefit	Community Outreach
A Site Infrastructure												
1	Allegheny Plateau Garden	Garden	Habitat	11	2	1	3		1	1	3	4
2	Amphitheater	Recreation	Education	7		2	4	1	1	1	4	3
3	Bicycle Pathway(s)	Recreation		18	6				5	5	2	2
4	Bird House(s)	Education	Habitat	10	2	1	3	1	2	2	3	4
5	Bird Watching Platform(s)	Recreation	Education	13	2	3	1		3	3	5	4
6	Community Garden	Garden	Habitat	0		1	2	4		1	1	3
7	Composting Facility	Garden	Education	5		1	4	1			5	3
8	Created Wetlands	Habitat	Education	15	3	3					5	3
9	Dedicated Research Plot(s)	Garden	Education	16	4	2					5	2
10	Exterior Event Space	Recreation	Education	9	1	3			2	2	2	3
11	Ecological Restoration Area	Education	Habitat	17	5	1					5	5
12	Fishing	Recreation	Education	-4			1	5		1		1
13	Floodway Area for Major Storm Events			14	4	1			1	1	1	5
14	Forest Woodland Area	Habitat	Education	17	5	1			1	1	5	2
15	Geology Display	Education		10		4	2				3	5
16	Habitat Box(s)	Habitat	Education	11	2	1	3		3	3	3	1
17	Invasive Species Removal	Garden	Education	18	6						4	3
18	Land Restoration Research Program	Garden	Education	16	4	2					5	3
19	Measured Mile Trail(s)	Recreation		10		4	2		3	3	2	4
20	Mulch Path(s)	Recreation		12	1	4	1		3	3	1	3
21	Native Bee Garden (Pollinator Garden)	Garden	Education	11	1	3	2				2	6
22	Native Plants Garden	Garden	Education	12	3		3				2	5
23	Nursery and Potting Station	Garden	Architecture	3		1	3	2		1	1	3
24	Parking for Bicycles	Recreation		16	5		1		2	3	3	3
25	Phytoremediation Area	Garden	Education	16	4	2					4	3
26	Picnic Area	Recreation		10	1	2	3		3	3	2	3
27	Plant Association Garden	Garden	Education	11	1	3	2			1	3	5
28	Prairie Meadow	Garden	Education	13	3	1	2		1	1	3	4
29	Raised Boardwalk(s)	Recreation		16	4	2			3	3	4	4
30	Sculpture Pads	Recreation	Education	13	3	1	2		2	2	3	2
31	Site Interpretive Signage	Education		17	5	1			2	2	2	4
32	Soil Storage Area	Garden		5		1	4	1			2	1
33	Stream Realignment(s)	Habitat	Education	14	4	1					2	4
34	Temporary/Rotating Garden Space	Garden	Education	4			5	1	1	1	1	3
35	Vegetable Farm for University	Garden	Education	0			3	3			2	3
36	Water Body (Pond)	Habitat	Education	18	6				2	2	4	3
37	Wet Meadow	Garden	Education	16	4	2					4	3
38	Wildflower Meadow	Garden	Education	18	6				1	1	4	3
39	Wildlife Viewing Blind(s)	Education		14	3	2	1		3	3	4	4
40	Working Research Area(s)	Garden	Education	16	5		1		1		4	2
41	Workout Fitness Trail	Recreation		4		2	2	2	3	3	2	2
	<i>An outdoor lab site near a run is very important</i>			3	1							
	<i>Nursery stock holding area</i>	Garden		0								1
	<i>Native 'Seed Pool'</i>	Garden										1

No.	Potential Program Item	Category	Sub-Category	Weighted Ranking	Ranking				Focus			
					High Priority	Medium Priority	Low Priority	Not Applicable	University Recreation	Community Recreation	University Benefit	Community Outreach
B Building Infrastructure												
1	Arboretum Office Space	Architecture	Education	15	3	3					5	3
2	Bathroom(s)	Architecture		12	3	2		1	1	1	3	3
3	Black Water Treatment System	Architecture		12	1	4	1				3	3
4	Concession Facility	Architecture		8	1		5		2	2	5	3
5	Flex Room Space (for rental events)	Architecture	Education	13	2	3	1		1	1	5	6
6	Geothermal Well Power System	Architecture		6		1	4				5	2
7	Gray Water Treatment System	Architecture		11	2	1	3				5	3
8	Greenhouse (or Conservatory)	Architecture	Education	-1	2	1	1	4			1	2
9	Maintenance Facility/Storage	Architecture		16	5		1				5	1
10	Museum	Architecture	Education	3	1	1	1	3	2	2	3	4
11	Parking for Vehicles	Architecture		14	3	2	1		2	2	2	4
12	Restrooms	Architecture		15	4	1	1		2	2	4	4
13	Site Lighting			10	1	3	1		2	2	5	1
14	Site Signage			18	6				3	3	5	4
15	Solar PV Power System	Education	Architecture	11	1	3	2				5	3
16	Visitor Center	Architecture		15	4	1	1		3	3	4	6
17	Green Roof Display	Habitat	Education	11	2	1	3		1	1	5	4
18	Wind Turbine Power System	Education		12	1	4	1				5	3
	<i>Eventually, will need to decide if IUP Welcome Center included</i>			0								
	<i>Visitors Center should have wet lab</i>			0								
C Operations and Maintenance												
1	Charge for Admission			1		1	2	3			2	2
2	Dedicated Security			7		1	5		1	1	2	1
3	Arboretum Director			17	5	1			1	1	4	2
4	Dedicated Maintenance Staff			13	3	1	2		1	1	2	2
5	Volunteer Staff			16	4	2			1	1	1	5
6	Institute an Endowment			16	4	2					4	3
7	Seeking Sponsorships			16	4	2					2	5
8	Arboretum Board			18	6						4	5
9	Mission Statement			17	5	1			1	1	4	3
10	Tree Maintenance Program			17	5	1			1	1	3	1
11	Preferred Species List			17	5	1			1	1	4	1
12	Tree Inventory Database			17	5	1			1	1	4	1
13	Management Practices Program			18	6						4	3
14	Green Infrastructure Program			16	4	2					4	5
15	Advocacy Linkages with the Community			18	6						2	5
16	Complete Accessibility			17	5	1			2	2	2	5
17	Consistency w. Community Planning			16	4	2			1	1	2	5
18	Consistency w. IUP Master Plan			15	4	1	1		1	1	4	3
19	Joint Horticultural Programs			7	2	1	1	2			2	3
20	Promote Green Tourism			17	5	1			2	2	2	5
21	Develop Strategies for Fund Raising			15	4	1	1				4	3
22	Reinforce Linkages with IUP Academics			17	5	1					4	3
	<i>Need to increase involvement of Arboretum Academic Committee</i>			0								

APPENDIX D

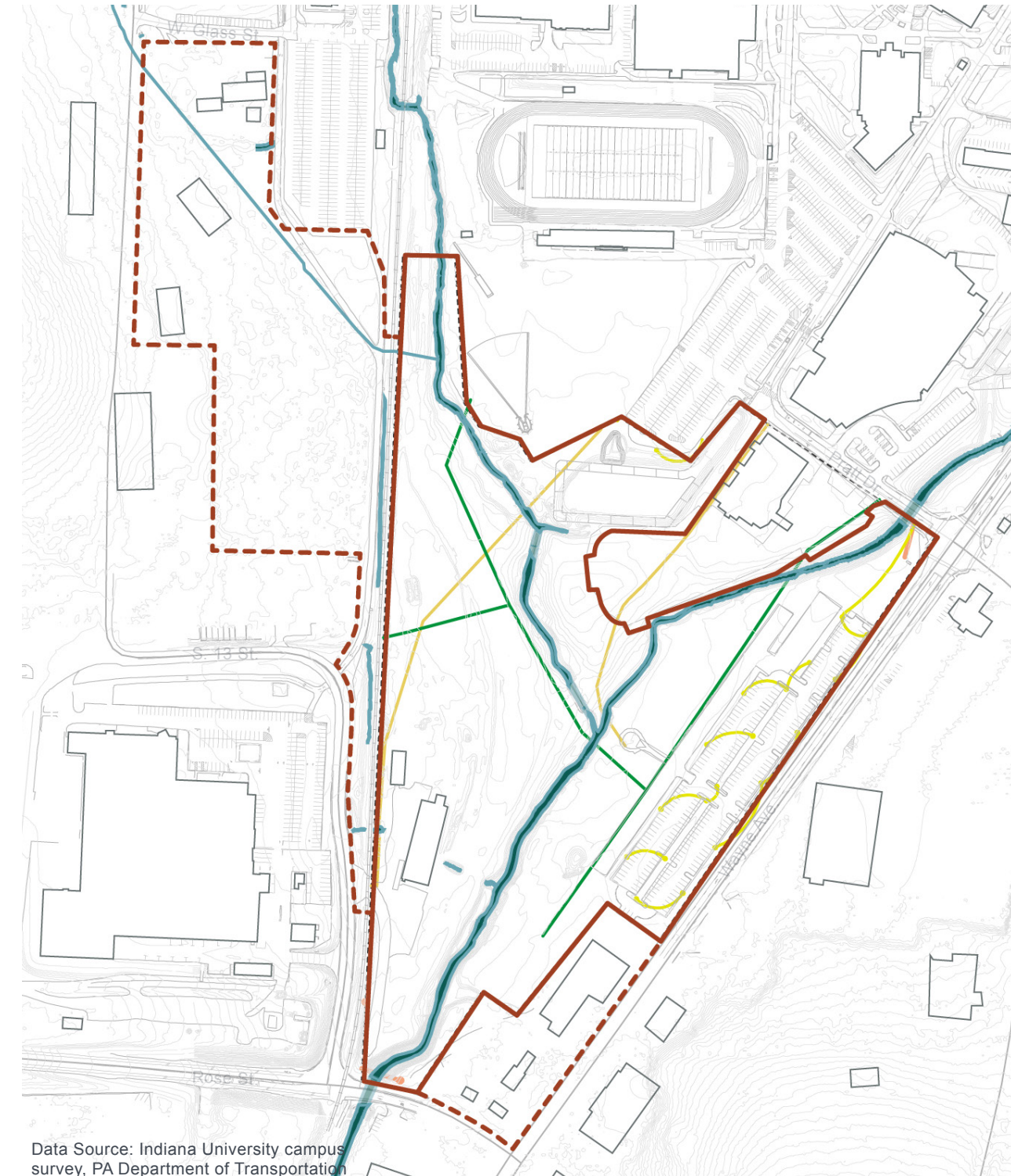
SITE INFRASTRUCTURE

Two existing gas lines and three sanitary sewer lines bisect Confluence Discovery Park. The longest gas line travels from Miller Stadium to S. 13th Street, passing underneath the wetland. The second gas line runs along Pratt Drive and the Kovalchick Complex toward the confluence of Stoney Run and Marsh Run, passes underneath Marsh Run, and then appears to connect to the gas well located off the northwest side of the Wayne Avenue parking lot. Gas service therefore appears to be available to Confluence Discovery Park along S. 13th Street and from either of the above mentioned locations, depending on demand and gas main pressures.

A White Township sanitary sewer runs from S. 13th Street into Confluence Discovery Park, underneath the wetland, and intersects with another sanitary sewer that bisects the park area from Miller Stadium south toward Wayne Avenue, somewhat parallel to Whites Run and Stoney Run. This sewer intersects a third sanitary sewer that parallels the north side of the Wayne Avenue parking area,

extending from Pratt Drive south toward Rose Street. If these sewer lines are owned and maintained by White Township, there is likely a 20-foot utility easement associated with the line. Sanitary sewer service should be available via the above mains provided ample fall from the development sites is provided to the main.

It appears that no telephone/data, electric (except within the parking lot), nor water utilities currently exist within Confluence Discovery Park. Service would be available by connecting to lines along the surrounding streets.



EXISTING SITE UTILITIES

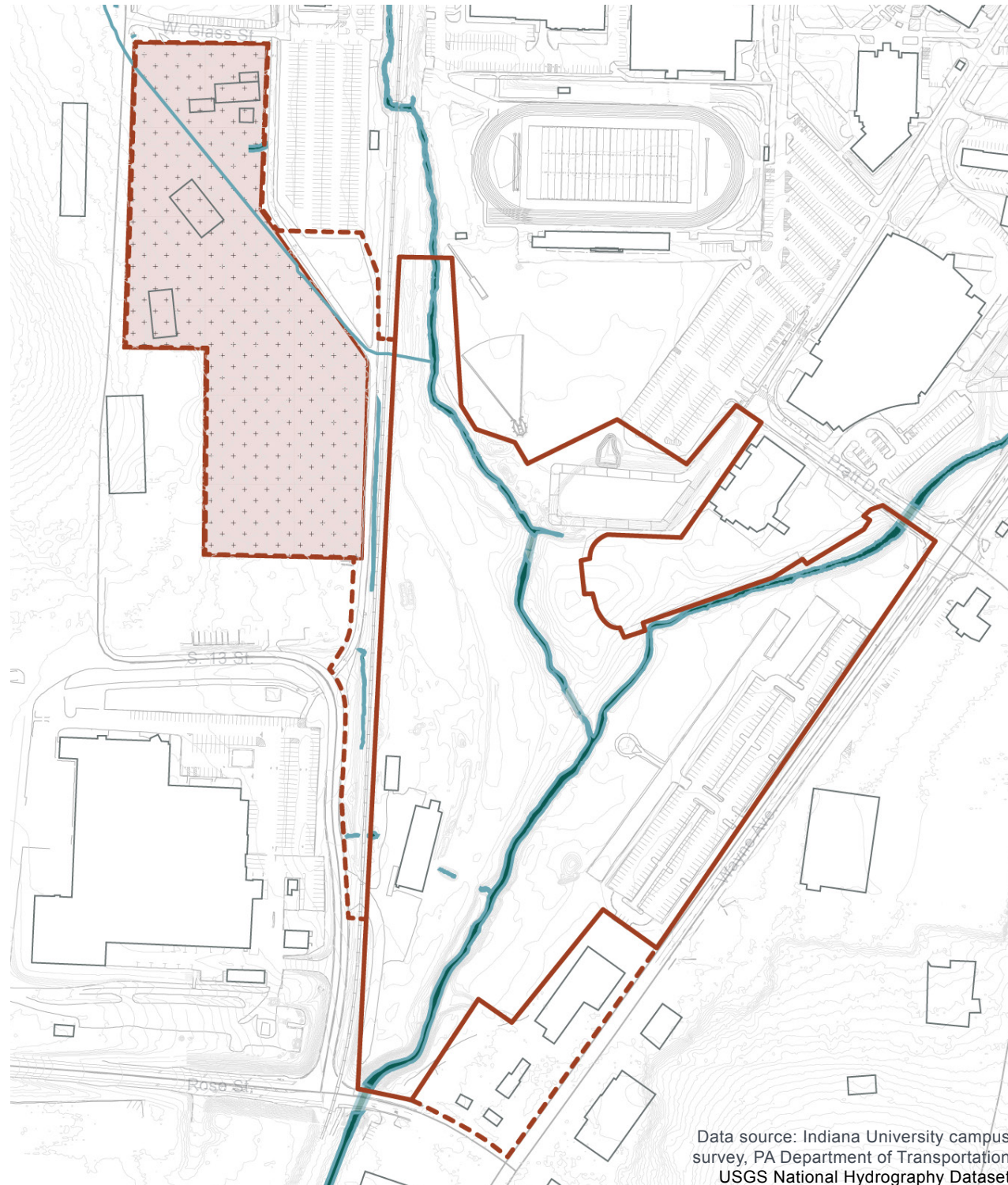
- Gas Line
- Electrical Distribution Line
- Electrical Site Lighting
- Sanitary Sewer
- Limit of Study
- Stream or open-air drainage



Data Source: Indiana University campus survey, PA Department of Transportation

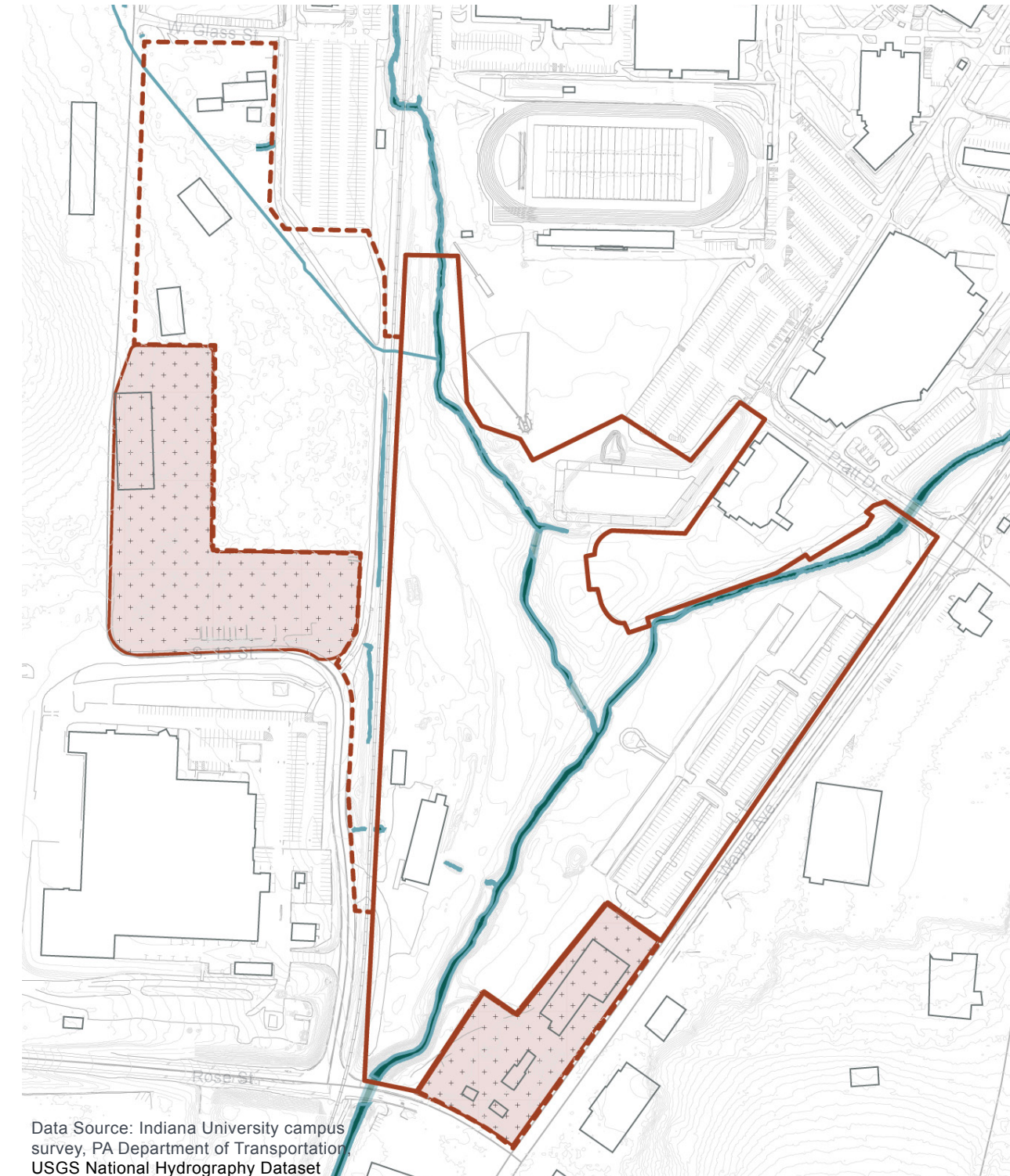
RECENT LAND ACQUISITION (2019)

Two parcels of land to the west of the rail line will be acquired by IUP in 2019 and are therefore included as part of the Confluence Discovery Park master plan. The larger, 5-6 acre parcel is owned by RSM Company (formerly Roumm's Scrap Materials), a scrap steel salvage and recycling facility. The property has several steel storage piles connected by access roads and several buildings. The east and northeast edges have a hedgerow of trees and the Stoney Run drainage course. The second is a privately-owned property at the corner of S. 13th Street and W. Glass Street. This property has four structures, gravel/dirt parking on W. Glass Street and a section of the Stoney Run drainage course with trees and shrubs. IUP's Long Range Facilities Master Plan Update identifies these properties as places for large storage, stormwater control ponds presumed to service much of the campus.



ADDITIONAL LAND ACQUISITION UNDER CONSIDERATION

The acquisition of additional, neighboring properties would allow IUP to expand the scale of Confluence Discovery Park by approximately 18-percent, from 39 to 47-acres. This expansion would include an L-shaped, 4.5-acre parcel along S. 13th Street that is currently occupied by Indiana Auto Glass and Corte Masonry Supplies. It would also include a 2.5-acre parcel at the intersection of Wayne Avenue and Rose Street that is currently occupied by Robert & Bev's Truck Accessory Center and Noble Stein Brewing Company. Gaining this latter parcel would help transform a highly-visible corner from commercial to park, thereby enhancing a critical entry sequence to the campus proper. Expanding Confluence Discovery Park through these land acquisitions would also increase the amenity's rainwater management, habitat, educational, research, and aesthetic values.



BUILDING SUITABILITY ASSESSMENT

A representative from GBBN visited the site to review existing conditions. The main building that includes and office component was not open and IUP had not yet taken ownership of the building to have key access. However, some assessments have been made based on exterior review of the buildings.



Building 1

BUILDING 1 OPPORTUNITIES

- Very few existing bearing walls, meaning large open spaces could easily be achieved
- Existing slab and walls providing structural integrity appear sound and reusable
- Existing garage door openings could be converted to large expanses of glass with no structural lintels required
- The 16' high roof makes the space feel impressive in the vertical dimension
- Surrounding site contains room for a potential parking area

BUILDING 1 CONSTRAINTS

- Roof will need significant repair
- Building (10,800-square feet) is larger than would likely be

necessary for a welcome or visitor center

- Existing entry area would likely need to be demolished
- Building's finished floor elevation is 3'-0" above existing site, meaning a ramp would be required to make the building ADA-accessible
- Building orientation is not optimal for solar panel application nor passive solar heating
- Existing walls are not waterproofed, and water is penetrating the CMU block wall

BUILDING 2 OPPORTUNITIES

- Finished floor elevation is on-grade, making ADA-accessibility easily achievable
- Building is appropriately sized



Building 3

for a visitor or welcome center (2,200-square feet)

- Existing walls could be reused to create new pitched roof for capturing rainwater and possibly for solar panels

BUILDING 2 CONSTRAINTS

- Existing partial-roof collapse means immediate work would be required to stabilize the building
- structural reinforcement
- Building orientation is not optimal for solar panel application nor passive solar heating.

BUILDING 3 is a metal gabled roof shed building. It has vertical corrugated metal over stud framing. The building has a concrete slab. The roof seems to be keeping water out, but the corrugated metal cladding should be replaced if the building is to be used for storage. The wood framing seems



Building 4 - (Building 6 in background at left)

to be in acceptable condition. The building is uninsulated. A sliding garage door is only marginal functional. The master plan calls for this building to be demolished and this is a recommendation based on future use needs. If the building is to be reused, exterior replacement of siding would be required, and any recommended use would only be for storage. The building has interior lights, indicating electrical service.

BUILDING 4 is a small office (roughly 1000sf) lean-to type of building that was added to building 4. The building was not able to be accessed, but from the exterior, it can be ascertained that a new shingle roof would be required. The master plan recommends demolition of this building. Demolition should not jeopardize the building 4 structure as the two appear to be structurally independent. Building 2 appears to have insulation and presumably has plumbing and conditioning systems. Electrical service to the building is

supplied by overhead lines.

BUILDING 5 is a concrete block structure with wood truss roof support and a concrete slab on grade. The building appears to have been used for vehicular storage. The walls and roof appear to be in acceptable shape with no noticeable water entering the building. The garage door could not be opened so it is undetermined whether it is functional. The building is not insulated, and some areas of walls have missing or failing mortar. The building could feasibly be reused for storage or other purposes and has is roughly 14 feet between the concrete floor slab and the roof structure. The garage door will likely need to be replaced or infilled but the track for the door seems in working order. Windows are high off the ground and currently are weather tight. Painting the interior block is recommended as an added seal against moisture infiltration. Some areas of failing mortar should be repointed. The master plan recommends this building be reused for an office. If this were to be the case, the building would



Building 4 - (Building 6 in background)



Building 5

require furring and insulation with drywall as well as mechanical heating and cooling. Given the small footprint (roughly 500sf) residential size units could be employed (perhaps a mini-split system attached to the wall) to keep costs down. If Building 3 is to be repurposed for office use, some underground utility work would have to be performed as the building does not currently have water supply or sanitary service. This could be resolved by extending the likely service that exists from Building 2. However, review of existing service sizes would be required to determine if any enlargements would need to be made. Since the plumbing needs for building 3 would be limited, current line sizing is likely to be acceptable. The building does have electrical service.

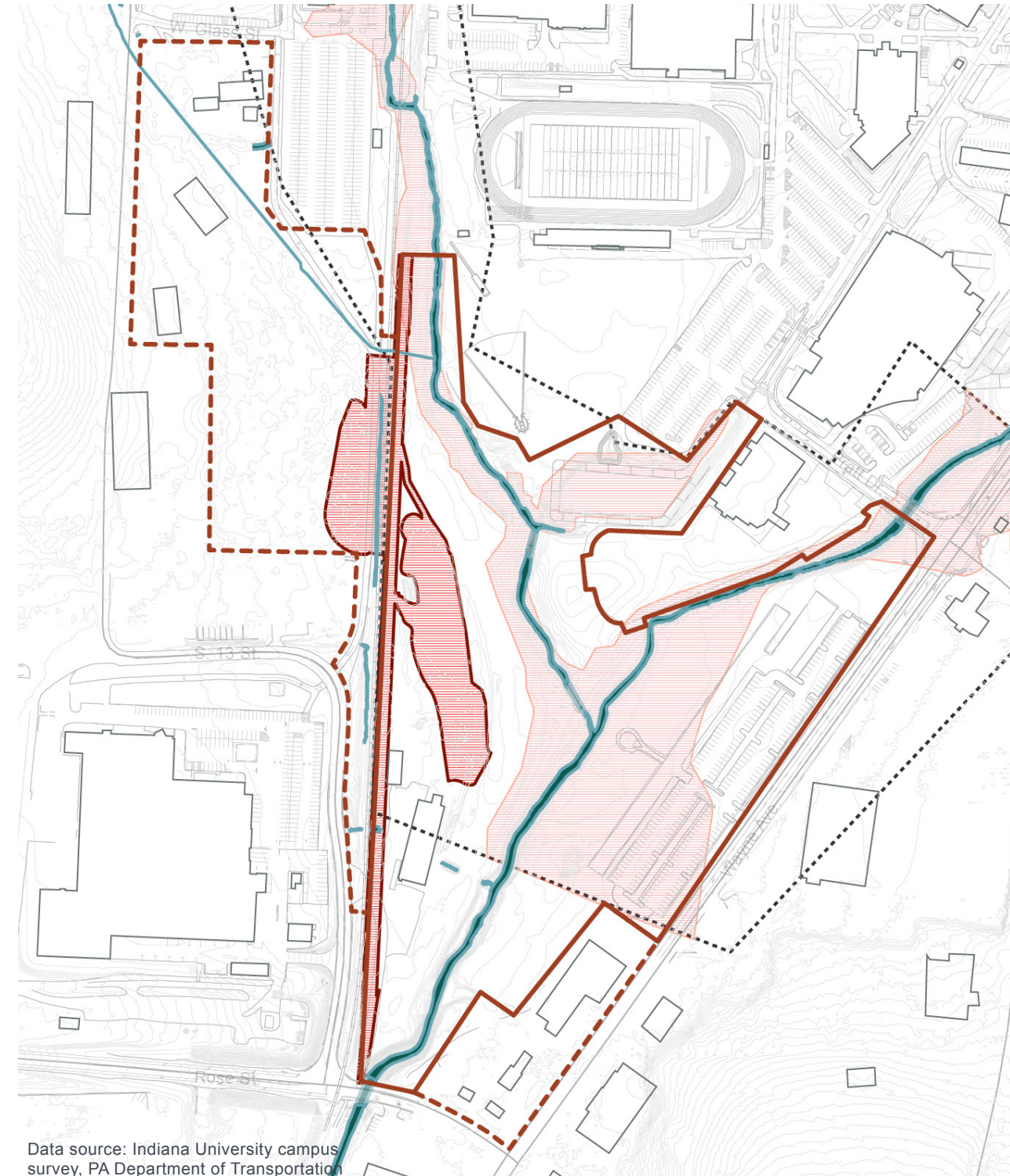
BUILDING 6 is a large linear corrugated metal building (roughly 3000sf) with Building 2 attached to the north face. The building is assumed to be uninsulated though this could not be confirmed as the building interior could not be accessed. A future visit may be required to confirm assumptions

from this report. From the exterior, the roof seems to be shedding water and the siding appears to be in acceptable condition. As noted in notes for Building 2, an office addition was built later than the original structure, so it is assumed that Building 2 could be demolished with little impact to Building 4. However, interior examination would be required to confirm condition of siding and extent of structural independence of Building 4. Some new cladding would be required to reuse Building 4. The master plan proposes using Building 4 for storage which is appropriate. If vehicular storage is proposed, examination of the existing slab will be required, and proper ventilation and drainage would be required. There is an existing garage door on the north face of the building and it appears to be in acceptable working order, but this would need to be confirmed. Electrical service to the building is supplied by overhead lines.

General notes and recommendations: all four buildings have had squatters and evidence of vandalism. It is recommended

that the buildings be locked for IUP use only immediately. It is recommended that local utilities review service to the building prior to occupancy. If valuable materials are to be stored in this location, a more robust façade treatment is recommended as the corrugated siding is easily penetrated. Security cameras and better site security lighting is recommended for the area as it feels a bit remote and has attracted vandals in the past.

-
- Location very close to the railroad means sound and vibration could cause disturbance
- With very few existing openings, new openings would have to be cut into walls, requiring additional structural reinforcement
- Building orientation is not optimal for solar panel application nor passive solar heating.



RESTRICTED- DEVELOPMENT ZONES

Opportunity exists for the construction of new buildings and structures within specific areas of Confluence Discovery Park. These areas are informed by federal, state, and local regulations, as well as site suitability and environmental stewardship. Strict no-build zones include land within designated railroad setbacks, wetlands, stream and wetland buffers, utility right-of-ways, and other setbacks. Impacts to water bodies, including streams, their floodways, and wetlands, would need to be permitted by PADEP and USACE, and may require mitigation. Most municipalities do not allow construction of buildings or structures within the floodway, 100-year floodplain, or steep slopes. Other considerations for new development include the location necessity of maintaining a clean cap or other approved engineering controls over contaminated soils, suitability of soils for building foundations, ease of utility routing, and water table depth.

- Primary restricted zone: railroad setback, wetland setback
- Secondary restricted zone: 100-year floodplain, retention basin wetland
- Limit of study



Data source: Indiana University campus survey, PA Department of Transportation

BUILDING SUITABILITY STUDY

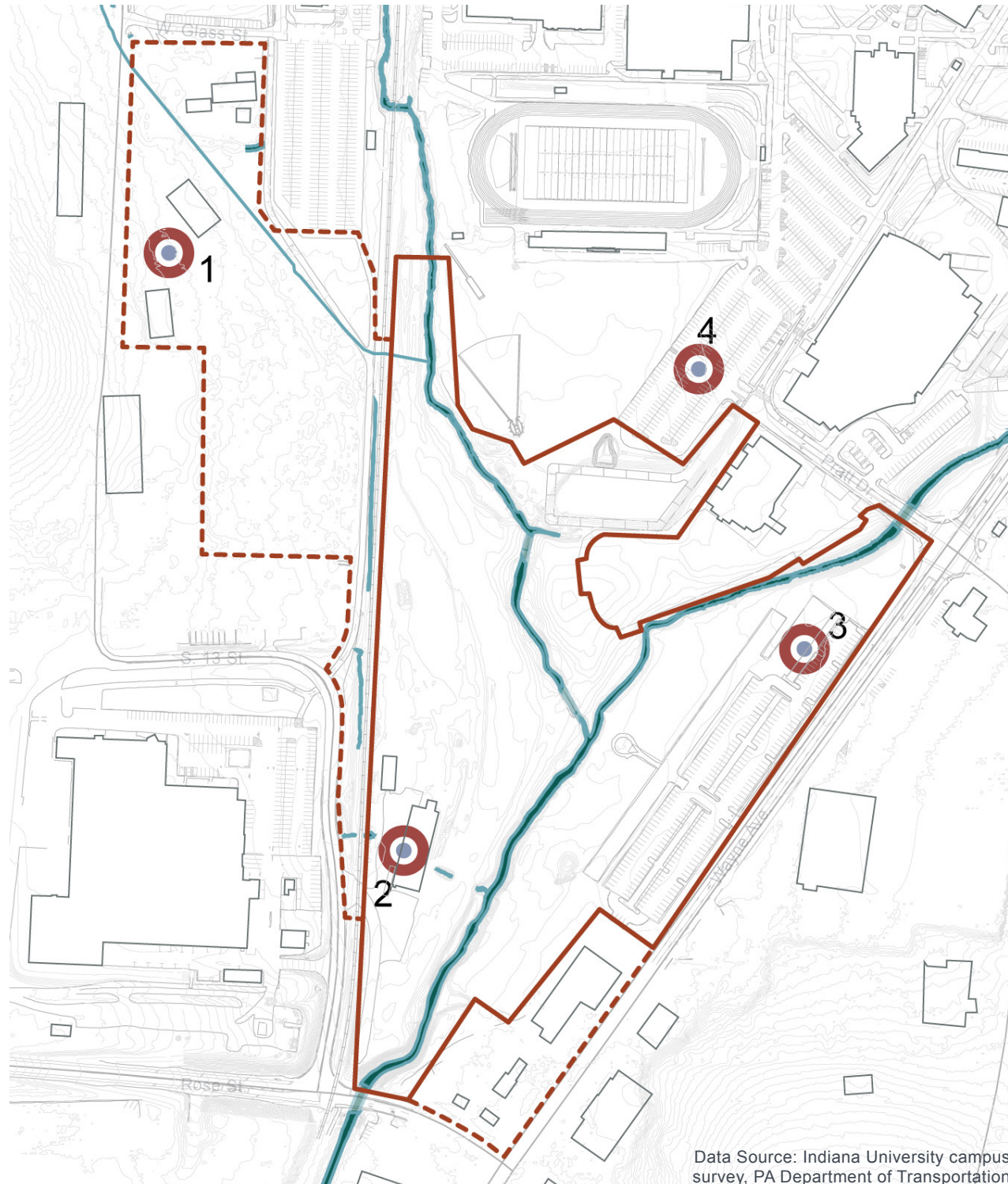
Opportunity for the construction of a new University Welcome Center and/or Allegheny Arboretum Visitor Center exists in four locations. The pros and cons of each location are as follows:

Option 1 Pros:

- Not within existing nor proposed floodway
- Not within existing nor proposed 100-year floodplain
- Easily accessible from S. 13th Street
- Flat topography with suitable space for parking, plaza space, and other landscape amenities

Option 1 Cons:

- Remote location that is not visible from the main access routes to campus
- Location is separated from the rest of Confluence Discovery Park and the campus proper by active railroad tracks, multi-use path, and stream
- Soils may require remediation due



Data Source: Indiana University campus survey, PA Department of Transportation

- to past industrial use
- Existing buildings are not suitable for adaptive reuse (i.e. they would need to be demolished)
- Adjacent land uses are industrial (i.e. inappropriate setting for a welcome center or visitor center)

Option 2 Pros:

- Not within existing nor proposed floodway
- Not within existing nor proposed 100-year floodplain
- Easily accessible from S. 13th Street
- Flat topography with suitable space for parking

Option 2 Cons:

- Remote location that is not visible from the main access routes to campus
- Location is separated from its access road by active railroad tracks
- Railroad could present negative soundscape impacts
- Close to wetlands (wetland setbacks are not shown on map)
- Neither existing building is suitable

- for adaptive reuse (i.e. they would need to be demolished)
- Location is better suited to a visitor center than University Welcome Center

Option 3 Pros:

- Not within existing nor proposed floodway
- Not within proposed 100-year floodplain
- Flat topography
- Prominent location along a main access route to campus
- Located within close proximity to the heart of Confluence Discovery Park
- Located strategically adjacent to hotel and athletic complex
- Existing parking area is not highly used

Option 3 Cons:

- Within existing 100-year floodplain and existing and proposed 500-year floodplains, so rainwater storage and fluvial dynamics would need to be addressed, and location could require additional measures for building foundation system
- Adjacent land uses are parking and

- retail (i.e. inappropriate setting for a welcome center or visitor center); some areas could be de-paved but others are not within the site limit

Option 4 Pros:

- Very strategic location for Campus or Arboretum
- On-axis with a main, campus-entry route (i.e. high visibility for visitors)
- Walkable to campus and other amenities
- Adjacent to existing parking
- Not in existing nor proposed floodway

Option 4 Cons:

- Not within the current site boundary
- Heavily utilized as current, parking use
- Within existing 100-year floodplain, so rainwater storage and fluvial dynamics would need to be addressed, and location could require additional measures for building foundation system
- Unclear if within proposed 100-year floodplain (due to limits of study area)

APPENDIX F

EARLY MASTER PLAN CONCEPTS

The Master Planning Team developed many iterations of Confluence Discovery Park throughout the master planning process, including these four:

- A - Conservative option
- B - Wayne Ave. parking lot mostly removed; hotel parking lot partially removed; parking garage, field house, and IUP Welcome Center proposed
- C - Wayne Ave. parking lot mostly removed; hotel parking lot removed; parking garage and IUP Welcome Center proposed
- D - Wayne Ave. parking lot mostly removed; hotel parking lot removed; parking garage; field house, IUP Welcome Center, and additional land acquisition proposed



APPENDIX G

REFERENCE PLANT COMMUNITIES

Sycamore Floodplain Forest		Species Association
Trees		
<i>Acer negundo</i>	Box-elder	
<i>Acer nigrum</i>	Black maple	
<i>Acer saccharinum</i>	Silver maple	
<i>Juglans nigra</i>	Black walnut	
<i>Platanus occidentalis</i>	Sycamore	
<i>Salix nigra</i>	Black willow	Eastern Tiger Swallowtail, Acadian Hairstreak
Shrubs		
<i>Cornus amomum</i>	Silky dogwood	
<i>Cornus racemosa</i>	Gray dogwood	
<i>Ilex verticillata</i>	Winterberry	
<i>Physocarpus opulifolius</i>	Ninebark	
Herbaceous		
<i>Bidens frondosa</i>	Beggar-ticks	Hoary edge
<i>Boehmeria cylindrica</i>	False nettle	
<i>Calamagrostis canadensis</i>	Canada bluejoint	
<i>Carex crinita</i>	Fringed sedge	
<i>Carex intumescens</i>	Bladder sedge	
<i>Carex lurida</i>	Sallow sedge	
<i>Dichanthelium clandestinum</i>	Deertongue	
<i>Elymus riparius</i>	Riverbank wild-rye	Skippers
<i>Impatiens capensis</i>	Jewelweed	Native Bees
<i>Persicaria punctata</i>	Dotted smartweed	
<i>Scirpus cyperinus</i>	Wool grass	

<i>Solidago rugosa</i>	Wrinkle-leaf goldenrod	Giant Swallowtail, Milbert's Tortoiseshell
Oak-Mixed Hardwood Floodplain Forest		Species Association
Trees		
<i>Acer negundo</i>	Box-elder	
<i>Acer rubrum</i>	Red maple	
<i>Carya cordiformis</i>	Bitternut hickory	
<i>Liriodendron tulipifera</i>	Tuliptree	Eastern Tiger Swallowtail
<i>Nyssa sylvatica</i>	Blackgum	
<i>Quercus bicolor</i>	Swamp white oak	
<i>Quercus palustris</i>	Pin oak	
Shrubs		
<i>Cephalanthus occidentalis</i>	Buttonbush	
<i>Ilex verticillata</i>	Winterberry	
<i>Lindera benzoin</i>	Spicebush	
Herbaceous		
<i>Bidens frondosa</i>	Beggar-ticks	Hoary edge
<i>Boehmeria cylindrica</i>	False nettle	
<i>Calamagrostis canadensis</i>	Canada bluejoint	

<i>Carex bromoides</i>	Brome-like sedge	
<i>Carex crinita</i>	Fringed sedge	
<i>Carex intumescens</i>	Bladder sedge	
<i>Carex lurida</i>	Sallow sedge	
<i>Dichanthelium clandestinum</i>	Deertongue	
<i>Elymus virginicus</i>	Virginia wild rye	Skippers
<i>Impatiens capensis</i>	Jewelweed	Native Bees
<i>Persicaria punctata</i>	Dotted smartweed	
<i>Scirpus cyperinus</i>	Wool grass	
Mesic Meadow		Species Association
Herbaceous		
<i>Agrostis perennans</i>	Autumn bent	Common Roadside Skipper, Leonard's Skipper, Indian Skipper
<i>Andropogon gerardii</i>	Big Bluestem	Deleware Skipper
<i>Andropogon scoparius</i>	Little Bluestem	Leonard's Skipper, Swarthy Skipper
<i>Apocynum cannabinum</i>	Indian hemp	Monarch
<i>Asclepias incarnata</i>	Swamp Milkweed	Monarch, Acadian Hairstreak, Regal Fritillary , Great Spangled Fritillary, Pearl Crescent, Gray Hairstreak
<i>Aster novae-angliae</i>	New England Aster	American Lady, Cabbage White, Common Buckeye, Painted Lady, Pearl Crescent, Question Mark, Red Admiral, Viceroy, American Snout, Orange Sulphur, Eastern Tailed Blue
<i>Bidens frondosa</i>	Beggar ticks	Hoary edge
<i>Boehmeria cylindrica</i>	False nettle	Question Mark, Red Admiral, Comma
<i>Carex vulpinoidea</i>	Fox Sedge	
<i>Dichanthelium clandestinum</i>	Deertongue	
<i>Doellingeria umbellata</i>	Field-topped white aster	

<i>Elymus riparius</i>	Riverbank wild-rye	Skippers
<i>Elymus virginicus</i>	Virginia Wildrye	Skippers
<i>Eupatorium perfoliatum</i>	Boneset	Bronze Copper
<i>Euthamia graminifolia</i>	Grass-leaved goldenrod	Native Bees
<i>Eutrochium fistulosum</i>	Joe pye weed	Little Glassywing, Zabulon Skipper, American Lady
<i>Eutrochium maculatum</i>	Spotted joe pye weed	Monarch
<i>Helenium autumnale</i>	Common sneezeweed	Various Butterflies
<i>Heliopsis helianthoides</i>	Oxeye Sunflower	Various Butterflies
<i>Impatiens capensis</i>	Jewelweed	Native Bees
<i>Lobelia cardinalis</i>	Cardinal flower	Various Butterflies
<i>Lobelia siphilitica</i>	Great Blue Lobelia	Native Bees
<i>Mentha arvensis</i>	Field mint	Native Bees
<i>Monarda fistulosa</i>	Wild Bergamot	Swallowtails, Skippers, Orange Sulphur, Clouded Sulphur
<i>Panicum virgatum</i>	Switchgrass	Regal Fritillary
<i>Persicaria pensylvanica</i>	Smartweed	
<i>Pycnanthemum tenuifolium</i>	Narrowleaf Mountainmint	Regal Fritillary
<i>Rudbeckia hirta</i>	Blackeyed Susan	Silvery Checkerspot Giant Swallowtail , Milbert's Tortoiseshell
<i>Solidago canadensis</i>	Canada goldenrod	Giant Swallowtail , Milbert's Tortoiseshell
<i>Solidago gigantea</i>	Smooth goldenrod	Giant Swallowtail , Milbert's Tortoiseshell
<i>Solidago rugosa</i>	Wrinkle-leaf goldenrod	
<i>Sorghastrum nutans</i>	Indiangrass	Pepper and Salt Skipper
<i>Verbena hastata</i>	Blue vervain	Least Skipper, Common Buckeye
<i>Verbesina alternifolia</i>	Wingstem	Pipevine Swallowtail
<i>Vernonia gigantea</i>	Giant Ironweed	American Lady, Crossline Skipper

Wet Meadow		Species Association
Trees		
<i>Acer negundo</i>	Box-elder	
<i>Acer rubrum</i>	Red maple	
<i>Quercus bicolor</i>	Swamp white oak	
Herbaceous		
<i>Andropogon gerardii</i>	Big Bluestem	Deleware Skipper
<i>Andropogon scoparius</i>	Little Bluestem	Leonard's Skipper, Swarthy Skipper
<i>Asclepias incarnata</i>	Swamp Milkweed	Monarch, Acadian Hairstreak, Regal Fritillary , Great Spangled Fritillary, Pearl Crescent, Gray Hairstreak
<i>Aster novae-angliae</i>	New England Aster	American Lady, Cabbage White, Common Buckeye, Painted Lady, Pearl Crescent, Question Mark, Red Admiral, Viceroy, American Snout, Orange Sulphur, Eastern Tailed Blue
<i>Aster umbellatus</i>	Flat Topped White Aster	
<i>Calamagrostis canadensis</i>	Canada bluejoint	
<i>Carex lurida</i>	Sallow sedge	
<i>Carex stricta</i>	Tussock sedge	
<i>Chelone glabra</i>	Turtlehead	Baltimore Checkerspot
<i>Cinna arundinacea</i>	Wood Reedgrass	
<i>Elymus virginicus</i>	Virginia Wildrye	Skippers
<i>Eupatorium perfoliatum</i>	Boneset	Bronze Copper Little Glassywing, Zabulon Skipper, American Lady
<i>Eutrochium fistulosum</i>	Joe Pye Weed	
<i>Helenium autumnale</i>	Common Sneezeweed	
<i>Heliopsis helianthoides</i>	Oxeye Sunflower	Various Butterflies
<i>Lobelia cardinalis</i>	Cardinal flower	Various Butterflies
<i>Lobelia siphilitica</i>	Great Blue Lobelia	Native Bees
<i>Panicum virgatum</i>	Switchgrass	Regal Fritillary
<i>Penthorum sedoides</i>	Ditch Stonecrop	
<i>Pycnanthemum tenuifolium</i>	Narrowleaf Mountainmint	Regal Fritillary
<i>Scirpus cyperinus</i>	Wool grass	
<i>Sparganium americanum</i>	Eastern bur reed	
<i>Verbena hastata</i>	Blue Vervain	Least Skipper, Common Buckeye

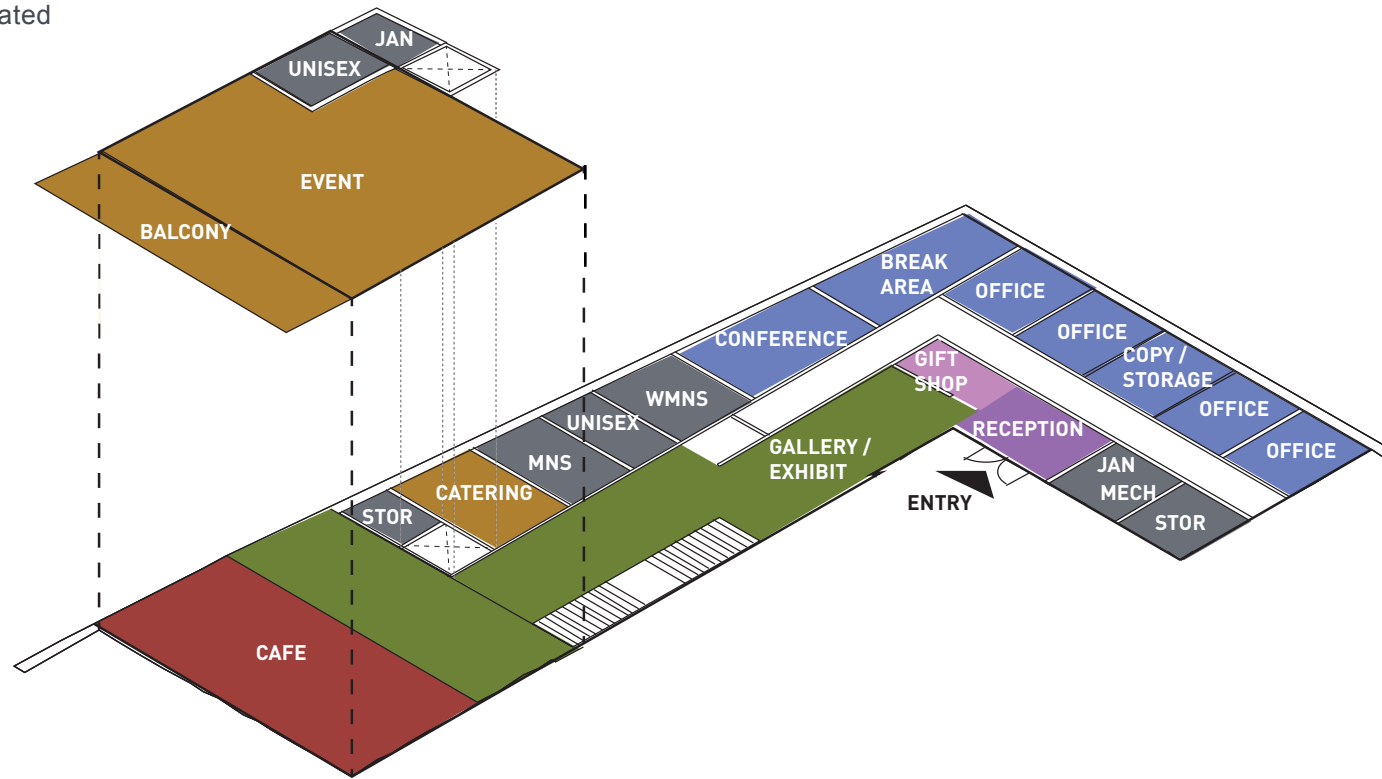
Tussock Sedge Marsh		Species Association
Herbaceous		
<i>Alisma subcordatum</i>	Mud Plantain	
<i>Asclepias incarnata</i>	Swamp Milkweed	Monarch, Acadian Hairstreak, Regal Fritillary , Great Spangled Fritillary, Pearl Crescent, Gray Hairstreak
<i>Calamagrostis canadensis</i>	Canada bluejoint	
<i>Carex canescens</i>	Silvery sedge	
<i>Carex intumescens</i>	Star Sedge	
<i>Carex lurida</i>	Sallow sedge	
<i>Carex stipata</i>	Awlfruit sedge	
<i>Carex stricta</i>	Tussock sedge	
<i>Carex tribuloides</i>	Blunt broom sedge	
<i>Chelone glabra</i>	Turtlehead	Baltimore Checkerspot
<i>Eupatorium perfoliatum</i>	Boneset	Bronze Copper
<i>Iris versicolor</i>	Blueflag iris	
<i>Juncus effusus</i>	Soft Rush	
<i>Lobelia cardinalis</i>	Cardinal flower	Various Butterflies
<i>Peltandra virginica</i>	Arrow arrum	
<i>Pontederia cordata</i>	Pickerelweed	
<i>Saururus cernuus</i>	Lizards trail	
<i>Scirpus cyperinus</i>	Wool grass	
<i>Scirpus validus</i>	Softstem Bulrush	
<i>Sium suave</i>	Water parsnip	

APPENDIX H

ALLEGHENY ARBORETUM VISITOR CENTER CONCEPTUAL FLOOR PLAN

The following is a conceptual floor plan for the proposed, 6,500-square foot Allegheny Arboretum Visitor Center. The abbreviated room functions are as follows:

- CATERING Catering kitchen
- EVENT Event space
- GENDER Gender-neutral restroom
- NEUTRAL with shower
- JAN Janitor's closet
- MECH Mechanical room
- MNS Men's restroom
- STOR Storage
- WMNS Women's restroom



APPENDIX I

OPINION OF PROBABLE COST TABLE

Confluence Discovery Park 2030 Master Plan						
Opinion of Probable Cost 31 May 2019						
	ITEM DESCRIPTION	QTY.	UNIT	UNIT COST	ITEM COST	ESTIMATING NOTES
Phase 1		454,033	SF	\$ 17.96	\$8,154,626	
Pre-Construction		454,033	SF			
Permitting (for Phases 1-5)						
	Building permit	1	EA	\$10,000.00	\$10,000	
	Driveway/ ROW permit	1	EA	\$25,000.00	\$25,000	
	Stormwater control permit	1	EA	\$50,000.00	\$50,000	
	Tree removal permit	1	EA	\$50,000.00	\$50,000	
	Railroad crossing permit	1	EA	\$50,000.00	\$50,000	
	Brownfield Phase 1 ESA	2	EA	\$5,000.00	\$10,000	
	Brownfield Phase 2 contingency	1	EA	\$50,000.00	\$50,000	Allowance, actual costs are very uncertain
	Stream restoration design and permit	1	EA	\$113,200.00	\$158,480	
	Wetland restoration permit	1	EA	\$50,000.00	\$50,000	
	Additional permits	1	EA	\$71,546.26		1% of total construction cost
	Subtotal				\$453,480	
Surveys						
	Full site	1.00	EA	\$140,000.00	\$140,000	Topography, natural features, trees, built features, utilities
	Subtotal				\$140,000	
Pre-Construction Total					\$593,480	
Construction		454,033	SF			
Mobilization						
	Stream restoration	1	EA	\$37,000.00	\$37,000	
	Wetland restoration	1	EA	\$24,000.00	\$24,000	
	Terrestrial revegetation	1	EA	\$28,485.00	\$28,485	
	Buildings and structures	1	EA	\$25,000.00	\$25,000	
	Subtotal				\$114,485	
Demolition & Tree Protection						
	Tree protection	2,128	LF	\$15.00	\$31,920	
	Building demolition and removal	14,799	SF	\$15.00	\$221,985	
	Vehicular aggregate pavement removal	76,031	SF	\$0.65	\$49,420	
	Fence removal	209	LF	\$6.00	\$1,254	
	Vegetation removal	216,308	SF	\$0.50	\$108,154	Includes invasive species removal
	Subtotal				\$412,733	

ITEM DESCRIPTION		QTY.	UNIT	UNIT COST	ITEM COST	ESTIMATING NOTES
Phase 1		454,033	SF	\$ 17.96	\$8,154,626	
Pre-Construction		454,033	SF			
Earthwork	Clean soil cap removal, stockpiling, and localized re-use	16,295	CY	\$10.00	\$162,947	
	Clean soil cap soil supplied from off-site sources and placement	8,147	CY	\$30.00	\$244,420	
	Export of unsuitable or contaminated soil	15,207	CY	\$60.00	\$912,423	
	Brownfield soil removal and placement at on-site landscape mounds	3,935	CY	\$5.00	\$19,675	
	Earthmoving and fine grading	14,953	CY	\$15.00	\$224,299	
	Temporary seeding (oats)	9.97	Acre	\$1,500.00	\$14,953	
	E&S controls and permitting	9.97	Acre	\$7,000.00	\$69,782	
	Stormwater conveyance and control	9.97	Acre	\$20,000.00	\$199,400	
	Utilities to buildings	0.65	EA	\$350,000.00	\$228,065	
	Parking and access drives to buildings	0.65	EA	\$140,000.00	\$91,226	
	Subtotal				\$2,167,189	
Buildings & Structures	Building renovation - garage	3,051	SF	\$40.00	\$122,040	
	Building renovation - office	929	SF	\$60.00	\$55,740	
	Bird blind	2	EA	\$20,000.00	\$40,000	3-sided open air, carpentry w/ roof
	Subtotal				\$217,780	
Exterior Improvements	Stream Restoration (excluding soil excavation and Vehicular pervious asphalt pavement)	862 7,705	LF SF	\$250.00 \$6.65	\$215,500 \$51,238	2-1/2" porous asphalt, 2" choker course, 12" aggregate base course, woven geotextile, prepared subgrade
	Pedestrian asphalt pavement - 8' w	6,032	SF	\$5.75	\$34,684	1/2" asphalt surface course, 2" asphalt base course, primecoat, 6" aggregate, woven geotextile, prepared subgrade
	Pedestrian aggregate pavement - 6' w	28,991	SF	\$9.00	\$260,919	4" compacted aggregate granite fines w/ binder, 4" aggregate base course, woven geotextile, prepared subgrade
	Carpentry boardwalk - 8' w	1,075	SF	\$170.00	\$182,750	20' helical piers, Cedar deck, weathered steel railing with wire mesh panels
	Carpentry pedestrian bridge - 8' w	239	SF	\$255.00	\$61,047	Cedar deck, weathered steel railing with wire mesh panels
	Pedestrian bluestone pavement	707	SF	\$40.00	\$28,272	3" bluestone, 1" sand leveling course, 6" aggregate base course, woven geotextile, prepared subgrade
	Monolithic stone seat wall	75	LF	\$625.00	\$46,875	
	Deer fence	418	LF	\$75.00	\$31,350	10' h chain link, black
	Interpretive signage	4	EA	\$2,000.00	\$8,000	Laser-cut weathered steel
	Bike Rack	4	EA	\$1,750.00	\$7,000	Landscape Forms - FGP bike rack
	Subtotal				\$927,635	
Planting	Meadow / wet meadow seeding	3.75	Acre	\$4,000.00	\$15,000	Herbicide existing and drill seed
	Wetland planting	0.19	Acre	\$100,000.00	\$18,600	Wetland hydrology in place
	Wooded riparian corridor planting	1.35	Acre	\$27,000.00	\$36,420	Excludes stream restoration
	Cross-sectional forest planting	2.82	Acre	\$27,000.00	\$40,240	
Utilities	Plumbing	150	LF	\$200.00	\$30,000	
	Electrical	150	LF	\$250.00	\$37,500	
	Telecom	150	LF	\$175.00	\$26,250	
	Subtotal				\$93,750	
Construction Total					\$4,225,253	
Land Management		396,831	SF			
Vegetation management	Invasive species management - 5 years	9.11	Acre	\$1,500.00	\$13,672	Assume 2 crew days/month, 8 months/year, crew day ~\$2,500, round up
	Subtotal				\$13,672	
Management Total					\$13,672	

Subtotal (Phase 1)		\$4,832,405
Subtotal without Management (Phase 1)		\$4,818,733
Contractor's overhead, profit, fees (Phase 1)	15%	\$722,810
Civil engineering & permitting (Phases 1-5)		\$630,000
Design/estimating contingency (Phase 1 through CA)	11%	\$609,570
Design/estimating contingency (Phases 2-5 through 30% CD)	5%	\$792,987
Civil engineering CA (Phase 1)		\$12,700
Construction contingency (Phase 1)	10%	\$554,154
TOTAL PHASE 1		\$8,154,626

ITEM DESCRIPTION		QTY.	UNIT	UNIT COST	ITEM COST	ESTIMATING NOTES
Phase 2		372,004	SF	\$ 14.69	\$5,462,929	
Construction		372,004	SF			
Mobilization	Stream restoration	1	EA	\$37,000.00	\$37,000	
	Wetland restoration	1	EA	\$24,000.00	\$24,000	
	Terrestrial revegetation	1	EA	\$28,485.00	\$28,485	
	Subtotal				\$89,485	
Demolition & Tree Protection	Tree protection	1,693	LF	\$15.00	\$25,395	
	Building demolition	0	SF	\$15.00	\$0	
	Vegetation removal	295,677	SF	\$0.50	\$147,839	Includes invasive species removal
	Subtotal				\$173,234	
Earthwork	Clean soil cap removal, stockpiling, and localized re-use	16,133	CY	\$10.00	\$161,333	
	Clean soil cap soil supplied from off-site sources and placement	8,067	CY	\$30.00	\$242,000	
	Export of unsuitable or contaminated soil	15,056	CY	\$60.00	\$903,389	
	Brownfield soil removal and placement at on-site landscape mounds	3,896	CY	\$5.00	\$19,481	
	Earthmoving and fine grading	14,805	CY	\$15.00	\$222,078	
	Temporary seeding (oats)	9.87	Acre	\$1,500.00	\$14,805	
	E&S controls and permitting	9.87	Acre	\$7,000.00	\$69,091	
	Subtotal				\$1,632,177	
Exterior Improvements	Stream Restoration (excluding soil excavation and replacement, including structures, planting, etc.)	897	LF	\$250.00	\$224,250	
	Frog Pond restoration & planting	1	EA	\$50,000.00	\$50,000	IUP Stormwater Masterplan lists \$21,000 for this pond, naturalization adds cost
	Pedestrian asphalt pavement - 8' w	4,388	SF	\$5.75	\$25,231	1/2" asphalt surface course, 2" asphalt base course, primecoat, 6" aggregate, woven geotextile, prepared subgrade
	Pedestrian aggregate pavement - 6' w	8,535	SF	\$9.00	\$76,815	4" compacted aggregate granite fines w/ binder, 4" aggregate base course, woven geotextile, prepared subgrade
	Carpentry boardwalk - 8' w	5,515	SF	\$170.00	\$937,550	20' helical piers, Cedar deck, weathered steel railing with wire mesh panels
	Carpentry pedestrian bridge - 8' w	1,397	SF	\$255.00	\$356,235	Cedar deck, weathered steel railing with wire mesh panels
	Pedestrian bluestone pavement	2,217	SF	\$40.00	\$88,680	3" bluestone, 1" sand leveling course, 6" aggregate base course, woven geotextile, prepared subgrade
	Monolithic stone seat wall	118	LF	\$625.00	\$73,750	??
	Interpretive signage	4	EA	\$2,000.00	\$8,000	Laser-cut weathered steel
	Mechanical railroad crossing arms	2	EA	\$75,000.00	\$150,000	Includes electrical
	Subtotal				\$1,990,511	

Planting	Meadow / wet meadow seeding	2.11	Acre	\$4,000.00	\$8,440	Herbicide existing and drill seed
	Wetland planting	0.77	Acre	\$100,000.00	\$77,000	Wetland hydrology in place
	Wooded riparian corridor planting	2.02	Acre	\$27,000.00	\$54,540	Excludes stream restoration
	Successional forest planting	2.18	Acre	\$27,000.00	\$58,860	
	Canopy Trees - 3.5"-4" cal	22	EA	\$1,850.00	\$40,700	
	Understory Trees - 8'-10' ht	6	EA	\$1,350.00	\$8,100	
	Shrubs - 2'-3' ht	48	EA	\$225.00	\$10,800	
	Herbaceous - SP3	250	EA	\$6.00	\$1,500	
Subtotal				\$259,940		

Construction Total					\$4,145,347	
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Land Management		308,404	SF			
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Vegetation management	Invasive species management - 5 years	7.08	Acre	\$1,500.00	\$10,620	Assume 2 crew days/month, 8 months/year, crew day ~\$2,500, round up
	Subtotal				\$10,620	

Management Total					\$10,620	
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	Subtotal (Phase 2)				\$4,155,967	
	Subtotal without Management (Phase 2)				\$4,145,347	
	Contractor's overhead, profit, fees (Phase 2)		15%		\$621,802	
	Design/estimating contingency (Phase 2 through CA)		5%		\$257,426	
	Civil engineering CA (Phase 2)				\$13,200	
	Construction contingency (Phase 2)		10%		\$414,535	
	TOTAL PHASE 2				\$5,462,929	

ITEM DESCRIPTION		QTY.	UNIT	UNIT COST	ITEM COST	ESTIMATING NOTES
Phase 3		334,042	SF	\$ 15.49	\$5,174,746	
Construction		334,042	SF			
Mobilization	Stream restoration	1	EA	\$37,000.00	\$37,000	
	Terrestrial revegetation	1	EA	\$28,485.00	\$28,485	
	Buildings and structures	1	EA	\$25,000.00	\$25,000	
	Subtotal				\$90,485	
Demolition & Tree Protection	Tree protection	2,581	LF	\$15.00	\$38,715	
	Vehicular asphalt paving saw cutting	1,080	LF	\$15.00	\$16,200	
	Vehicular asphalt paving removal	43,137	EA	\$1.00	\$43,137	
	Vegetation removal	208,707	EA	\$0.50	\$104,354	Includes invasive species removal
Subtotal				\$202,406		
Earthwork	Clean soil cap removal, stockpiling, and localized re-use	11,293	CY	\$10.00	\$112,933	
	Clean soil cap soil supplied from off-site sources and placement	5,647	CY	\$30.00	\$169,400	
	Export of unsuitable or contaminated soil	20,629	CY	\$60.00	\$1,237,754	
	Brownfield soil removal and placement at on-site landscape mounds	2,727	CY	\$5.00	\$13,636	
	Earthmoving and fine grading	10,364	CY	\$15.00	\$155,455	
	Temporary seeding (oats)	6.91	Acre	\$1,500.00	\$10,364	
	E&S controls and permitting	6.91	Acre	\$7,000.00	\$48,364	
Subtotal				\$1,747,906		
Buildings & Structures	Overlook Pavilion	1	EA	\$200,000.00	\$200,000	
	Subtotal				\$200,000	
Exterior Improvements	Stream Restoration (excluding soil excavation and replacement, including structures, planting, etc.)	1229	LF	\$250.00	\$307,250	

	Vehicular pervious unit pavement	42,392	SF	\$9.50	\$402,724	Grass Pave or equiv.
	Pedestrian asphalt pavement - 8' w	2,959	SF	\$5.75	\$17,014	1/2" asphalt surface course, 2" asphalt base course, primecoat, 6" aggregate, woven geotextile, prepared subgrade
	Pedestrian aggregate pavement - 6' w	7,035	SF	\$9.00	\$63,315	4" compacted aggregate granite fines w/ binder, 4" aggregate base course, woven geotextile, prepared subgrade
	Carpentry boardwalk - 8' w	1,110	SF	\$170.00	\$188,700	20' helical piers, Cedar deck, weathered steel railing with wire mesh panels
	Carpentry pedestrian bridge - 8' w	998	SF	\$255.00	\$254,490	Cedar deck, weathered steel railing with wire mesh panels
	Welcome signage	1	EA	\$17,800.00	\$17,800	Custom, internally illuminated, on pedestal, 84" x 30" x 12"
	Interpretive signage	2	EA	\$2,000.00	\$4,000	Laser-cut weathered steel
	Subtotal				\$1,255,293	

Planting	Eco-lawn seeding	0.67	Acre	\$3,500.00	\$2,345	
	Meadow / wet meadow seeding	0.05	Acre	\$4,000.00	\$200	Herbicide existing and drill seed
	Wetland planting	0.01	Acre	\$100,000.00	\$1,000	Wetland hydrology in place
	Wooded riparian corridor planting	2.29	Acre	\$27,000.00	\$61,830	Excludes stream restoration
	Successional forest planting	1.68	Acre	\$27,000.00	\$45,360	
	Canopy Trees - 3.5"-4" cal	58	EA	\$1,850.00	\$107,300	
	Understory Trees - 8'-10' ht	16	EA	\$1,350.00	\$21,600	
	Shrubs - 2'-3' ht	358	EA	\$225.00	\$80,550	
Herbaceous - SP3	1,000	EA	\$6.00	\$6,000		
Subtotal				\$326,185		

Utilities	Plumbing	300	LF	\$200.00	\$60,000	Water and sanitary allowance
	Electrical	100	LF	\$250.00	\$25,000	Underground electrical
	Telecom	100	LF	\$175.00	\$17,500	Underground telecom
	Subtotal				\$102,500	

Construction Total					\$3,924,774	
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Land Management		204,732	SF			
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Vegetation management	Invasive species management - 5 years	4.70	Acre	\$1,500.00	\$7,050	Assume 2 crew days/month, 8 months/year, crew day ~\$2,500, round up
	Subtotal				\$7,050	

Management Total					\$7,050	
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	Subtotal (Phase 3)				\$3,931,824	
	Subtotal without Management (Phase 3)				\$3,924,774	
	Contractor's overhead, profit, fees (Phase 3)		15%		\$588,716	
	Design/estimating contingency (Phase 3 through CA)		5%		\$243,728	
	Civil engineering CA (Phase 3)				\$18,000	
	Construction contingency (Phase 3)		10%		\$392,477	
	TOTAL PHASE 3				\$5,174,746	

ITEM DESCRIPTION		QTY.	UNIT	UNIT COST	ITEM COST	ESTIMATING NOTES
Phase 4		268,465	SF	\$ 23.59	\$6,334,054	
Construction		268,465	SF			
Mobilization	Stream restoration	1	EA	\$37,000.00	\$37,000	
	Terrestrial revegetation	1	EA	\$28,485.00	\$28,485	
	Buildings and structures	1	EA	\$25,000.00	\$25,000	
	Subtotal				\$90,485	
Demolition & Tree Protection	Tree protection	1,059	LF	\$15.00	\$15,885	
	Building demolition	13,289	EA	\$15.00	\$199,329	
	Vehicular asphalt paving saw cutting	731	LF	\$15.00	\$10,965	
	Vehicular asphalt paving removal	28,505	SF	\$1.00	\$28,505	

	Vegetation removal	187,625	SF	\$0.50	\$93,813	Includes invasive species removal
	Subtotal				\$348,497	
Earthwork	Clean soil cap removal, stockpiling, and localized re-use	8,712	CY	\$10.00	\$87,120	
	Clean soil cap soil supplied from off-site sources and placement	4,356	CY	\$30.00	\$130,680	
	Export of unsuitable or contaminated soil	11,649	CY	\$60.00	\$698,943	
	Brownfield soil removal and placement at on-site landscape mounds	2,104	CY	\$5.00	\$10,519	
	Earthmoving and fine grading	7,995	CY	\$15.00	\$119,922	
	Temporary seeding (oats)	5.33	Acre	\$1,500.00	\$7,995	
	E&S controls and permitting	5.33	Acre	\$7,000.00	\$37,309	
	Stormwater conveyance and control	5.33	Acre	\$20,000.00	\$106,600	
	Utilities to buildings	0.35	EA	\$350,000.00	\$121,935	
	Parking and access drives to buildings	0.35	EA	\$140,000.00	\$48,774	
	Subtotal				\$1,369,798	
Buildings & Structures	Visitor Center	5,500	EA	\$300.00	\$1,650,000	Wood siding, standing seam metal roof, PV array, green roof, high-performance glass
	Bird blind	2	EA	\$20,000.00	\$40,000	3-sided, open air carpentry w/ roof
	Subtotal				\$1,690,000	
Exterior Improvements	Stream Restoration (excluding soil excavation and replacement, including structures, planting, etc.)	694	LF	\$250.00	\$173,500	
	Vehicular pervious asphalt pavement	13,638	SF	\$6.65	\$90,693	2-1/2" porous asphalt, 2" choker course, 12" aggregate base course, woven geotextile, prepared subgrade
	Vehicular pervious unit pavement	17,905	SF	\$9.50	\$170,098	Grass Pave or equiv.
	Pedestrian asphalt pavement - 8' w	5,884	SF	\$5.75	\$33,833	1/2" asphalt surface course, 2" asphalt base course, primecoat, 6" aggregate, woven geotextile, prepared subgrade
	Pedestrian aggregate pavement - 6' w	7,367	SF	\$9.00	\$66,303	4" compacted aggregate granite fines w/ binder, 4" aggregate base course, woven geotextile, prepared subgrade
	Pedestrian concrete pavement	7,474	SF	\$11.00	\$82,214	Plaza at building
	Carpentry boardwalk - 8' w	628	SF	\$170.00	\$106,760	20' helical piers, Cedar deck, weathered steel railing with wire mesh panels
	Carpentry pedestrian bridge - 8' w	426	SF	\$255.00	\$108,630	Cedar deck, weathered steel railing with wire mesh panels
	Pedestrian bluestone pavement	1,292	SF	\$40.00	\$51,680	3" bluestone, 1" sand leveling course, 6" aggregate base course, woven geotextile, prepared subgrade
	Monolithic stone seat wall	46	LF	\$625.00	\$28,750	??
	Bike Rack	4	EA	\$1,750.00	\$7,000	Landscape Forms - FGP bike rack
	Interpretive signage	3	EA	\$2,000.00	\$6,000	Laser-cut weathered steel
	Subtotal	0			\$925,460	
Planting	Meadow / wet meadow seeding	0.57	Acre	\$4,000.00	\$2,280	Herbicide existing and drill seed
	Wetland planting	0.04	Acre	\$100,000.00	\$4,000	Wetland hydrology in place
	Wooded riparian corridor planting	1.41	Acre	\$27,000.00	\$38,070	Excludes stream restoration
	Successional forest planting	1.57	Acre	\$27,000.00	\$42,390	
	Canopy Trees - 3.5"-4" cal	40	EA	\$1,850.00	\$74,000	
	Understory Trees - 8'-10' ht	10	EA	\$1,350.00	\$13,500	
	Shrubs - 2'-3' ht	200	EA	\$225.00	\$45,000	
	Herbaceous - SP3	1,000	EA	\$6.00	\$6,000	
	Subtotal				\$225,240	
Utilities	Plumbing	250	LF	\$200.00	\$50,000	Water and sanitary allowance
	Electrical	250	LF	\$250.00	\$62,500	Underground electrical
	Telecom	300	LF	\$175.00	\$52,500	Underground telecom
	Subtotal				\$165,000	

Construction Total				\$4,814,480		
Land Management		156,380	SF			
Vegetation management	Invasive species management - 5 years	3.59	Acre	\$1,500.00	\$5,385	Assume 2 crew days/month, 8 months/year, crew day ~\$2,500, round up
	Subtotal				\$5,385	
Management Total				\$5,385		
Subtotal (Phase 4)				\$4,819,865		
Subtotal without Management (Phase 4)				\$4,814,480		
Contractor's overhead, profit, fees (Phase 4)				15%	\$722,980	
Design/estimating contingency (Phase 4 through CA)				5%	\$299,023	
Civil engineering CA (Phase 4)					\$10,200	
Construction contingency (Phase 4)				10%	\$481,987	
TOTAL PHASE 4				\$6,334,054		
ITEM DESCRIPTION						
Phase 5		274,961	SF	\$ 9.56	\$2,629,280	ESTIMATING NOTES
Construction		274,961	SF			
Mobilization	Stream restoration	1	EA	\$37,000.00	\$37,000	
	Wetland restoration	1	EA	\$24,000.00	\$24,000	
	Terrestrial revegetation	1	EA	\$28,485.00	\$28,485	
	Subtotal				\$89,485	
Demolition & Tree Protection	Tree protection	1,440	LF	\$15.00	\$21,600	
	Building demolition and removal	18,259	SF	\$15.00	\$273,885	
	Vehicular asphalt paving removal	57,202	SF	\$1.00	\$57,202	
	Vehicular aggregate pavement removal	36,493	SF	\$0.65	\$23,720	
	Vegetation removal	263,975	SF	\$0.50	\$131,988	Includes invasive species removal
	Subtotal				\$508,395	
Earthwork	Clean soil cap removal, stockpiling, and localized re-use	9,680	CY	\$10.00	\$96,800	
	Clean soil cap soil supplied from off-site sources and placement	4,840	CY	\$30.00	\$145,200	
	Export of unsuitable or contaminated soil	6,865	CY	\$60.00	\$411,913	
	Brownfield soil removal and placement at on-site landscape mounds	2,338	CY	\$5.00	\$11,688	
	Earthmoving and fine grading	8,883	CY	\$15.00	\$133,247	
	Temporary seeding (oats)	5.92	Acre	\$1,500.00	\$8,883	
	E&S controls and permitting	5.92	Acre	\$7,000.00	\$41,455	
	Subtotal				\$849,186	
Exterior Improvements	Stream Restoration (excluding soil excavation and replacement, including structures, planting, etc.)	409	LF	\$250.00	\$102,250	
	Pedestrian asphalt pavement - 8' w	8,411	SF	\$5.75	\$48,363	1/2" asphalt surface course, 2" asphalt base course, primecoat, 6" aggregate, woven geotextile, prepared subgrade
	Pedestrian aggregate pavement - 6' w	6,469	SF	\$9.00	\$58,221	4" compacted aggregate granite fines w/ binder, 4" aggregate base course, woven geotextile, prepared subgrade
	Welcome signage	2	EA	\$17,800.00	\$35,600	Custom, internally illuminated, on pedestal, 84" x 30" x 12"
	Interpretive signage	1	EA	\$2,000.00	\$2,000	Laser-cut weathered steel
	Subtotal	0			\$246,434	
Planting	Wetland planting	0.27	Acre	\$100,000.00	\$27,000	Wetland hydrology in place
	Meadow / wet meadow seeding	0.22	Acre	\$4,000.00	\$880	Herbicide existing and drill seed
	Wooded riparian corridor planting	0.85	Acre	\$27,000.00	\$22,950	Excludes stream restoration

	Successional forest planting	4.27	Acre	\$27,000.00	\$115,290	
	Canopy Trees - 3.5"-4" cal	15	EA	\$1,850.00	\$27,750	
	Understory Trees - 8'-10' ht	5	EA	\$1,350.00	\$6,750	
	Shrubs - 2'-3' ht	88	EA	\$225.00	\$19,800	
	Herbaceous - SP3	385	EA	\$6.00	\$2,310	
	Subtotal	0			\$222,730	
Utilities	Electrical	300	LF	\$250.00	\$75,000	Underground electrical
	Subtotal				\$75,000	
	Construction Total				\$1,991,230	
Land Management		244,372	SF			
Vegetation management	Invasive species management - 5 years	5.61	Acre	\$1,500.00	\$8,415	Assume 2 crew days/month, 8 months/year, crew day ~\$2,500, round up
	Subtotal				\$8,415	
	Management Total				\$8,415	
	Subtotal (Phase 5)				\$1,999,645	
	Subtotal without Management (Phase 5)				\$1,991,230	
	Contractor's overhead, profit, fees (Phase 5)			15%	\$299,947	
	Design/estimating contingency (Phase 5 through CA)			5%	\$123,724	
	Civil engineering CA (Phase 5)				\$6,000	
	Construction contingency (Phase 5)			10%	\$199,965	
	TOTAL PHASE 5				\$2,629,280	
	TOTAL PHASES 1-5				\$16,631,259	
Notes:						
1) This Opinion of Probable Cost reflects the estimated cost of construction based on the project's Master Plan, not on construction documents. Andropogon anticipates that the development of construction documents may result in design changes that impact the estimated construction costs. Increasing the contingencies can aid in the reduction of this risk.						
2) This Opinion of Probable Cost does not include lighting or site furniture costs; nor escalation; nor costs associated with unforeseen conditions revealed by the future site surveys. All values are based upon 2019 pricing.						
3) Andropogon has no control over the cost of labor, materials, or equipment; the Contractor's method of determining prices; or competitive bidding or market conditions. This Opinion of Probable Cost is therefore made on the basis of Andropogon's and International Consultants Inc.'s experience and qualifications. These opinions represent the design and estimating team's judgment as professional firms familiar with the construction industry. However, the design and estimating team cannot guarantee that proposals, bids, or other construction costs will not vary from opinions of probable costs prepared by Andropogon. If the Owner wishes greater assurance as to the costs, then the Owner shall employ an independent cost estimator, particularly during and after development of construction documents.						
4) Additional contingency for endowments is not included. Andropogon recommends an endowment of 8% for each project.						
5) This Opinion of Probable Cost assumes the following design fees as a percentage of construction cost: Schematic Design (SD) 15%; Design Development (DD) 20%; Construction Documentation (DD) 35%; Bidding 5%; and Construction Administration (CA) 25%.						

APPENDIX J

ECOSYSTEM SERVICES VALUATION TABLE

Forest Ecosystem Services						
Forest (Successional & Riparian at 30 yrs)	Rate/ ac	Acres	Total	Dollar Value Rate/ ac	Dollar Value Total	Reference
Carbon Storage (lbs)	175,000	21.1	3,692,500	\$ 14,963	\$ 315,709	USFS iTree, EPA, Social Cost of Carbon in 2018 dollars. This is not equivalent to voluntary carbon offset credit value.
Avoided Runoff (cu ft/yr)	360	21.1	7,596	\$ 24	\$ 506	USFS iTree, USFS Community Tree Guide Series for value of avoided runoff
Air Pollution Removal (lbs/yr)	94	21.1	1,983	\$ 2,553	\$ 53,868	USFS iTree, EPA Environmental Benefits Mapping and Analysis Program for cost of pollution externalities
Oxygen Production (lbs/yr)	11,500	21.1	242,650	NA	NA	USFS iTree
					\$ 370,083	

Carbon Sequestration of All Plant Communities						
Plant Community at 30 yrs	Rate (lbs/ac/yr)	Acres	Total	Dollar Value Rate/ ac	Dollar Value Total	Reference
Successional Forest	12,000	13.1	157,019	\$ 1,026	\$ 13,425	USFS iTree, EPA, Social Cost of Carbon in 2018 dollars
Riparian Forest	12,000	8.0	95,456	\$ 1,026	\$ 8,162	USFS iTree, EPA, Social Cost of Carbon in 2018 dollars
Wet Meadow	900	1.9	1,712	\$ 77	\$ 146	Literature reference, EPA, Social Cost of Carbon in 2018 dollars
Wetland	900	1.3	1,136	\$ 77	\$ 97	Literature reference, EPA, Social Cost of Carbon in 2018 dollars
Meadow	400	4.7	1,889	\$ 34	\$ 161	Literature reference, EPA, Social Cost of Carbon in 2018 dollars
Eco-lawn	400	0.7	296	\$ 34	\$ 25	Literature reference, EPA, Social Cost of Carbon in 2018 dollars
			257,508		\$ 22,017	

Annual carbon sequestration is equivalent to:

- Annual greenhouse gas (GHG) emissions from 90 passenger vehicles.
- Annual average energy use for 50 single-family homes.
- Consumption of 990 barrels of oil.

Carbon storage at 30 years is equivalent to:

- Greenhouse gas (GHG) emissions from 1,300 passenger vehicles for one year.
- Average energy use for 735 single-family homes for one year.

Notes:

- All values and dollar values are based on conceptual potential of landscape from iTree modeling and referenc literature.
- Dollar values represent standards in the ecosystem service valuation literature if services could be monetized.
- It does not represent direct payment that could currently be received from any particular entity for those services.

APPENDIX K

POTENTIAL FUNDING SOURCES

Grant Programs	Agency	Project Type	Website
Brownfields Cleanup Grant	US EPA	Brownfield	www.epa.gov/brownfields/types-brownfields-grant-funding
Coldwater Heritage Partnership Grant Program	PA Fish & Boat Commission	Cold stream evaluation Cold stream conservation Cold stream protection	www.fishandboat.com/Transact/Grants/Pages/ColdwaterHeritagePartnership.aspx
Community Change Micro Grant	America Walks	Safe, accessible walking	https://americawalks.org/america-walks-announces-community-change-grantees
Community Conservation Partnerships Program Grants	PA DCNR	Parks Recreation Conservation	www.dcnr.pa.gov/Communities/Grants/Pages/default.aspx
Environmental Education	PA DEP	Environmental education	www.dep.pa.gov/Citizens/EnvironmentalEducation/Grants/Pages/default.aspx
Environmental Grant Program	American Water	Watershed restoration Watershed protection	https://amwater.com/corp/customers-and-communities/environmental-grant-program
Flood Mitigation Program	PA Department of Community & Economic Development	Flood mitigation	https://dced.pa.gov/programs/flood-mitigation-program-fmp/
Greenways, Trails & Recreation Program	PA Department of Community & Economic Development	Greenways Recreational trails Open space Parks	https://dced.pa.gov/programs/greenways-trails-and-recreation-program-gtrp/
Growing Greener Watershed Protection	PA DEP	Non-point source cleanup Watershed conservation	www.dep.pa.gov/Citizens/GrantsLoansRebates/Growing-Greener/Pages/default.aspx
H2O PA – Flood Control Projects	PA Department of Community & Economic Development	Flood control	https://dced.pa.gov/programs/h2o-pa-flood-control-projects/
Industrial Sites Reuse Program	PA Department of Community & Economic Development	Environmental site assessment Remediation	https://dced.pa.gov/programs/industrial-sites-reuse-program-isrp/
Keep PA Beautiful	PA Department of Environmental Protection	Cleanup	www.keeppabeautiful.org
Marketing to Attract Tourists	PA Department of Community & Economic Development	Events Facility enhancements Construction or renovations Marketing, advertising, PR	https://dced.pa.gov/programs/marketing-to-attract-tourists/

REI Trail Grant	REI	Trail maintenance and restoration	www.rei.com/stewardship
Rivers Conservation Grants	PA DCNR	Land acquisition Planning Rehabilitation or development Partnerships Riparian forest buffers	www.dcnr.pa.gov/Communities/Grants/RiversConservationandRiparianBufferGrants/Pages/default.aspx
Shade Structure Program	American Academy of Dermatology	Shade structures	www.aad.org/members/volunteer/shade-structure-program
Solar Energy Program	PA Department of Community & Economic Development	Solar arrays	https://dced.pa.gov/programs/solar-energy-program-sep/
Stream Improvements	PA DEP	Stream design Stream construction	www.dep.pa.gov/Business/Water/Waterways/Flood-Protection/Pages/StreamImprovements.aspx
Trail Grants	PA DCNR	Trailheads Access roads Parking areas Interpretive signage Comfort stations	www.dcnr.pa.gov/Communities/Grants/TrailGrants/Pages/default.aspx

Loan & Rebate Programs

Industrial Sites Reuse Program	PA Department of Community & Economic Development	Environmental site assessment Remediation	https://dced.pa.gov/programs/industrial-sites-reuse-program-isrp/
Solar Energy Program	PA Department of Community & Economic Development	Solar arrays	https://dced.pa.gov/programs/solar-energy-program-sep/

Incentive Programs

Conservation Easement Assistance Program	PA Land Trust Association	Conservation easements	https://conservationtools.org/ceap
Green Mountain Energy	N/A	Solar arrays	www.greenmountainenergy.com
PA American Water	N/A	Rain barrels	https://amwater.com/paaw
Wildlife Habitat Incentives Program	USDA Natural Resources Conservation Service	Fish habitat Wildlife habitat	www.nrcs.usda.gov/wps/portal/nrcs/detail/pa/programs/financial/eqip/?cid=nrcs142p2_018210

Foundations

Community Foundation for the Alleghenies Indiana County Endowment		Community development Education	https://cfalleghenies.org/grants/
Heinz Foundation		Sustainability Education Environment protection	www.heinz.org/grants
The Andrew W. Mellon Foundation		International higher education Strategic projects	https://mellon.org/grants/
William Penn Foundation		Creative communities Great learning Watershed protection	https://williampennfoundation.org/what-we-fund

Local Organization & Business Partners

Environmental organizations	Volunteers	N/A
Indiana Rotary Club	Volunteers	www.indianarotary.org
Wholesale plant nurseries	Plant donations	N/A

