Environmental Assessment

for the proposed

New Headquarters Project
Monroe County, Indiana

Hoosier Energy REC and USDA Rural Utilities Service

Project No. 70913

March 2013

Environmental Assessment
New Headquarters Project
Monroe County, Indiana

prepared for

Hoosier Energy REC and USDA Rural Utilities Service

March 2013

Project No. 70913

prepared by

Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri

TABLE OF CONTENTS

Page No.

LIST OF TABLES

Page No.

LIST OF FIGURES

Page No.

ACRONYM LIST

ACHP	Advisory Council on Historic Preservation
ADA	Americans with Disabilities Act
APE	area of potential effect
ASTM	American Society for Testing and Materials
BMPs	Best Management Practices
CEDC	
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIP	Critical Infrastructure Protection
DHPA	Division of Historic Preservation and Archaeology
EA	environmental assessment
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Environmental Site Assessment
FIRM	Flood Insurance Rate Map
GHG	Greenhouse gas
gpm	gallons per minute
HVAC	heating, ventilation, and air conditioning
IDEM	Indiana Department of Environmental Management
IDNR	Indiana Department of Natural Resources
INDOT	Indiana Department of Transportation
IUH	Indiana University Health
LEED	Leadership in Energy and Environmental Design
LED	light-emitting diode
MSA	Metropolitan Statistical Area
MSL	mean sea level
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NHPA	National Historic Preservation Act
NRCS	Natural Resources Conservation Service
REC	Registered Environmental Concern
RFFA	reasonably foreseeable future actions
ROI	Region of Influence
RUS	Rural Utilities Service
SR	State Road
SWPPP	Storm Water Pollution Prevention Plan
TIF	tax increment financing
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WCC	Williams Creek Consulting

* * * * *

1.0 INTRODUCTION

Hoosier Energy Rural Electric Cooperative, Inc. (Hoosier Energy), a generation and transmission cooperative that provides wholesale electric power and services to 18 member distribution cooperatives in central and southern Indiana and southeastern Illinois, is proposing to construct a new Headquarters building in Bloomington, Indiana (the proposed Project). The proposed Project involves the relocation of Headquarters corporate and administrative functions from the existing Hoosier Energy Headquarters Site (the existing site) to a newly constructed site due to projected service territory and employee growth, space restrictions on expansion, the deteriorating condition of the existing facilities, and the potential limitations to access that may be imposed by the proposed Interstate 69 (I-69) highway project. The proposed Project would meet Hoosier Energy's long-term corporate needs, including a projected two percent annual employee growth at the Headquarters building over the next 20 years. Currently, Hoosier Energy's Headquarters building is collocated at the existing site with the Power Delivery Operations and System Control (Power Delivery), which includes transmission asset design and planning, parts and equipment receiving, garage maintenance, transmission maintenance equipment and material, dispatch and system control, and all personnel associated with these functions. After assessing numerous alternatives for the potential renovation and relocation of the existing site functions, Hoosier Energy determined that two separate facilities should be constructed for Power Delivery and Headquarters functions. The Power Delivery facilities are being relocated to a site in Owen County, Indiana; this project, entitled the Centerpiece Project, was reviewed under an Environmental Assessment (EA) issued by RUS in November 2012. RUS issued a Finding of No Significant Impact (FONSI) on December 12, 2013, and occupancy is scheduled for December 2013.

This EA reviews Hoosier Energy's proposed construction of a an 83,000-square-foot three-story office building on a 13.5-acre site located in the southern portion of Bloomington, Indiana for the Headquarters functions. In addition to the office building, the site will contain a parking lot for 235 vehicles, including 6 plug-in hybrid vehicle charging stations and 10 car pool spaces.

Hoosier Energy intends to request financing assistance from the U.S. Department of Agriculture (USDA) Rural Utilities Service (RUS) for the proposed Project, which thereby makes it a federal action subject to review under the National Environmental Policy Act of 1969, the National Historic Preservation Act (NHPA), and all applicable federal environmental laws and regulations. This Environmental Assessment (EA) was prepared in accordance with 7 Code of Federal Regulations (CFR) Part 1794, RUS's Environmental Policies and Procedures, and 40 CFR Parts 1500-1508, the regulations promulgated by the Council on Environmental Quality (CEQ) for implementing the National Environmental Policy Act

(NEPA). This EA also addresses other laws, regulations, executive orders, and guidelines promulgated to protect and enhance environmental quality including, but not limited to, the Endangered Species Act, the Farmland Protection Policy Act, the Clean Water Act, and executive orders governing floodplain management, protection of wetlands, and environmental justice.

* * * * *

2.0 DESCRIPTION OF THE PROPOSED PROJECT

Hoosier Energy proposes the relocation of its existing Headquarters building from the existing site on the north side of Bloomington, Indiana to a site on the south side of Bloomington in Monroe County, near the intersection of State Road (SR) 37 and Tapp Road (Figure 2.1). The existing site currently contains the Headquarters functions of the chief executive office, business marketing, human resources, administrative services, finance, and accounting in one building. Several other buildings at the existing site house the functions of operations systems asset management and fuels management.

The proposed Project involves the acquisition of 13.5 acres and construction of an 83,000-square-foot three-story Headquarters office building (Figure 2.2). The Headquarters building would house the central office corporate services, which includes executive, legal, finance and accounting; marketing and business development; purchasing and contracts; human resources; information systems; safety and training; power marketing; North American Electric Reliability Corporation (NERC) and Critical Infrastructure Protection (CIP) compliance; generation asset, outage, and fuels management; communications; key accounts; environmental services; and administrative support. The new facility would employ an estimated 116 permanent employees and up to 25 temporary employees after construction. Hoosier Energy estimates a 2 percent annual employment growth over the next 15 to 20 years. The building would be designed for occupancy of approximately 200 people. SR 37 and Tapp Road would be used for construction access and ingress/egress to the site would occur from South Tech Park Boulevard constructed (Figure 2.2); no upgrades to off-site roads are anticipated to be required.

The Headquarters building would consist of two wings and center connecting core. The north wing would consist of three floors and the south wing would have three floors over a basement, which takes advantage of the site topography. The central core of the building would consist of two floors and include the board room, lobby, large conference rooms, executive conference room, and executive offices. Building amenities include a kitchen and dining area, fitness center and employee training room. Parking for 235 vehicles, including 6 plug-in hybrid vehicle charging stations and 10 car pool spaces, would be provided on the site. The building is expected to be at least Leadership in Energy and Environmental Design (LEED) silver certified and be outfitted with the most energy efficient mechanical, electrical and lighting systems available, including geothermal heating and cooling, light-emitting diode (LED) lighting and occupancy sensors.

The proposed Project would be constructed using standard construction techniques and sequencing. Overall, approximately five acres of gently rolling wooded land would be disturbed for construction and

operation of the proposed Project. Some tree removal would be required for the project in the location of the proposed building and parking areas. Grounds and parking would be landscaped with native plantings per LEED standards and permeable pavers used in strategic locations. Hoosier Energy provided detailed site plans to the City of Bloomington Planning Department. Unanimous city approval to construct the project was received on February 6, 2013.

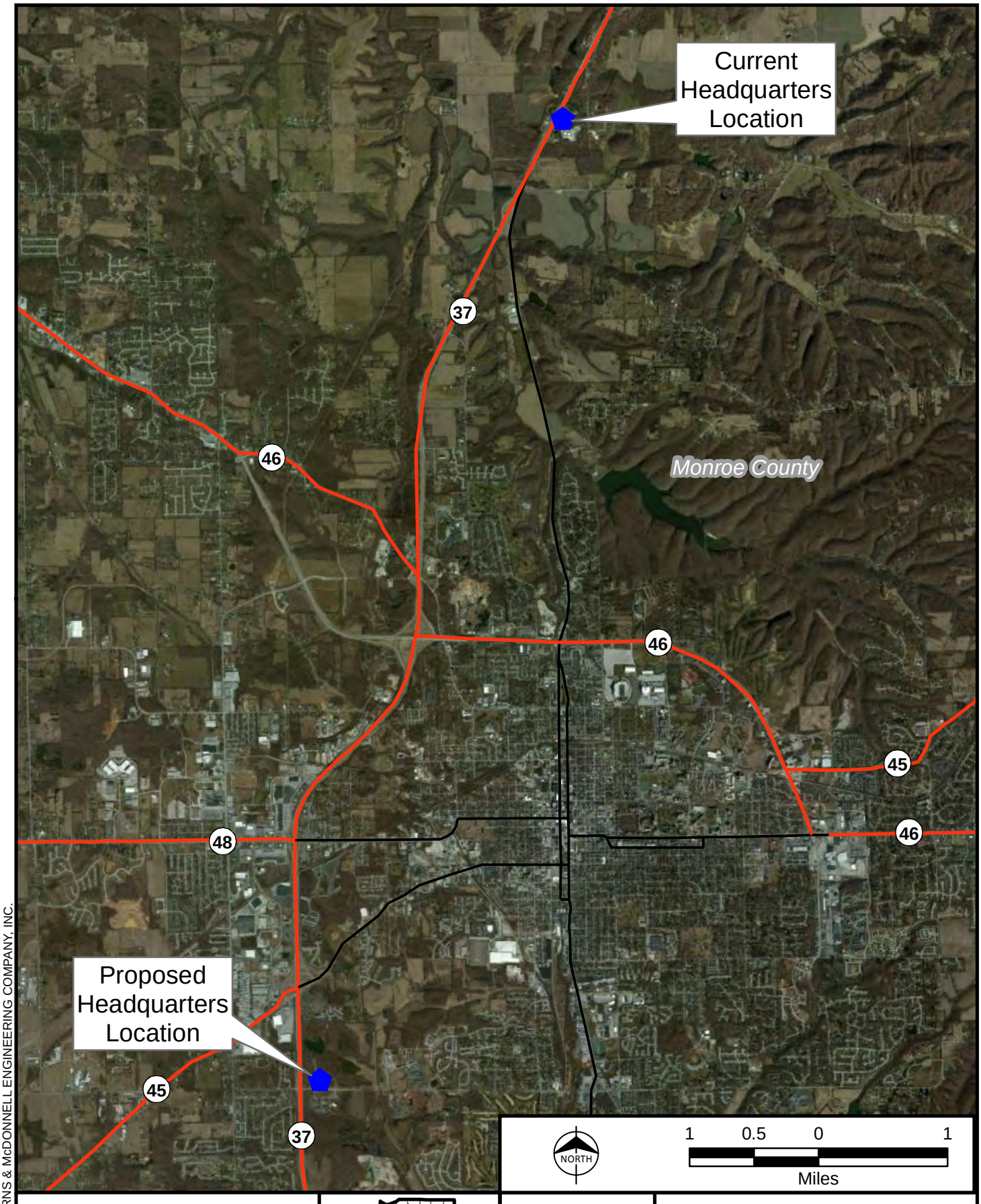
Preconstruction activities include the installation of site security lighting, video surveillance cameras, a Hoosier Energy field construction office trailer, temporary construction electrical power, temporary potable water service, and connection to the existing sewer construction trailer sanitary and gray water needs. In addition, a security trailer would be installed to serve as the main point of entrance for construction workers, engineers, and Hoosier Energy employees. Roving security officers would patrol the site 24 hours per day, 7 days per week during construction to assure a safe and secure site. Other preconstruction activities include site surveying and installation of erosion control structures to comply with Indiana Department of Environmental Management (IDEM) Rule 5 Construction Plan/Storm Water Pollution Plan.

Site construction activities would occur sequentially and include cut and fill grading, excavation and forming for concrete basement in the south wing and concrete slab for the central core and north wing. Soil stabilization would be utilized during excavation if needed. Excess soil from site preparation would be stored on the south end of the property. The permanent site drainage system, which includes storm water piping/drains, sediment traps, rain gardens with underground detention systems and geotextile fabric would be installed during the grading activity and connected to the existing storm drainage infrastructure. All storm water created at the site including building gutter collection systems and parking lot runoff will be treated either through the rain garden detention system, sediment trap structures, or both. The site drainage system would be approved by the City Council and be constructed in accordance with the applicable state and federal regulations.

Following all concrete wall and flatwork, steel shell erection would commence and include all structural framing, post and beams, trusses, girts, steel siding and roof system. Other outside activities would occur simultaneously with site grading, excavation, foundations and shell erection and include: installation of the fire protection system; installation of sanitary piping connecting to the existing sewer system, construction of the interior road system and installation of permanent lighting. The fire protection system would meet Indiana Building code and FM Global standards.

Following shell erection, interior construction measures would be undertaken to complete the buildings, including internal wall construction, mechanical, electrical and plumbing systems, interior finishes, flooring, lighting, and fixtures. The site would be landscaped to meet zoning requirements. Site security would include fencing, with a motor operated security gate at the entrance. Finally, exterior lighting would be installed.

* * * * *



Headquarters Location

INDIANA

Figure 2.1
Location Map
New Headquarters Facility
Hoosier Energy, Inc.
Monroe County, Indiana

Source: Burns and McDonnel, 2010 Microsoft Corporation and its data suppliers - Bing Aerial Photography

Issued: 1/25/2013

Figure 2.2
Proposed Site Layout
New Headquarters Facility
Hoosier Energy, Inc.
Monroe County, Indiana

Burns & McDonnell SINCE 1898

Source: Burns and McDonnel, 2010 Microsoft Corporation and its data suppliers - Bing Aerial Photography

Issued: 3/11/2013

3.0 PURPOSE AND NEED FOR THE PROPOSED PROJECT

In 2011, Hoosier Energy conducted a Facility Condition Assessment of the existing site, which consists of the Headquarters and Power Delivery functions, with the goal of developing a long term (20-year) facility plan to accommodate predicted future growth. The existing site, located in Bloomington, Indiana, serves not only as the central location for Hoosier Energy's administrative offices in the Headquarters building but also for the Power Delivery functions, maintenance garages, and warehouse facilities (Figure 3.1). The purpose of the Facility Condition Assessment was to quantify needed space versus current available space to efficiently perform Headquarters functions, quantify projected employee growth, determine the physical condition of the existing facility and quantify the needed investment to restore the facility to acceptable building and regulatory standards. The Facility Condition Assessment also sought to understand the implications of the new Interstate 69 (I-69) highway construction project that proposes to pass immediately in front of the current Headquarters ingress and egress driveways. The I-69 project consists of a new interstate highway beginning in Evansville, Indiana and continuing to Indianapolis, Indiana. Currently, I-69 is complete from Evansville to a location approximately 27 miles southwest of Bloomington, with the next section of I-69 to be completed to a point just south of the city of Bloomington by December 2014.

Figure 3.1: Hoosier Energy Current Site

3.1 Headquarters Space Requirements

Hoosier Energy estimates that Headquarters staffing will increase two percent per year over the next 20 years. The Facility Condition Assessment concluded that the existing Headquarters office space cannot accommodate this projected employee growth needed to maintain business functions. Currently, the Headquarters building has 49,000 square feet of office space at the existing site and leases 10,000 square feet of space off site, where 30 employees work. Based on the projected growth and needs, the Headquarters building would require an 83,000 square feet building that includes, offices, conference rooms, board room and other ancillary spaces. There is also inadequate conference space to accommodate normal business and inadequate number of parking spaces; especially during board meeting dates and no available space to expand.

3.2 Existing Facility Condition Evaluation

The Headquarters office spaces at the existing site are presently housed in two separate buildings; the main office building and the safety and training building. Each building was assessed utilizing a building condition form that evaluated the buildings based on seven characteristics and associated attributes as evaluation factors.

Table 3.1: Facility Condition Assessment Categories

Characteristics	Attributes
Site	Walking safety Parking Sanitary Storm Lighting Security Fence
Structural	Roof Gutters, Soffit and Fascia Exposed foundation
Exterior Cladding	Aluminum siding
Windows/Doors	Storefront Windows Headers/Sills Doors

Characteristics	Attributes
Building Climate and Environmental Conditions	Plumbing Fire Protection Electrical Lighting System Control Technology Security
Interiors	Finishes Casework Doors Glazing Partitions/Walls Fixed Equipment
Code	Accessibility Fire Alarms Means of Egress Sprinkler System Emergency Lighting

A suitability rating was established from 0 to 5 with 5 being the most suitable and 0 the least suitable for each attribute. Each building was evaluated according to characteristics and attributes and a suitability percent was calculated as the total points scored divided by the number of points possible for all categories. The lower the percentage, the less likely the building was suitable for meeting the criteria. The suitability scores for the main office building and safety and training building were 52 percent and 61 percent, respectively out of 100 percent possible. The most common issues noted were:

- original roofs – 33 years old
- no sprinkler system
- poor sound insulation
- lack of Americans with Disabilities Act (ADA) compliance (non-compliant hardware, no elevator, no ramps at entrance/exit)
- rusted windows and doors
- poor energy efficient windows and doors
- cracked/spalled exterior concrete cladding and lintels
- poor sound insulation
- poor heating, ventilation, and air conditioning (HVAC) zone control
- absence of panic hardware on exterior doors

- extremely crowded office area in administrative services and accounting and payroll
- inadequate parking spaces for employees, board directors and member managers and visitors from the public, and other company departments
- poor lighting and poor energy efficiencies of the building mechanical systems

The Facility Condition Assessment identified nearly $4.1 million in upgrades over the course of three years to remedy existing deficiencies; however, no space would be added, the 10,000 square feet of leased office would continue to be leased and the lack of adequate parking would still exist.

3.3 Interstate 69 (I-69) Construction Limitations to Access

The existing site is currently accessed by SR 37. Increased congestion on the highway has made accessing the existing site difficult. A new interstate highway (I-69) is being constructed between Evansville and Indianapolis, Indiana as part of an overall long range plan to connect Mexico to Canada in order to expedite the shipment of goods as part of the North American Free Trade Agreement and relieve congestion on state highways. The proposed I-69 corridor would pass directly in front of the existing site. Although the final alignment of the I-69 right-of-way has yet to be determined, it is predicted to potentially include a part of the existing parking lot, which may compromise access to the existing site. Hoosier Energy has informed the Indiana Department of Transportation (INDOT) of the need to maintain access; however, with the uncertainty comes risk to operation and, as a member-owned cooperative, Hoosier Energy is unable to accept this magnitude of risk and must plan accordingly. Regardless of I-69's exact location, when the construction of the interstate reaches the southern part of Bloomington in 2014, the traffic count is expected to increase by 14,000 vehicles per day on the existing SR 37. This dramatic increase will further impede Hoosier Energy's employees and visitors to safely egress from the site and potentially create an unsafe condition for public traffic as well.

3.4 Purpose and Need Summary

The Facility Condition Assessment identified substantial issues with the current location when taking into consideration all health, safety and welfare factors, including code requirements, structural integrity, mechanical/electrical/technology, windows and doors, and existing site issues. The physical condition of the Headquarters building and safety and training building is deteriorating and requires significant upgrades. Lastly, the existing site has no space for expanding both facilities and infrastructure.

Relocation of the Headquarters building functions from the existing site to a new site is essential for Hoosier Energy to meet long-term employee growth projections, improve efficiencies, and avoid significant investment to upgrade facilities that could never be recovered or increase space to meet current

needs. The target completion date of the proposed Project is December 2014, which would provide sufficient time to occupy the facility prior to the projected increased traffic on I-69 and allow for unforeseen delays in construction.

* * * * *

4.0 ALTERNATIVES ANALYSIS

4.1 Relocation and Renovation Alternatives

Based on the findings of the Facility Condition Assessment, Hoosier Energy considered numerous potential renovation and relocation alternatives for resolving the deficiencies of the existing site. The process for assessing the potential relocation and renovation alternatives for functions at the existing site was documented under the previously mentioned Centerpiece Project EA, which assessed the relocation of the Power Delivery functions at the existing site. To provide a methodical approach to the alternative selection, an alternatives evaluation matrix was created jointly by Hoosier Energy executive staff and consultants. The evaluation matrix consisted of five individual design criteria and 28 evaluation factors. The design criteria were created specifically for use in the alternative selection process and included (in priority order): space requirements, safety/security of the facility, cost of the project, location, and operations impact. Space requirements criteria were assigned a numerical value of 5, which is the highest priority on a scale of 1 to 5 because the purpose of considering a long range master facility plan centers on whether the alternatives being evaluated have sufficient land to meet the space requirements of the facility. Each design criterion was assigned evaluation factors which reflected specific factors crucial for operation and business. For each evaluation factor, a score of -3 to +3 was assigned with -3 being the least suitable or least agreeable to +3 being the most suitable or most agreeable. For each of the alternatives evaluated, a score was assigned, then multiplied by the priority rank, and totaled to arrive at a final score. Design criteria used in the option evaluation matrix included:

Table 4.1: Alternatives Evaluation Criteria and Factors

Priority	Design Criteria	Attribute
5	Space Requirements	Meets office building program recommendations Meet operations/Storage building program recommendations Provides programmed parking spaces Provides adequate lay down space Design allows for flexibility in space use Project does not require leased space Site allows for future expansion
5	Safety/Security	Site ideal per NERC requirements Operations traffic flow is safe Pedestrians are safe on site Vehicular traffic on site is safe
3	Costs	Least anticipated project cost Middle anticipated project cost Low anticipated project cost

Priority	Design Criteria	Attribute
2	Location	Site is not located within City of Bloomington Site is located within 30 minutes of workforce commute Site has no environmental issues/limitations Location has high resale value Location does not require additional towers I-69 risk factor Site has sewer and adequate capacity Location has easy access to highway and interstate
1	Impact	Project can be phased Project has minimal impact on workforce System control is not impacted Duration of construction 20 months Duration of construction 21-36 months Duration of construction 36+ months

The alternatives evaluated in the Facility Condition Assessment were ultimately vetted by a Hoosier Energy Headquarters Planning Subcommittee which is a subset of the Board of Directors, and Hoosier Energy's executive staff. The following alternatives were considered:

1. **No Action/Maintenance of Headquarters and Power Delivery at the Existing Site**

   Under this alternative, Hoosier Energy would continue operations and maintenance at the existing location and would not build the proposed Project. Hoosier Energy would continue leasing additional space off site. Leaving Power Delivery functions at the existing site would expose Hoosier Energy to unacceptable risk in its ability to reliably provide service to its member distribution systems. Although there is uncertainty regarding the potential impacts of the proposed I-69 project to accessing the existing site, significant improvements would still be needed regardless of the selected route to provide alternative access options, and to meet Hoosier Energy's current and projected future office and storage space needs.

   The existing site conditions including topography, right-of-way, geotechnical conditions, and layout prevent expansion of operational activities and facilities at the current location. The existing site is not expandable as all of the flat/buildable land has been consumed for storage, laydown and normal business. Hoosier Energy has expanded the existing site to its limitations, and the expansion that has occurred requires constant erosion control upkeep through periodic replacement of rip rap. Maintenance and upkeep of the existing site would be very costly. This option was not selected because the current location does not allow for future expansion of the business and work force.

2. Upgrade/Renovation of Headquarters and Power Delivery at the Existing Site

This Alternative would involve investing in expansion and retrofitting within the boundaries of the existing site. As stated in Alternative 1, the facility cannot be expanded because there is no flat ground left and, the existing soils are not suitable for erecting a building or warehouse. Under this alternative, Hoosier Energy would have to continue leasing additional space off site. Without the ability to expand the existing site, Hoosier Energy could not reliably service its member cooperative systems.

Based on the Facility Condition Assessment's evaluation matrix, the renovation/additions at the existing site received negative scores and was no longer considered as a viable option. The Facility Condition Assessment determined that an investment of nearly $4.1 million would be required to restore the Headquarters facilities at the existing site to good condition. Such an investment in the existing site is unsound from a financial perspective, given that the existing site has been appraised at a value less than the needed investment; thus, the return on the investment could not be realized. Furthermore, the upgrades would not include the construction of additional space; the 10,000-square-foot office space would continue to be leased and the inefficient layout of the Power Delivery facilities would still exist. Leasing additional off-site space is inefficient, expensive, and impractical considering this scenario and ultimately affects Hoosier Energy's ability to reliably maintain their electrical systems.

3. Relocation/Collocation of Headquarters and Power Delivery to a New Site

This option was not selected because other properties evaluated could not accommodate the unique needs of the Power Delivery operations. Power Delivery operations require access to major highways, a site that would allow for the erection of a 300-foot-tall microwave tower and central access to existing transmission assets. Of all sites evaluated to collocate the Headquarters and Power Delivery needs, none could meet the needs of Power Delivery.

4. Upgrade/Renovation of Headquarters at the Existing Site & Relocation of Power Delivery to a New Site

This option was not selected for several reasons. Based on a geotechnical evaluation, the site has unsuitable soils for construction and would require corrective measures to improve the soil conditions to allow construction; therefore, adding additional site costs and putting the project schedule at risk. If the existing building was to be renovated and a new separate building constructed as part of the Headquarters complex on the area where the Power Delivery now exists, it would not be as

operationally efficient as having all the Headquarters functions in one building. The site would have poor access once the I-69 project is completed adjacent to the site.

5. Relocation of Headquarters and Power Delivery to Separate Sites

Based on the disadvantages described under options 1 through 4 above, this option emerged as the preferred option, and, this specific document refers only to the relocation of the existing headquarters to a new location. Relocation of Power Delivery to a separate site was considered as a separate project and previously approved by Hoosier Energy and RUS, entitled the Centerpiece Project. The Centerpiece Project EA was completed in November 2012, a Finding of No Significant Impact was signed in December 2012, and construction of the Centerpiece Project is now underway.

The final scores ranked the last alternative, Relocation of Headquarters and Power Delivery to Separate Sites, as the preferred alternative. The Facility Condition Assessment resulted in a determination that the Headquarters buildings should be located on a separate site. A resolution authorizing Hoosier Energy to pursue the new site selection for Headquarters was approved by its Board in March of 2012.

4.2 Site Selection for Headquarters

After determining relocation of Headquarters to a new location as the preferred alternative, 43 potential sites were identified that would provide sufficient space) within Monroe, Morgan, Lawrence and Owen Counties in Indiana. Based on the industry standard of a 4:1 ratio of land to building footprint when constructing a new facility, Hoosier Energy determined that at least 10 acres would be required for the construction of the facility and the associated infrastructure (83,000 square foot building and parking) and to provide sufficient space for expansion (an anticipated 113,000 square feet). These counties were chosen because they are more central to Hoosier Energy's member territory and transmission assets (substations, switchyards, and transmission lines). A preliminary review of the sites eliminated 39 of the sites due to one or more of the following factors:

- Suitability of the site's size – This factor considered the size of the property needed to meet the immediate business needs as well as future requirements, and included parking, zoning setbacks, future building addition and easements. . Hoosier Energy was willing to buy a slightly larger parcel of property than what was needed, but the primary focus throughout the site selection was on right sizing the total acreage needed for the facility for cost savings purposes.
- Available land for future expansion – At the projected employee growth rate, Hoosier Energy anticipates the need to expand the facility in 15-20 years; therefore the size of the property must accommodate an estimated 30,000-square-foot building expansion. In addition, the property must accommodate a future expansion with minimal disruption to business functions, while

minimizing site preparation costs including earthwork and utility relocations, and disruptions to traffic patterns.

- Cost of the site – A key focus during the site selection process was to understand comparable costs to deliver a site ready for construction. When determining the overall cost of the site, Hoosier Energy considered not only the price of acquisition of the property, but also the potential local government tax incentives that could reduce the cost and the lack of needed onsite utilities that would increase the cost. A site was considered more favorable if tax abatements/incentives were offered utilizing tax increment financing (TIF) districting as the tax abatement incentive is used to offset site development costs. Hoosier Energy also took into account the potential price of installation of needed on-site infrastructure, including access roads, water, sewer, storm drains and three phase electricity. The absence of any of the noted utilities would result in additional expense incurred by Hoosier Energy to bring or deliver the utility to the building location
- Site availability – During Hoosier Energy's search for a suitable building site, it approached property owners who had property listed for sale and some properties not listed for sale, but attractive due to the location and access to highways. In some cases, the property owner was not interested in selling due to the type of project which would be constructed. In other cases, the property was found to be zoned for retail or apartment use and the owner was not interested in initiating or participating in a rezoning effort through the local zoning board. Also, a few of the sites pursued were under negotiations with other buyers, and therefore no longer pursued.
- Soil quality – Soil quality can vary considerably from location to location in Indiana with its rolling hills and agricultural lowlands. The suitability of the soil for construction is an important factor and can add to the site development costs if there is too much topsoil which would have to be removed and replaced with higher load bearing clay material, or if bedrock would be encountered at shallow depths which would have to be blasted to allow for excavation and concrete foundation work.
- Topography – Some of the properties evaluated had varying topography including hills and valleys, bedrock close to the surface and streams. While nearly any property can be developed, the amount of site-work necessary to make the site suitable for constructing a building increases the cost per square foot to construct the facility and therefore an important consideration.
- Neighborhood not conducive for corporate headquarters – This factor considered the uses of adjacent land such as residential, industrial and retail. A few properties considered were located within residential neighborhoods, and while the property could have been rezoned for an office building, concerns about encroachment, residual value and future development were viewed as risks for locating a corporate office at this type of property.

- I-69 uncertainty – Many of the sites evaluated fell within the proposed I-69 Section 5 corridor which is currently planned to enter the south side of Bloomington at Victor Pike and Indiana Highway 37 and proceed north to Martinsville, Indiana. The Indiana Department of Transportation (INDOT) provided (and continues to make revisions) several options to the public, and the options show where access ramps and exit ramps would exist along the corridor. For sites considered that existed along, or near the proposed I-69 corridor, the risk of having an access ramp from the interstate as well as the risk that property would be annexed for INDOT right of way were strongly considered.
- Accessibility –Safe and efficient access for employees was a key consideration, and included relative proximity to major highway arteries and consideration of employee's current commuting distance. The Hoosier Energy service territory for its 18 member system covers nearly the entire southern half of the State of Indiana as well as a portion of Southwestern Illinois. Access to a headquarters site for member managers and directors via major highway arteries was important in the site selection since regular attendance to both board and committee meetings is part of normal business.
- Commute related workforce retention – One of the goals of the site selection process was to ensure that all of Hoosier Energy's work force was retained with the new building location. For each potential property evaluated, an employee workforce commute chart, which assessed the distance of each employee's commute to the respective site as compared to their commute to the existing site, was prepared to determine the impact to the workforce.
- Proximity of the Headquarters facility to the Owen County Power Delivery Site – Proximity of the new Headquarters facility to the new Owen County Power Delivery facility was a critical factor. Headquarters personnel will make frequent trips to the Owen County site and certain corporate services located at Headquarters will continue to support the Owen County facility from the home office. Centralized corporate services served out of Headquarters such as fleet management, purchasing and contracts, compliance, safety, and environmental services will continue to support Power Delivery.

Four alternative sites were carried forward for further consideration including the Tapp Road, Shaw Property, Victor Pike and Monroe Hospital locations, all located in Bloomington, Indiana. After further evaluation of these four sites, two properties, Shaw Property and Monroe Hospital, were dropped from consideration. The Shaw Property was eliminated due to the significant development (infrastructure) costs that would be incurred by Hoosier Energy. This particular site would have required a bridge to cross a tributary, as well as the construction of a 2,000-foot-long access road. In addition, Hoosier

Energy would have to incur the expense of extending the water and sewer line 2,000 feet. , The Shaw Property also had limited usable property out of the 26-acre parcel and, more property than needed overall. The Monroe Hospital location property was also eliminated because the site was larger than needed, would require the construction of a costly access road, and because the bank that held the mortgage on the property foreclosed. A property in foreclosure cannot be sold, and it was uncertain when this property would become available for sale. After the Shaw Property and Monroe Hospital locations were eliminated, one additional property, Fullerton Pike, was brought under consideration. The Fullerton Pike property, while for sale during the site selection process, was never considered previously because it was considerably larger than needed (90 acres in comparison to the needed 10 acres) and lacked requisite infrastructure (access road and utilities). The owner of the Fullerton Pike property approached Hoosier Energy and offered to subdivide the property to as little as 20-25 acres, which caused this property to become a potential candidate. The Fullerton Pike property became very attractive because it was located in the southern part of Bloomington along Indiana SR 37, within the appropriate proximity to the relocated Power Delivery facility in Owen County, , and has existing access to SR 37. To address the lack of an access road, the owner advised Hoosier Energy that he would work with the local government to determine if TIF districting might be available, which would cover the cost of the 2,000-foot access road. However, an equivalent length of water and sewer lines would still be needed and paid for by Hoosier Energy. No definitive plans were developed to create a TIF district for this site, or review zoning requirements.

The three final sites were evaluated using a weighted suitability criteria scoring matrix; the results are shown in Table 4.2. Three categories included cost risk factor, location/proximity, and site impacts were identified as the most important evaluation factors. Cost risk factor was weighted by a multiplier of 3 given that the attributes within the cost risk factor were considered to have the highest priority and present the largest impact and risk potential. The other two factors, location/proximity and site impact were given a priority assignment multiplier of 2 and 1 respectively as these factors were considered to be less impactful or risky concerning site selection. The specific attributes for each category are shown in Table 4.2. Values of 0, 25, 50, 75 and 100, with 0 being the lowest or worst score and 100 being the highest or best score, were assigned to each attribute for the properties. The score was calculated as “value” multiplied by “priority multiplier”. The site that emerged with the highest score would be considered the most suitable for construction.

Cost Risk Factors

The cost risk suitability factors were assigned a weighted value of 3 and include geotechnical, regulatory approvals, acreage/layout suitability and future expansion/space, and resale value.

- Geotechnical risk factors include the suitability of the soil for construction and the presence of bedrock at or near the surface of the ground. Extensive depths of sandy loam top soil would result in increased excavation costs and increased costs to deliver soils which have a higher content of clay needed for compaction. If bedrock is found close to the surface, costs could increase due to the need to blast or, utilize pneumatic hoe rams to excavate the rock.

- Regulatory approvals were identified as a cost risk factor primarily due to potential, project schedule impacts. Some sites required a lengthier review and approval process required by the local government due to zoning and districting. The RUS environmental assessment review and approval process, including public comment period is another regulatory requirement with unpredictable approval periods due to potential public comments and need to address public comments. Delays in the approval schedule translates to increased costs and risk for Hoosier Energy. The first cost risk is possible increased costs by starting construction late in the year and incurring delays due to inclement weather. The second cost risk factor concerning regulatory approvals is the uncertainty of tax incentives being granted during the local government approval process. Hoosier was unwilling to spend months in the local government approval process for a specific property only to be denied tax incentives after investing funds in site design, geotechnical and other costs to meet a December 1, 2014 occupancy date. Tax incentives were more likely for some properties than others due to the properties being located within a TIF district, and the city planning department advising Hoosier Energy that a tax incentive was possible or probable.

- Acreage/layout suitability and future expansion refers to the combination of the amount of property being considered, the ability to layout out the current building in an efficient manner; have space for a future building expansion while minimizing site work and major infrastructure changes for the expansion, and the topography of the ground. In the first case, Hoosier Energy did not want to buy more property than was necessary to construct the Headquarters and allow for future expansion. Hoosier Energy was willing to purchase a few more acres than what was needed for the facility, understanding that some owners would not subdivide beyond a certain number of acres. Beyond purchasing a few more acres than needed, Hoosier Energy did not want to overbuy due to the outright additional cost, costs associated with upkeep of the property and property taxes. Secondly, the configuration of the property, including location of utilities in relation to a future expansion presented cost risks, as well as access to an existing access road. The preferred scenario is to design the building layout to allow space for an addition in the future while minimizing costly relocation of utilities and additional site development work. Last, flat

ground is less costly to develop than hilly ground, therefore a cost risk depending on the topography of the ground was considered.

- Resale value was another long term risk considered during site selection. Hoosier Energy was careful to evaluate the location of the site while considering the ability to sell the facility if business conditions changed in the future, such as a merger with another generation and transmission utility. Hoosier Energy did not want to build a new Headquarters facility at a site which may not be attractive to a buyer in the future, because of the location.

Location/Proximity

Location/Proximity suitability factor was assigned a weighted value of 2 and the values were determined based on the locations relative proximity to Bloomington, the Owen County Power Delivery Site, Indianapolis, Amenities, Workforce Residences, and the I-69 Interchange.

All three finalist sites were either in the city of Bloomington or close to Bloomington. The closer the candidate site was to the central part of Bloomington, or slightly north of the city of Bloomington, the higher the score received. Closeness to the Owen County Power Delivery Site is important as certain positions, such as executive, compliance, facilities and communication technicians will travel between sites often to support activities. Proximity to Indianapolis is important as Indianapolis is a major recruiting area for employees, and has a major airport which is used frequently by Hoosier Energy employees. Amenities, including city of Bloomington shopping, restaurants, and services, are included in the risk factors for employee recruitment and retention. The proximity of the selected sites to the workforce's residences is another critically important factor to ensure that the average commute length would not increase and threaten workforce retention. The final attribute assessed was proximity to the proposed I-69 interstate. This attribute considered the proximity to I-69, but more importantly whether the site would have an interchange nearby where employees could have safe and efficient access to the new facility.

Site Impacts

Site impacts suitability factor identified and included workforce disruptions, site screening from neighbors, view from the building, and visual/noise impact of the future I-69 interstate. This factor was given the lowest priority multiplier value of 1. Workforce disruptions refer to the potential disruption to the workforce when and if a future building expansion occurred. This attribute largely depended on the ability to lay out the facility site such that a building addition could occur without major disruptions to business processes due to utility relocations, road and parking changes or additions, noise and contractor

activity. Ability to screen from neighbors represents the site layout and ability to ensure that sufficient distance and screening from other ongoing land uses is maintained. Zoning is a consideration, and the ability to screen from potential residential and industrial neighbors is important for ongoing business and resale value. The view of the building and view from the building takes into account the facility site layout on the property, as well as surrounding scenery and buildings. A site received a higher score if while approaching the building there were trees in the background and no visible buildings, highways or neighborhoods in view. Similarly, view from the building includes the quality of the view from employees looking out from the building. The last attribute within the site impact factor is visual/noise of the future I-69 interstate. While being close to an interstate with an interchange is important, the ability to screen visual and noise impacts from I-69 was also considered important by the site selection committee.

Table 4.2: Site Evaluation Criteria Matrix

	Tapp Road		**Fullerton Pike**		**Victor Pike**	
	Value	Score	Value	Score	Value	Score
Cost Risk Factor (Priority Multiplier = 3)						
Geotechnical	100	**300**	100	**300**	100	**300**
Regulatory Approvals	50	**150**	0	**0**	100	**300**
Acreage/Layout Suitability	100	**300**	50	**150**	50	**150**
Future Expansion/Space	50	**150**	100	**300**	100	**300**
Resale Value	100	**300**	100	**300**	50	**150**
Cost Subtotal	400	**1200**	350	**1050**	400	**1200**
Location /Proximity (Priority Multiplier = 2)						
Bloomington	100	**200**	100	**200**	0	**0**
Power Delivery	75	**150**	50	**100**	0	**0**
Indianapolis	50	**100**	0	**0**	0	**0**
Amenities	100	**200**	100	**200**	50	**100**
Workforce Commute	100	**200**	100	**200**	50	**100**
I-69 Interchange	50	**100**	100	**200**	100	**200**
Location/Proximity Subtotal	375	**750**	350	**700**	200	**400**
Site Impacts (Priority Multiplier = 1)						
Workforce Disruptions	50	**50**	50	**50**	50	**50**
Site Screening from Neighbors	100	**100**	100	**100**	50	**50**
View from Building	100	**100**	50	**50**	0	**0**
View of Building	100	**100**	50	**50**	50	**50**
Visual/Noise Impact of I-69	100	**100**	50	**50**	0	**0**
Site Impacts Subtotal	450	**450**	300	**300**	150	**150**
Summary Scores						
Total Points	1325	**2600**	1100	**2250**	800	**1850**

4.2.1 Tapp Road

The Tapp Road site is a 13.5-acre site located approximately 8 miles south of the existing site. This site and the Victor Pike site had equal, lowest overall cost risk factor and therefore the greatest suitability score. The geotechnical assessment showed that little bedrock would be encountered during foundation work. Water, sewer, storm drains, phone fiber optics and electric service exist on the site as well as an improved access road with sidewalks to the site. The Phase I environmental site assessment (ESA), archaeological and wetland studies, and geotechnical assessment revealed no findings or concerns. This site is already platted for use as corporate headquarters; tax incentives and vacation of an existing road were also offered by the City of Bloomington. Given the findings of the ESA and the relative support of the local government, Hoosier Energy anticipated that regulatory approval would be timely. While the amount of acreage exceeds the minimum required, it is not excessive, and offers flexibility for future growth. The site is well oriented for a 30,000-square-foot expansion in 15-20 years; the site for potential expansion is located in an area on the site where minimal impacts to the facility and ongoing Hoosier Energy business would be expected. Further, the existence of a corporate headquarters facility on the site is expected to maintain or appreciate its value. The Tapp Road Site had the highest score for location and proximity suitability factors. It is centrally located within the city of Bloomington and across the street from a medical park complex, and. Only 20 minutes from the Owen County Power Delivery Site and less than an hour to the Indianapolis airport, the Tapp Road site is located along a major highway corridor with an interchange. This site has minimal impact on employee's existing commute. INDOT's preferred alternative for section 5 of I-69 shows an interchange at Tapp Road immediately adjacent to this site making the property even more accessible for board directors, member managers, employees and visitors.

The Tapp Road Site also had the highest score for the site impact factor. This site is surrounded on three sides by property owned by the city of Bloomington parks and recreation department and known as the Wapehani Mountain Bike Trail Park. This park consists of 45 acres and is not expected to ever be available for other land uses, which made this site very appealing. The majority of the 13.5-acre site is forested; employees will have excellent views of the woods from the office and while approaching the building from any direction. While this property is along the proposed I-69 corridor, a buffer of tress approximately 500 feet in width separates the building from the highway which will serve well to control noise and impacts from the interstate.

4.2.2 Victor Pike

The Victor Pike site is an 88-acre site located about 12 miles south of the existing site outside the city limits of Bloomington. While the owner would not consider subdividing this property, the cost per acre was much more attractive than the other two sites. Therefore, it was less of a concern to overbuy the

needed acreage to build the facility. The cost risk suitability factor for Victor Pike scored equal to the Tapp Road site and slightly better than the Fullerton Pike site. During the assessment, the geotechnical risk for this site emerged as a major discussion point as the geotechnical investigation suggested a higher probability of encountering bedrock near the surface. The committee scored the geotechnical risk for this site the same as the other two sites because all Greenfield sites have some inherent geotechnical risks, and only a preliminary geotechnical investigation had been performed on the site,. Similarly, a discussion with the local government suggested that timely regulatory approvals of the site would be expected even though the site was not in a TIF district or planned unit development. It was believed the county would work expeditiously towards development of incentives at this location. The acreage/layout suitability category was scored slightly lower than the other two sites because of the rolling topography. The site scored slightly lower in the residual value component of the cost risk factor because of odor concerns coming from an adjacent wastewater treatment plant during the summer months, Lastly, neither sanitary sewer nor electric service exists near the proposed construction site and would have to be installed.

For the location/proximity and site impacts suitability factors categories, the site scored significantly lower than the other two sites. The location of the Victor Pike site, relative to the City of Bloomington, Power Delivery, and Indianapolis, had the largest impact on the overall score for this site. While this site is only a few miles south of both Fullerton Pike and Tapp Road, it is the farthest and thus was scored accordingly. Work force commute distances for many employees would increase for this site, more than the other two sites and posed concerns about employee retention and future recruitment from Indianapolis labor markets.

INDOT plans of the proposed I-69 interstate show access to Victor Pike, thus the site scored even with the other two sites base on access alone. However, INDOT plans show the site would be completely bisected by the proposed interchange of the I-69 project, where it will connect to the south side of Bloomington via SR 37. While there would be sufficient acreage on one side of the interstate interchange to build a facility, it would not be convenient or desirable to have half of the property cut off by a major interstate; and could potentially affect the future resale value of the property. INDOT maps indicate that the interchange at this location, relative to a potential building site, suggest that the facility would be surrounded by the interchange and would adversely affect views from the building and of the building as well as create potential adverse noise and visual impacts from the interstate. The Victor Pike site scored the lowest in the suitability factors overall.

4.2.3 Fullerton Pike

The Fullerton Pike site is a 25-acre site located about 9 miles south of the current Headquarters. This site emerged as the second leading candidate with many favorable attributes. Minimal tree removal, grading and contouring would be required at this site as it is currently used for agriculture and, is relatively flat lying. While a geotechnical investigation was not completed, the low elevation of the property suggested bedrock could be encountered at shallower depths than the Tapp Road site. There were greater concerns about receiving timely regulatory approvals for this site as it is not currently a planned unit development, which requires an additional step in the approval process. This site scored well in site layout suitability as the site is relatively flat lying, however, more than twice as much property was offered than needed which offset the favorable attribute of site layout. Conversely, a 2,500-foot access road would need to be constructed to access this property, as well as the installation of sanitary sewer, water and electric service. This site scored high in the resale attribute as it is accessible, along the existing SR 37 corridor with access, and the proposed I-69 corridor shows an interchange at Fullerton Pike.

This site is only one mile south of Tapp Road therefore location proximity factors were considered equal between the Fullerton and Tapp Road sites. This site scored well in the site impacts category as the orientation of the property would lend itself well to a future building addition causing minimal impact or disruption to the work force during the construction. Also, the site is surrounded by trees which would provide good views from and to the building as well as screening from neighbors. Last, while the opportunity for development of retail centers exist and would be immediately across from the Headquarters building, the retail centers would be a sufficient distance from the building. Overall, this site received the second highest rating and would serve Hoosier Energy needs well.

4.2.4 Site Selection Summary

The Headquarters alternative site analysis process consisted of two steps. The first step compared renovation of the existing Headquarters site and relocation alternatives. A total of five site renovation/relocation options were considered as part of the site selection analysis:

1. No Action/Maintenance of Headquarters and Power Delivery at the Existing Site
2. Upgrade/Renovation of Headquarters and Power Delivery at the Existing Site
3. Relocation/Collation of Headquarters and Power Delivery to a New Site
4. Upgrade/Renovation of Headquarters at the Existing Site and Relocation of Power Delivery to a New Site
5. Relocation of Headquarters and Power Delivery to Separate Sites

An alternative evaluation matrix consisted of five design criteria including space requirements, safety/security, costs, location and impact containing a total of 28 evaluation factors was created, and used to evaluate the renovation and relocation options. The evaluation resulted in the decision to relocate Headquarters and Power Delivery to separate sites.

After determining relocation of headquarters to a new location as the preferred alternative, the next step consisted of the process to determine where to relocate the Headquarters facilities. Within a four-county region, 43 potential sites were initially considered. Eleven criteria were used to eliminate 39 sites leaving four alternative sites as candidates for further evaluation and vetting, The criteria used included: suitability of the site's size, available land for future expansion, cost of the site, site availability, soil quality, topography, compatibility of adjacent land use, Interstate 69 uncertainty, site accessibility from existing highways, commute related workforce retention and proximity of Headquarters to Owen County Power Delivery site. The four alternative sites included Tapp Road, Victor Pike, Monroe Hospital site and the Shaw property. After further evaluation, the Monroe Hospital and Shaw property were dropped and the Fullerton Pike site, which was never previously considered, was added resulting in a quantity of three alternative sites to further evaluate. A second site evaluation criteria scoring matrix including cost risk factor, location/proximity and site impacts was utilized to evaluate the remaining three alternative sites. Each of the three criteria contained six or more attributes each, and the basis for performing a detailed analysis on the three remaining sites.

The detailed analysis resulted in the Tapp Road site being selected as the preferred site. This site scored highest using the established selection criteria and was recommended to the Headquarters Planning Subcommittee and Operations Committee by Hoosier Energy Senior Staff.

* * * * *

5.0 AFFECTED ENVIRONMENT

This section provides a description of the existing natural and human resources present in the vicinity of the proposed Project. The proposed Project is located in the Interior Plateau Ecoregion, which is characterized by rolling to deeply dissected, rugged terrain with areas of karst topography common on the Mitchell Plain. Vegetation of the Interior Plateau includes a variety of forest types which range from hardwood forests to mixed mesophytic (i.e., moderately moist) forests (University of Indiana 2008). In addition to diverse forestland, additional vegetation types in the Interior Plateau ranges from warm and cool season pasture to cultivated cropland. Yearly precipitation is approximately 44.9 inches in this area of Indiana (U.S. Climate Data 2012). The proposed Project site is on the southwest side of Bloomington, Indiana.

Several studies were conducted to determine the resources within the proposed Project site and surrounding areas. These include a Natural Resource Assessment, Preliminary Subsurface Investigation and Geotechnical Study, a Phase I Environmental Site Assessment, and a Cultural Resource Management Report.

5.1 Air Quality

According to the U.S. Environmental Protection Agency's (EPA) assessment of air quality attainment status (40 CFR Part 81), the existing air quality in the vicinity of the proposed Project has been designated as in attainment for all criteria pollutants (EPA 2012). Non-industrial primary pollutants in the area may include particulates (i.e., dust) generated from farming, traffic on unpaved roads, wind erosion, and smoke from burning trash or ground cover. These sources produce pollution that is temporary, intermittent, and dependent on seasonal and atmospheric conditions. Most industrial sources in Monroe County are located to the north and west of the proposed Project.

5.2 Land Use

The proposed Project site is located in the southwest portion of Bloomington, Indiana. Land use adjacent to the proposed Project site is a mix of residential, industrial, and commercial uses. Indiana SR 37 is located adjacent to the site on the west and Tapp Road runs east and west on the south side of the proposed Project site. The Wapehani Mountain Bike Park is located approximately 0.2 miles north of the proposed Project site. There is an existing cell tower which is located in the north end of the site. Leonard Springs Park is located approximately 1.8 miles to the southwest of the proposed Project.

The nearest school is the Summit Elementary School, approximately 0.9.miles east of the proposed Project site. The nearest commercial airport, Monroe County Airport, is located west of Bloomington approximately 2.3 miles west of the site.

5.3 Geology, Soils, and Farmland

5.3.1 Geology

The proposed Project site lies within the Mitchell Plain physiographic unit which is a karst terrain formed on thick middle Mississippian limestone common to southern Indiana (USDA 1981). Monroe County also includes two other physiographic units including the Muscatatuck regional slope to the west and the Crawford upland to the east of the proposed Project site. Monroe County is located within the Southern Hills and Lowland Region of the state of Indiana. The Mitchell Plain consists of rolling clay-covered upland of low relief and large areas of karst, entrenched by major valleys. For the most part, the area is unglaciated and residuum is present throughout most of the area; however, it is covered by wind-blown silt or loess.

The entire area underlying Monroe County is part of the Mississippian Bedrock Unit which is primarily comprised of limestone, shale, and sandstone. Ground elevation at the proposed Project site ranges from approximately 760 feet above mean sea level (MSL) in the northeast portion of the site to approximately 830 feet above MSL in the northwest portion of the site. In general, the land surface slopes from the northwest to east and southeast with an approximate relief 40 feet. Drainage is primarily along the existing ground surface towards storm sewers located in the southern portion of the site.

According to the U.S. Fish and Wildlife Service (USFWS), the proposed Project is in an area of karst geologic features (Appendix A). A large sinkhole is present between the northern part of the proposed Project site and SR 37.

5.3.2 Soils

The primary soil type located within the proposed Project site is from the Crider series, with primarily silt loam soils ranging from 2 to 12 percent slope (Figure 5.1). Crider series consists of very deep, well drained, moderately permeable soils on uplands which typically formed in a loess mantle over an underlying residuum of limestone (USDA 2011a). Water capacity of the Crider soils is high with moderate permeability. Runoff from cultivated areas is characterized as medium and the organic matter content of the surface layer is generally considered low (USDA 1981).

Figure 5.1
Soils Map
New Headquarters Facility
Hoosier Energy, Inc.
Monroe County, Indiana

Source: USDA SSURGO Soils, 2010 Microsoft Corporation and its data suppliers - Bing Aerial Photography, and Burns and McDonnell,

Issued: 1/23/2013

Hagerstown silt loam is also found in the southwest portion of the proposed Project site. The Hagerstown series consists of deep and very deep, well drained soils formed in residuum of hard gray limestone; permeability is moderate and typical mean annual precipitation is 30 to 45 inches (USDA 2011b). Hagerstown series are generally found on steeper slopes. Water capacity of the Hagerstown soils is moderate with permeability also considered moderate. Runoff from cultivated areas is characterized as rapid and the organic matter content of the surface layer is generally considered low (USDA 1981).

5.3.3 Farmland

In 2007, Monroe County had approximately 53,538 acres (roughly 20.3 percent of the total county area) classified as farmland from 481 farms (USDA 2007). The county ranked 86 out of 92 Indiana counties in the total value of agricultural products sold (2007).

Prime farmland is a valued resource in Monroe County, with approximately 30 percent or less being classified as "prime." The Natural Resources Conservation Service (NRCS) evaluates and classifies soil mapping units (areas of soil delineated on county soil survey maps) as "prime" or "not prime" farmland based on characteristics that are necessary for economic crop production. In addition to these criteria, Indiana has specific criteria that define prime farmland in this state (Wheeler et al. 1983). These include the following:

1) Soils are deeper than 20 inches to rock or coarse sand (which reflects water-holding capacity)
2) The subsoils are finer in texture than sandy loam (which also reflects water-holding capacity)
3) The land has less than six percent slope (which reflects the erosion hazard)
4) The land is not subject to frequent flooding during any season of the year

The NRCS soil types listed as occurring in the immediate vicinity of the proposed Project site are classified by the NRCS as prime farmland if drained (NRCS 2012). For the area in the vicinity of the proposed Project, these soils are designated as Crider silt loam (NRCS 2012) (Figure 5.1). According to the NRCS, the area for the proposed Project includes a total of approximately 4 acres of land classified as prime and unique farmland, representing less than one-tenth of one percent of the total prime and unique farmland in Monroe County.

5.4 Water Resources

Monroe County is located within the White River Drainage Basin with much of the northern portion of the county draining into the White River, primarily through Beanblossom Creek. Southern areas drain primarily into the East Fork White River through Hunter Creek, Salt Creek, and Indian Creek (Indiana Department of Natural Resources (IDNR) 1989). The nearest reservoir to the proposed Project is the

Griffy Reservoir, which is one of three primary reservoirs that are part of the surface water drainage in Monroe County (along with Monroe Lake and Lake Lemon). Located approximately one mile north of Bloomington, the Griffy Reservoir has a surface area of approximately 110 acres and its drainage basin covers approximately 5,000 acres (IDNR 1989). The reservoir was used as the primary drinking water source for Bloomington until the completion of Monroe Lake (1989).

5.4.1 Surface Water, Water Supply, and Discharge

In addition to the Griffy Reservoir noted above, the most prominent surface water resource near the proposed Project is Monroe Lake, located approximately 8 miles southwest of the proposed Project site. Monroe Lake exists as a cooperative management effort between the U.S. Army Corps of Engineers (USACE) and the IDNR and has 10,750 acres of water in the summer for fishing, boating, swimming and other water related activities. Monroe Lake dam is located on Salt Creek, approximately 26 miles upstream of its juncture with the East Fork of White River, approximately 20 miles south and east of Bloomington (USACE 2012).

In general, runoff from approximately two-thirds of the City of Bloomington flows to the south into Clear Creek, while the northern third of the City drains to the north as tributaries to Beanblossom Creek (Monroe County 2004). The primary tributaries to Clear Creek include Jackson Creek, West Fork Clear Creek, and Sinking Creek. Clear Creek flows to the south, where it picks up effluent from the Dillman wastewater treatment plant, and joins Salt Creek about a mile downstream from the Monroe Lake Dam (2004).

According to the Natural Resource Assessment conducted for this proposed Project (May 2012), two unnamed stream tributaries to Clear Creek are located within the proposed Project site boundary on the parcel east of Grossman Boulevard and north of West Schmaltz Boulevard One additional unnamed drainage feature was identified within the proposed Project boundary on the parcel west of Grossman Boulevard. Weimer Lake, located within the 46-acre Wapehani Mountain Bike Park, is located just north of the project site boundary. No other streams or ponds were identified on the proposed Project site.

5.4.2 Groundwater

Four bedrock aquifer systems are identified for Monroe County: Pennsylvanian Raccoon Creek Group; the Mississippian Buffalo Wallow, Stephensport, and West Baden Groups; the Mississippian Blue River and Sanders Groups; and the Mississippian Borden Group (IDNR 2003a). The Blue River and Sanders Groups is present in the majority of Monroe County, including the entire proposed Project site. This aquifer system is not regarded as a major groundwater resource in the county; well depths range from 90

to 200 feet, with capacities ranging from 3 to 20 gallons per minute (gpm) and depth to bedrock generally between 10 and 70 feet below land surface (Maier 2010).

Monroe County includes four unconsolidated aquifer systems: the Dissected Till and Residuum/Unglaciated Southern Hills and Lowlands; the Alluvial, Lacustrine, and Backwater Deposits; the Norman Upland/Mitchell Plateau Till Subsystem; and, the White River and Tributaries Outwash Aquifer System (IDNR 2003b). The Dissected Till and Residuum/Unglaciated Southern Hills and Lowlands is mapped throughout the majority of Monroe County, including the proposed Project site. The IDNR has no records of drilled wells producing from these systems and they are recognized as two of the most limited groundwater resources in Monroe County (IDNR 2003b). In general, both of these systems are recognized as having low permeability of surface materials and the systems are therefore not very susceptible to surface water contamination.

5.4.3 Water Quality

The 2012 Draft 303(d) List of Impaired Waters does not cite any surface water features in Monroe County as impaired waters (State of Indiana 2012). Pollution sources in the East Fork White River watershed include nonpoint sources from agriculture and pastures, land application of manure and urban and rural run-off, as well as point sources from straight pipe discharges, home sewage treatment system disposal, and combined sewer overflow outlets.

5.4.4 Wetlands and Waters of the U.S.

The Indiana Department of Environmental Management (IDEM), reviews and issues permits regarding isolated wetlands (Indiana Code 13-18-22). The Indiana Code recognizes three types of wetlands, Class I, Class II, and Class III. Class I isolated wetlands occur in areas that have been disturbed by human activity or development, have low species diversity or greater than 50 percent nonnative species, do not provide critical habitat for the support of significant wildlife or aquatic vegetation, or do not possess significant hydrologic function. Class III isolated wetlands are located in areas that are undisturbed or minimally disturbed by human activity or development, are composed of rare or important ecological types, and support more than minimal wildlife or aquatic habitat and hydrologic function. Class II isolated wetlands are those that do not fit the criteria set for either Class I or Class III isolated wetlands.

Williams Creek Consulting, Inc. (WCC) conducted a field investigation at the proposed Project site on May 15, 2012. Based on review of publicly available and reasonably ascertainable federal, state, and local resources, and a site inspection, WCC identified one drainage feature and two unnamed tributaries to Clear Creek. No wetlands or “waters of the U.S.” were observed on the proposed Project site. The

drainage feature originates in the southwestern portion of the proposed Project site and drains to the southwest into the road right-of-way adjacent to SR 37 and Tapp Road. The drainage feature was not observed to have a direct hydrological connection to a "waters of the U.S". The two tributaries were observed to originate within the proposed Project boundary in the eastern portion of the proposed Project site and exhibited an ordinary high water mark. Tributary 1 flows into Tributary 2, which exits the proposed Project site to the east and flows into an unnamed tributary to Clear Creek. Therefore, both tributaries appeared to a have direct hydrological connection to Clear Creek. A summary of the identified tributaries is shown in Figure 5.2.

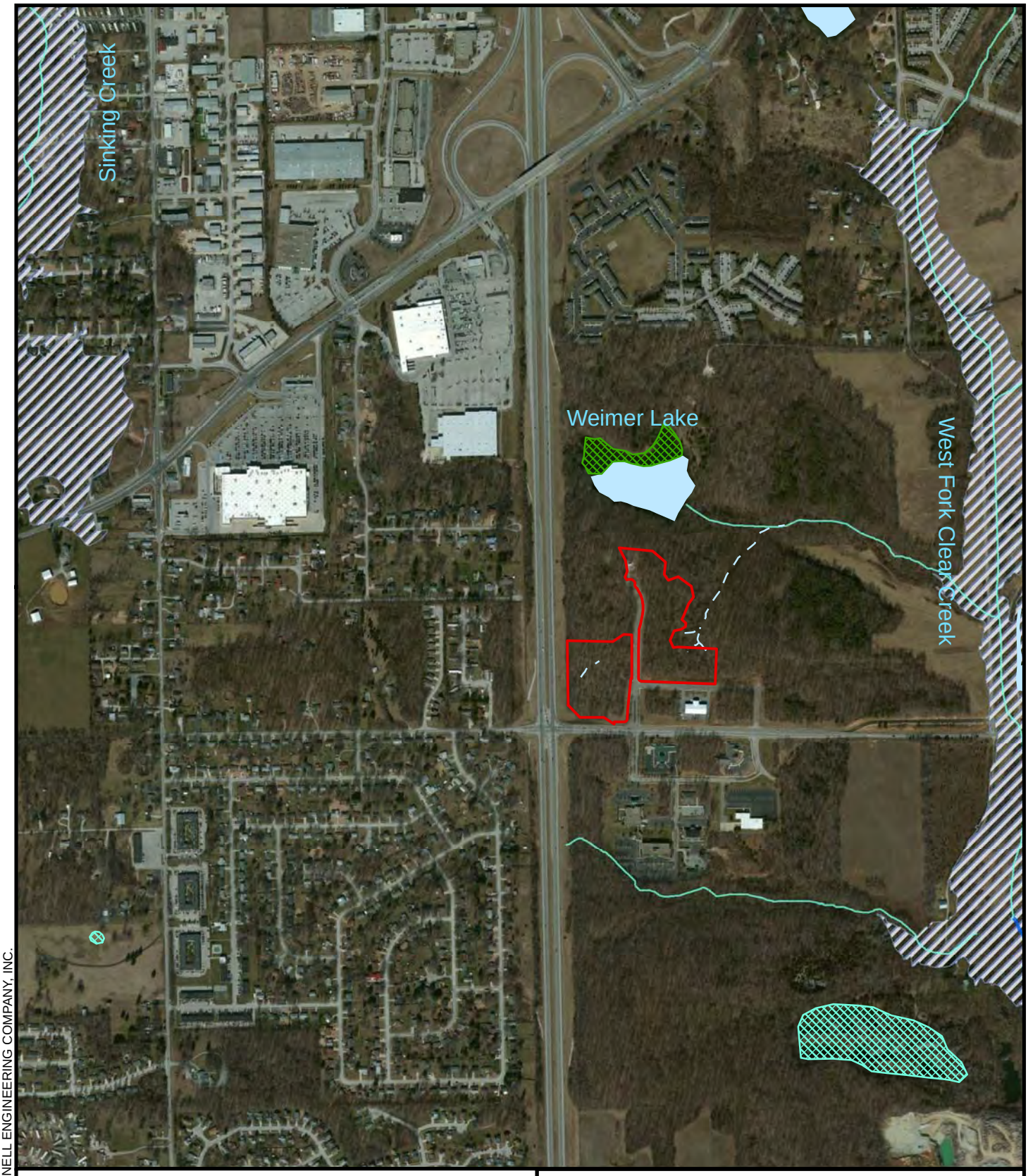
5.4.5 Floodplains

According to the Flood Insurance Rate Map (FIRM) for Monroe County unincorporated areas (Community – Panel Number 18105C0139D), the two closest designated 100-year flood zones are located along Sinking Creek floodplain approximately one mile west of the proposed Project site and West Fork Clear Creek approximately 0.5 mile east of the Project Site (Figure 5.2).

5.5 Vegetation

The proposed Project site is located within the Mitchell Plain Ecoregion (Woods et al. 1998). The Mitchell Plain is an area of relatively low relief that is pockmarked by sinkholes and underlain by extensive cave systems that developed in the Mississippian age limestone bedrock (Hill 2012). Surface drainages in this region often disappear into caves and fissures that have developed within the rock. Historically, the dominant vegetation communities in this region consisted of western mesophytic forests, karst wetland communities, and limestone glades (Woods et al. 1998). Due to the productive soils of this ecoregion, the once common beech forests, oak-hickory forests, and scattered prairies have been converted to crop fields. What remains of the forested communities within this ecoregion are relatively small in size, fragmented, and located in areas that were not easily farmed.

Much of the land within and adjacent to the proposed Project site is forested. A total of approximately 11.9 acres of the proposed Project site consist of forest. According to the Natural Resource Assessment site survey completed by WCC in May of 2012, the forested areas within the proposed Project site consisted of white oak (*Quercus alba*), American beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), American elm (*Ulmus Americana*), slippery elm (*U. rubra*), eastern redbud (*Circis canadensis*), Ohio buckeye (*Aesculus glabra*), green ash (*Fraxinus pennsylvanica*), and pawpaw (*Asimina triloba*). Tree sizes ranged mostly from small to medium, with several larger specimens, a few snags and regeneration of saplings (USFWS 2013). Pawpaw and multiflora rose (*Rosa multiflora*) were present in the shrub layer and poison ivy (*Toxicodendron radicans*), stinging nettle (*Urtica dioica*), eastern



Site Boundary
Intermittent Stream
Perennial Stream
Ephemeral Stream
100 Year Floodplain
Open Water
Emergent Wetland
Forested/Shrub Wetland

NORTH
1,000 500 0 1,000
Feet

Figure 5.2
Water Resources
New Headquarters Facility
Hoosier Energy, Inc.
Monroe County, Indiana

Source: USFWS NWI, USGS NHD, NFHL, 2010 Microsoft Corporation and its data suppliers - Bing Aerial Photography, and Burns and McDonnell,

Issued: 3/11/2013

Path: \\espsrv\data\Projects\Hoosier\70913\GIS\DataFiles\ArcDocs\5-2 Water Resources.mxd cronchetti 3/11/2013

woodland sedge (*Carex blanda*), and mayapple (*Podophyllum peltatum*) were present in the herbaceous layer. Virginia creeper (*Parthenocissus quinquefolia*) and cat greenbrier (*Smilax glauca*) vines were also common.

5.7 Wildlife

Common wildlife species such as fox and gray squirrels (*Sciurus niger* and *S. carolinensis*), gray fox (*Urocyon cinereoargenteus*), red fox (*Vulpes vulpes*), Red-bellied Woodpecker (*Melanerpes carolinus*), Downey Woodpecker (*Picoides pubescens*), Yellow Warbler (*Dendroica petechia*), Eastern Kingbird (*Tyrannus tyrannus*), raccoon (*Procyon lotor*), eastern cottontail rabbit (*Sylvilagus floridanus*), opossum (*Didelphis virginiana*), skunk (*Mephitis mephitis*), white-tailed deer (*Odocoilius virginianus*), and various species of mice, voles, and shrews are expected to occupy the proposed Project site. These species are typically tolerant of human disturbances and opportunistic, seeking out and occupying the margins of suburban developments.

5.8 Threatened and Endangered Species

Based on correspondence with the USFWS, the proposed Project site is within the range of the federally endangered Indiana bat (*Myotis sodalist*) (Appendix B). No other federally protected species were identified by the USFWS at or within the vicinity of the proposed Project. According to the December 7, 2012 e-mail received from the USFWS, the proposed Project site is heavily forested and contains suitable summer habitat for the Indiana bat. In addition, there are several Indiana bat hibernacula caves in the surrounding area, and the proposed Project is within the 5-and 10-mile buffers of multiple hibernacula; however, the proposed Project site is separated from the Indiana bat hibernacula caves by the SR 37 corridor and extensive development on the west side of the corridor. The USFWS Critical habitat portal (http://criticalhabitat.fws.gov/crithab/) was also reviewed, and no critical habitat for federally listed species is known to occur within the surrounding area of the proposed Project site.

A review of the Indiana Natural Heritage Data Center database identified three state species of special concern that were documented north of the proposed Project in 2004 at Camp Wapehani. The three state species of special concern included the little brown bat (*Myotis lucifugus*), northern myotis (*Myotis septentrionalis*), and eastern pipistrelle (*Pipistrellus subflavus*). No other endangered, threatened, or rare species or high quality natural communities listed by the State of Indiana are located within 0.5 mile of the proposed Project site.

5.9 Socioeconomics and Community Resources

In order to identify general socioeconomic patterns in the vicinity of the proposed Project site, population growth trends, racial and ethnic characteristics, economic indicators, and employment data were reviewed. In 2010, the population of Monroe County was 137,974, a 14.4 percent increase from the 2000 population of 120,563 (U.S. Census Bureau 2000 and 2010). The 2010 population ranks Monroe County 12 out of a total of 92 counties in Indiana. The largest city in Monroe County is Bloomington, with a 2010 population of 80,405, and the nearest urban area is Bloomington, Indiana Metropolitan Statistical Area (MSA) (comprised of Owen, Monroe and Green Counties), with a 2010 population of 192,714 (2010).

5.9.1 Population Growth Trends

The population of Bloomington has experienced an upward trend over the last 20 years, with a 36 percent increase between 1990 and 2010. Table 5.1 shows the trends in population change and population projections for Indiana, Owen County, Spencer, and the Bloomington MSA.

Table 5.1: Populations Trends and Projections

	1990	2000	2010	% Change 2000-2010	2020	2030
Indiana	5,544,159	6,080,485	6,483,802	6.6%	6,739,126	7,018,710
Monroe County	108,978	120,563	137,974	14.4%	151,396	163,506
Bloomington	60,633	69,291	80,405	16%	NA	NA
Bloomington MSA	NA	120,563	192,714	28%	205,618	216,476

Source: U.S. Census Bureau, 2000 and 2010 Census; STATS Indiana 2010

5.9.2 Racial and Ethnic Characteristics

The proposed Project site is located within Census Tract 4.02. Census tracts are small, relatively permanent statistical subdivisions of a county. In general, Monroe County and those cities and towns within Monroe County are considered mainly rural, with average percentages of minority populations. A comparison of racial and ethnic characteristics among Indiana, Monroe County, and the further detailed Census Tract is provided below in Table 5.2.

5.9.3 Employment and Income

In 2011, Monroe County's resident labor force, the population aged 16 and over, was 116,326 individuals, (84 percent of the total population); 69,654 of these workers were employed, resulting in an annual unemployment rate (for the civilian labor force) of 4.2 percent (U.S Census Bureau 2012). Major industries in Monroe County include education, health care and social services (36 percent),

manufacturing (9.6 percent), and retail (9.6 percent). Table 5.3 provides the employment characteristics for the state, county, local community, and the nearest MSA to the project.

Table 5.2: Racial Characteristics in the Vicinity of Proposed Project Site

	Total Population	White	Black or African American	Other	Hispanic	Total Minority
Indiana	6,483,802	84.3%	9.1%	6.6%	6.0%	15.7%
Monroe County	137974	87.7%	3.2%	8.9%	2.9%	12.3%
Bloomington	80405	83.0%	4.6%	12.4	3.5%	17.0%
Census Tract 4.02	4,348	84.1%	6.4%	9.5%	4.3%	15.9%

Source: U.S. Census Bureau, 2010

Table 5.3: Employment

	Total Population (16 yrs. and over)	Employed	Unemployment Rate
Indiana	5,035,313	2,984,502	5.8%
Monroe County	116,326	69,654	4.2%
Bloomington	71,680	38,141	4.1%
Bloomington MSA	159,580	96,315	4.6%

Source: U.S. Census Bureau, 2007-2011 American Community Survey 5-year Estimates

In 2011, the city of Bloomington had a slightly higher percentage of resident labor force at 89 percent of the total population 16 and over compared to Monroe County at 84 percent, and a slightly lower unemployment rate at 4.1 percent. Major industries in Bloomington include education and healthcare (41 percent), arts, entertainment and food services (17 percent), and retail trade (9.9 percent). In comparison, Indiana's resident labor force represented approximately 60 percent of the total state population 16 and over in 2010, and had an annual unemployment rate (for the civilian labor force) of 5.5 percent (U.S. Census Bureau 2010). Major industries in Indiana include education, health care and social services (22 percent); manufacturing (19 percent), and retail (11.3 percent).

Bloomington's per capita annual income and medium household income were considerably lower than Monroe County, Bloomington MSA, and Indiana. Monroe County and the Bloomington MSA had similar per capita incomes ranging between $22,306 and $22,104. The per capita income in Indiana was notably higher than Monroe County, Bloomington, and the Bloomington MSA at $24,497 per year, and the median annual household income was also higher at approximately $48,393. Table 5.4 provides the income characteristics for the state, county, local community and the nearest MSA to the proposed Project. Bloomington had the highest poverty level at 39.9 percent, followed by the Bloomington MSA at

21.6 percent. Poverty rates for the state as a whole were considerably lower (11.2 percent) compared to Monroe County. Census Tract 4.02 had a higher poverty rate compared to the state, county, and Bloomington MSA.

Table 5.4: Income Characteristics, 2010

	Per Capita Income	Median Household Income	Percent Population Below Poverty Level
Indiana	$24,497	$48,393	14.1%
Monroe County	$22,306	$38,524	25.3%
Bloomington	$18,071	$26,516	39.9%
Bloomington MSA	$22,104	$40,490	21.6%
Census Tract 4.02	$19,944	$32,379	28%

Source: U.S. Census Bureau, 2006-2010 American Community Survey 5-year Estimates

5.9.4 Environmental Justice

Environmental justice concerns may arise from human health or environmental effects of a project on either minority or low-income populations. The need to identify environmental justice issues is stated in Executive Order 12898 (EO), entitled "Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations." The EO states "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." A Presidential Memorandum accompanying the EO directed agencies to incorporate environmental justice concerns into their NEPA processes and practices.

Environmental justice issues are identified by determining whether minority or low-income populations are present in the project area. If so, disproportionate effects on these populations would be considered. The Council on Environmental Quality (CEQ) guidance states that minority populations should be identified when the percentage of minority residents in the affected area exceeds 50 percent or is meaningfully greater than the percentage of minority residents in the general population (CEQ 1997). If the percentage of minority residents of the population in the project area census tract exceeds the county level by more than 10 percent, it is considered to be "meaningfully greater" for the purposes of this analysis. The CEQ guidance also states that the low-income populations should be identified based on poverty thresholds as reported by the U.S. Census Bureau. If the poverty rate for the population of the project area census tract exceeds the county poverty rate by more than 10 percent, it is considered to be an area of environmental justice concern for the purposes of this analysis.

Based on this methodology, the proposed Project area, within Census Tract 9559, is not considered to be an area of environmental justice concern. As identified in Table 5.4, the percentage of minority residents in Census Tract 4.02 is only slightly higher than the percentage for Monroe County as a whole. As identified in Table 5.4, the poverty rate for the project area census tract is slightly higher than the county poverty rate. Therefore, the proposed Project area is not considered to be an area of environmental justice concern.

5.10 Aesthetics

The proposed Project site is surrounded by various developed and undeveloped areas. The site is dominated by woodlands on both sides of South Tech Boulevard, but also includes a nearby automotive repair business off of West Schmaltz Road. The Wapehani Mountain Bike Park is located approximately 0.2 mile to the north of the proposed Project site. This park was the first mountain bike park in the state of Indiana (City of Bloomington 2012c). An existing cellular tower, installed in 2009, is present toward the north portion of the site near the north end of South Tech Boulevard. There are no designated natural areas in the surrounding area or adjacent to the proposed Project site. The topography is relatively rolling and forested, with riparian areas along the periphery of nearby streams. Man-made features include existing buildings, homes, and state highways. There is no planted landscaping, earthen berms, walls, or decorative fencing along the perimeter of the project boundary. Concrete paved sidewalks are located along both the paved portions of South Tech Boulevard and West Schmaltz Boulevard.

5.11 Transportation

The proposed Project site is served by an existing network of paved roads and is located on the east side of SR 37 at the intersection of Tapp Road within the Seymour District of Indiana Department of Transportation. SR 37 extends south to Tell City, Indiana and north into Bloomington. SR 37 is the only thoroughfare in the vicinity of Bloomington that is classified as a Freeway/Expressway in Bloomington's Master Thoroughfare Plan (City of Bloomington 2002). South Tech Boulevard provides ingress to the site from Tapp Road and West Schmaltz Road.

Tapp Road is classified as a Secondary Arterial and provides access to both SR 37 to the west and other Primary Arterials to the east such as South Walnut Street. South Walnut Street, located approximately 2 miles to the east of the proposed Project site, is a north/south Primary Arterial thoroughfare that provides access to downtown Bloomington (to the north) and other residential neighborhoods to the south. The proposed Project site is located approximately 2.3 miles east of the Monroe County Airport. This airport is a public use airport located in southwest Bloomington.

5.12 Human Health and Safety

The nearest major medical facilities to the proposed Project site include the Indiana University Health Bloomington Hospital and Monroe Hospital, located approximately 2.3 miles northeast and 1.2 miles south of the proposed Project site, respectively. Bloomington Hospital is a private not-for-profit healthcare system with a 355-bed acute care facility and the Monroe Hospital is a non-profit 32-private room acute care facility. Both hospitals include emergency trauma services in addition to standard outpatient care services (Indiana University Health (IUH) 2012a). Additional medical services are available in Martinsville, Indiana at the Morgan Hospital and Medical Center (approximately 22 miles from the proposed Project site). Morgan Hospital is a fully licensed 116-bed acute care facility (IUH 2012b).

Public safety in the city of Bloomington is provided by the Bloomington Police Department (approximately 2.8 miles northeast of the proposed Project site). The City of Bloomington Police Department is a full-service police agency, providing police protection to a city of approximately 72,000 residents and a land area of approximately 20 square miles. The Police Department employs 133 full-time persons: 97 sworn officers and 36 civilian employees. As part of the department, the Central Emergency Dispatch Center (CEDC), gathers and maintains law enforcement records and provides general operations and maintenance support. The Monroe County Correctional Center employs 64 full-time and 7 part-time employees (City of Bloomington 2012b).

Fire protection for the project area is provided by the Bloomington Fire Department. The Department has 99 full-time firefighters devoted to protecting the community. The department also employs seven full-time and one part-time office staff that includes the Fire Chief, Deputy Chief of Administration, Deputy Chief of Operations, Battalion Chief of Training, Fire Prevention Officer, Fire Inspection Officer and two administrative assistants (City of Bloomington 2012a).

A Phase I Environmental Site Assessment (ESA) was performed for the proposed Project site; site reconnaissance was performed on May 8, 2012 (Alt & Witzig 2012a). An ESA is a common process conducted to permit the user to satisfy one of the requirements to qualify for the innocent landowner, contiguous property owner, or bona fide prospective purchase limitations on Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) liability. The ESA was prepared in accordance with the American Society for Testing and Materials (ASTM) Standard E1527-05.

No evidence of underground storage tanks, polychlorinated biphenyl equipment, hazardous waste generation or hazardous substance/petroleum product releases were identified during the site

investigation. The ESA concluded that the property had no known or suspected Registered Environmental Concerns (REC), no historical RECs, no known or suspected De Minimus Environmental Conditions, nor any other environmental concerns.

5.13 Cultural Resources

In accordance with Section 106 of the National Historic Preservation Act (36 CFR Section 800), federal agencies are required to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on such undertakings. A survey was conducted to identify historic properties in the area of potential effect. Archaeological Consultants of Ossian conducted an archeological survey of the 13.5-acre proposed Project site and produced a report entitled *An Archeological Field Reconnaissance of a Proposed Mill Creek Development in Bloomington, Monroe County, Indiana (May 17, 2012)*, which included a cultural history review, a literature survey of previously recorded archeological sites, and reconnaissance field survey (Appendix C). The findings of the survey and the proposed determinations of eligibility and finding of effect were provided to the Indiana State Historic Preservation Officer (SHPO). This information was also provided to the thirteen Native American tribes that were identified based on present and ancestral geographic interest.

5.13.1 Cultural History

The archaeological record for south central Indiana is divided into six periods: PaleoIndian (10,000 to 8,000 B.C.), Archaic (8,000 to 700 B.C.), Woodland (700 B.C. to A.D. 1200), Mississippian (A.D. 1000 to 1700, Historic Native Americans (ca. 1660 to A.D. 1846), and Euroamerican Historic (1660 – Present) (Stillwell 2012). The PaleoIndian peoples were highly mobile small groups with relatively simple social structure. Their sites are usually located on high river terraces or in upland areas on wetland edges such as the Magnet or Alton site located in southern Indiana.

The Archaic period can be noted as having a marked shift in tool technology and more intensive exploitation of the land. Archaic tool kits not only included projectile points and scrapers, but also the introduction of the atlatl as well as grinding slabs and pitted stone. The Late Archaic is characterized by grave offerings, mortuary or cemetery site, dog burials, shell middens, large semi-permanent camps, and trade of exotic goods. Tool kits in the later period included specialized items made of bone and antler and later consisted of barbed projectile points.

The early Woodland years coincides with a shift from the hunter-gatherer way of life to a more agriculturally based economy. The mortuary activities include the building of earthen mounds with grave

goods. Widespread trading was established; artifacts and raw materials such as obsidian (Rocky Mountains), copper (Michigan), mica (Appalachians), shark teeth and marine shell (Gulf of Mexico), and a wide variety of cherts were exchanged. Maize, a tropical import, was actively cultivated during the period along with appearance of the bow and arrow. The final years of the Woodland period showed decreased emphasis on both ceremonial and mortuary activities. New mounds are rare and small in size. Subsistence strategies are a mix of agricultural and hunting and gathering. Various theories as to why this shift occurred include change of climate to a shorter growing season, subsistence technology could not support the increasing population size, or disease and warfare caused from increasing populations.

Mississippian culture is characterized by a dependence on agriculture which intensively cultivated corn, beans, squash, lesser seed crops and tobacco; the development of large platform mounds; use of shell-tempered ceramics; nucleated villages and town with central plaza areas; large cemeteries; public ceremonial structures; and a hierarchically ordered social structure. Settlements were permanently established, with a population tied to ceremonial and/or trade centers.

The Historic Native American period begins as European explorers, trappers, missionaries, and traders initially penetrate the region. By the time of the European contact, the indigenous Mississippian groups had been replaced by the Potawatomi and Miami Indians, along with smaller groups such as the Ottawa and Fox. Euroamerican westward expansion resulted in conflict between the Native Americans and the Euroamerican invaders. Most of the Potawatomi were removed to reservations in Wisconsin and Kansas by 1841 and the Miami were resettled in Kansas in 1846.

The Euroamerican Historic period is characterized by the arrival of the French. The French lost control to the British after the French and Indian War (1754-1763) which the British lost in turn to the American Colonists in 1783. Most of the settlers of central Indiana were American-born Protestants of British descent. After 1830, non-American born immigrants began to arrive in greater numbers, principally from Germany and Ireland. By WWII, Indiana had made the transition to an industrialized economy.

5.13.2 Records Search

In an effort to identify known cultural resources that could be affected by this project, IDNR Division of Historic Preservation and Archaeology (DHPA) records were conducted. A review of the records revealed 42 known cultural resource sites within an approximate one-mile radius of the proposed Project site. The sites included 12-Mo-60, 12-Mo-61, 12-Mo-76, 12-Mo-78, 12-Mo-124, 12-Mo-205, 12-Mo-254, 12-Mo-255, 12-Mo-633, 12-Mo-659, 12-Mo-665 through 12-Mo-67L, 12-Mo-700, 12-Mo-70l, 12-Mo-769, 12-Mo-79L, 12-Mo-792, 12-Mo-924, 12-Mo-980 through 12-Mo-983, 12-Mo-988 through 12-

Mo-1000, 12-Mo-1123, and 12-Mo-1386. There were no known cultural resource sites within the proposed Project boundaries.

5.13.3 Field Surveys

During Archaeological Consultants of Ossian's field reconnaissance conducted on May 12, 2012. Due to the lack of available ground surface visibility at the proposed Project site, shovel testing was utilized within the project area. A shovel probe survey was performed on the proposed Project site, which consisted of small test holes approximately 35 centimeters in diameter and 50 centimeters deep that were excavated across the project area at intervals of 15 meters (approximately 50 feet). No archaeological sites were identified within the proposed Project's Area of Potential Effect (APE).

* * * * *

6.0 ENVIRONMENTAL CONSEQUENCES

Based on the alternatives analysis (Section 4.0), two alternatives have been carried forward for assessment; the no action alternative and the construction and operation at the Tapp Road site (the proposed Project). The No Action alternative serves as the benchmark for alternative comparison, under which the proposed Project would not be constructed and Hoosier would continue to use existing facilities located at the Hoosier Energy's existing headquarters site.

An estimated 116 permanent staff and up to 25 temporary employees will be employed post-construction at the new facility. Based on an estimated 2 percent annual employment growth rate over the next fifteen years, the proposed Project has been designed for occupancy of approximately 200 people. Construction of the proposed Project will require the disturbance of 4.5 acres of wooded land. SR 37 and Tapp Road would be used for construction access; ingress/egress to the site would occur from South Tech Boulevard during construction (Figure 2.2).

This section of the EA describes the potential impacts of these two alternatives on air quality, land use, soils, surface and groundwater, water quality, vegetation, wildlife, threatened endangered or rare species, wetlands, floodplains, socioeconomics, aesthetics, transportation, noise, health and safety, and cultural resources. Both short-term and long-term impacts have been considered; all direct, indirect, and cumulative impacts associated with the proposed Project and the No Action Alternatives have been considered (Table 6.1). The CEQ regulations implementing NEPA define cumulative impacts as, "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such action" (40 CFR §1508.7). Cumulative impacts are identified and summarized in Section 6.16.

Table 6.1: Summary Comparison of Alternatives and Impacts

Resource	Proposed Facility	No Action Alternative
Air Quality	Minimal impacts during construction. Operational impacts are expected to be below the National Ambient Air Quality Standards (NAAQS) standards.	No Impact
Greenhouse Gas (GHG) Emissions	Minimal impacts	No Impact
Land Use	Conversion of woodland to commercial use.	No Impact
Geology, Soils and	No impacts to geology; minimal impacts to prime	No Impact

Resource	Proposed Facility	No Action Alternative
Farmland	farmland (2.7 acres removed) or farmland of statewide importance	
Surface Water	Potential sedimentation from construction would be controlled by storm water pollution prevention measures	No Impact
Groundwater	No impact	No Impact
Vegetation	Minimal impacts during construction; permanent removal of 4.5 acres of soil and vegetation would be required for construction purposes	No Impact
Wildlife	No Impact	No Impact
Threatened and Endangered Species	No Impact	No Impact
Wetlands	No wetlands on proposed Project site; no impacts to streams	No Impact
Floodplains	No floodplains on proposed Project site	No Impact
Socioeconomic and Community Resources	No Impact	No Impact
Environmental Justice	No Impact	No Impact
Aesthetics	No Impact	No Impact
Transportation	No Impact	No Impact
Human Health and Safety	No Impact	No Impact
Cultural Resources	No Impact	No Impact

6.1 Air Quality

6.1.1 No Action

The No Action Alternative would have no short- or long-term impacts to air because no construction would occur.

6.1.2 Construction and Operation Impacts of the Proposed Project

During construction of the proposed Project, small amounts of air pollutants would be temporarily generated from construction activities in and around the site. These activities, including clearing and grading of the site and the subsequent construction of the 83,000-square-foot office building, would increase ambient concentrations of suspended particulate matter over the short term. However, these short-term increases in particulate matter are anticipated to end following major construction activities

and would not represent a substantial change to the overall air quality of southern Bloomington. Additionally, vegetated areas to the north and east of the site could reduce the levels of airborne particulate matter that extend beyond the site's boundaries. Impacts to the air quality of nearby businesses are anticipated to be minor and occur over the short term. As a result of the distance from the site and the presence of existing vegetative buffers, there would be no anticipated adverse effects to the Summit Elementary School (located approximately 0.9.miles east of the proposed Project site) or Wapehani Mountain Bike Park (approximately 0.2 mile north of the proposed Project site). Recreational users at the Wapehani Mountain Bike Park may experience increases of fugitive dust during heavy construction activities, but the existing vegetative buffers and distance to the site would decrease the likelihood and severity of potential impacts to air quality.

The use of construction equipment in the vicinity of the site would also generate combustive exhaust emissions during their operation. The level of these emissions would be dependent on the construction phase, level of activity, and prevailing weather conditions. However, all exhaust emissions from construction vehicles would occur over the short term and would quickly decrease after the conclusion of major construction activity at the site. Increases from exhaust emission would contribute to greenhouse gas emissions; however, as a result of the limited duration and extent of construction operations, significant increases to regional greenhouse gas emissions are not anticipated. As with emissions from fugitive dust, exhaust emissions would return to pre-construction levels following the conclusion of construction activities. During pre-construction activities, temporary construction electrical power would be used for the installation of site security lighting, video surveillance cameras, and a Hoosier Energy field construction office trailer. As a result of the temporary nature of these planned actions, there would be no significant impacts to air quality. Overall, there are no anticipated impacts to air quality from construction activities at the proposed site.

As previously stated, the proposed Project consists of an 83,000-square-foot office complex that is being constructed to a LEED silver certification. The new office would be outfitted with the most energy efficient mechanical, electrical and lighting systems available. In addition, geothermal heating and cooling, LED lighting, and occupancy sensors would further reduce the use of energy resources. The planned office complex would be similar in nature to other retail and office structures in the vicinity of the site. Potential impacts to air quality as a result of emissions from the new office complex would be minimal and further reduced with the application of LEED-certified mechanical, electrical and lighting systems. The increase in worker vehicle trips would also increase exhaust emissions above existing levels, but as a result of the limited number of workers and developed nature of the area, there would be no significant impacts to overall air quality as a result of the proposed Project's operation.

6.2 Land Use

6.2.1 No Action

The No Action Alternative would have no short- or long-term impacts to land use at or in the vicinity of the proposed Project because no construction or changes in land development patterns would occur.

6.2.2 Construction and Operation Impacts of the Proposed Project

Construction and operation of the proposed Project would take place on property that is currently wooded. The City of Bloomington Planning Department is responsible for planning activities within city limits, and works with the Monroe County Building and Planning Departments. According to the City of Bloomington Planning Department, the proposed Project site is zoned a Planned Unit Development District and the 2002 Growth Policies Plan categorizes the area as an Employment Center. The proposed Project is in keeping with this District and land use category. Construction staging and laydown areas as well as project offices would be located on site. The proposed construction and operation of the proposed Project would introduce additional traffic on local roadways during the construction period (see Section 4.10 Transportation). The proposed Project would have no effect on nearby parks including Wapehani Mountain Bike Park (located approximately 0.2 mile north of the proposed Project site).

6.3 Geology, Soils, and Farmland

This assessment focuses on impacts to geologic resources, soils, and prime or unique farmland at the proposed Project site

6.3.1 No Action

The No Action Alternative would have no short- or long-term impacts to geology, soils or farmland at or in the vicinity of the project site because no construction would occur.

6.3.2 Construction and Operation Impacts of the Proposed Project

As a result of construction operations at this site, a total of 4.5 acres of soil and vegetation would be permanently removed. Additional potential impacts to soil resources include soil erosion, loss of soil productivity, and the establishment of noxious weeds on the soil surface. Construction activities, such as vegetation clearing, trenching, grading, topsoil segregation, and back filling, may also increase erosion potential by destabilizing the soil surface. Soil compaction can result from the movement of heavy construction vehicles on the poorly drained soils at the proposed Project site. The degree of compaction would depend on the moisture content and texture of the soil. These impacts would be short-term in nature and minimized as much as possible through the use of Best Management Practices (BMPs).

According to a Karst Assessment (Appendix D) for the proposed Project, no karst features are known to occur within the boundary of the proposed Project site. If caverns or springs are encountered during excavation, all work would stop and the USFWS and INDR would be contacted concerning proper mitigation measures. If sinkholes occur within construction areas, they would be left undisturbed along with a 25-foot buffer around the highest closed contour. Existing volume of surface drainage to sinkholes would be maintained, and drainage from construction would be filtered or treated prior to entering a sinkhole.

During construction, soils at the proposed Project site would be exposed to erosion. Hoosier Energy would implement soil erosion practices (BMPs) during the construction phase that would guard against soils leaving the construction site. Hoosier would also install erosion control structures to comply with IDEM Rule 5 Construction Plan/Storm Water Pollution Plan. BMPs may include silt fencing, fiber rolls or straw bale barriers, hydroseeding, soil binders, mulching, etc. Disturbed areas would be stabilized and re-vegetated, as soon as practicable, once construction activities are completed. As a result, no significant erosion problems would be anticipated from the construction of the proposed facilities.

As presented in Section 5.3.3, prime or otherwise important farmland soils are found in the project area. However, because the site is located in the city limits and already zoned for development, the site would be considered already committed to development and not subject to the Farmland Protection Policy Act. A total of 2.7 acres of prime farmland would be permanently affected by the proposed Project, which represents less than one-tenth of one percent of the available prime farmland in Monroe County.

6.4 Water Resources

6.4.1 Surface Water, Water Supply, and Discharge

According to the U.S. Geological Survey (USGS) topographic map and field surveys conducted for the proposed Project, two unnamed stream tributaries to Clear Creek are within the footprint of the proposed Project.

6.4.1.1 No Action

The No Action Alternative would have no short- or long-term impacts to surface waters, water supply, and discharge in the vicinity of the proposed Project because no construction would occur.

6.4.1.2 Construction and Operation Impacts of the Proposed Project

The proposed Project would not result in any impacts to the one unnamed drainage feature or the two unnamed tributaries to Clear Creek that were identified within the proposed Project site boundary. The

location of the two unnamed tributaries mentioned in the Natural Resources Assessment has been further refined, and it has been determined that these tributaries are now located east of the proposed site, beyond its' boundaries beyond the boundary (Figure 6.1). The site layout was designed to avoid the two unnamed tributaries, thereby minimizing any potential impacts to the tributaries.

Construction and operation of the proposed Project are not anticipated to result in any long-term or short-term impacts to surface waters. Before construction activities begin, a Storm Water Pollution Prevention Plan (SWPPP) would be prepared for all construction activities. The SWPPP would describe the best management practices that would be implemented during construction such as: silt fence, inlet protection, straw bale barriers, rip-rap, and erosion control blankets. All proposed sediment and erosion control measures would be installed prior to initiating soil-disturbing activities including new foundations, piping for fuel and water supply, building erection, asphalt driveway construction and paving, concrete pad installation, cleanup, and re-vegetation. Existing roads would be used for construction access to the site. Perimeter silt fencing would be installed around the site.

6.4.2 Groundwater

As indicated in Section 3.4.2, one bedrock aquifer and one unconsolidated aquifer systems (Blue River and Sanders Group and Martinsville Hills/Crawford Upland/Mitchell Plateau Till Subsystem) are located within and adjacent to the proposed Project.

6.4.2.1 No Action

The No Action Alternative would have no short- or long-term impacts to groundwater at or in the vicinity of the proposed Project because no construction or changes in groundwater usage would occur.

6.4.2.2 Construction and Operation Impacts of the Proposed Project

Groundwater resources are located within the proposed Project site; however, as a result of the permeability and depth of these aquifers and the limited extend of drilling operations planned at the proposed Project site, there are no anticipated adverse impacts to groundwater resources. The water needs for the proposed Project would be provided by the local rural water district. No fuel or similar hazardous materials would be stored on-site; potential contamination of groundwater resources from such materials is not anticipated. The proposed Project would have no short- or long-term impacts to groundwater.

Figure 6.1
Location of Tributaries
New Headquarters Facility
Hoosier Energy, Inc.
Monroe County, Indiana

Source: Burns and McDonnel, 2010 Microsoft Corporation and its data suppliers - Bing Aerial Photography

Issued: 3/11/2013

6.4.4 Water Quality

6.4.4.1 No Action

The No Action Alternative would have no short- or long-term impacts to water quality at or in the vicinity of the proposed Project because no construction or changes in water usage would occur.

6.4.4.2 Construction and Operation Impacts of the Proposed Project

The facility would be connected to city utilities and would not generate any industrial processed wastewater on site. Sanitary wastewater that is generated from the new headquarters facility would be directed to the existing city sanitary wastewater system.

6.4.5 Wetlands and Waters of the U.S.

According to the USGS topographic map and field surveys completed for the proposed Project, two unnamed tributaries to Clear Creek are located within the proposed Project site boundary on the parcel east of Grossman Boulevard and north of West Schmaltz Boulevard One additional unnamed drainage feature was identified within the proposed Project site boundary on the parcel west of Grossman Boulevard. No other wetlands were identified on the proposed Project site.

6.4.5.1 No Action

The No Action Alternative would have no short- or long-term impacts to wetlands within the proposed Project site.

6.4.5.2 Construction and Operation Impacts of the Proposed Project

Construction and operation of the proposed Project is anticipated to have no short- or long-term impacts to wetlands or streams. Based on the Natural Resources Assessment provided by Williams Creek Consulting (Williams Creek Consulting, 2012), the estimated impacts to streams within the Project boundaries would be less than the 300-linear-feet limit established for the USACE Nation Wide Permit (NWP) 39 for Commercial and Institutional Developments and less than the 0.1-acre limit for IDEM Section 401 Water Quality Certification Regional General Permit (RGP) notification. Additionally, the two unnamed tributaries to Clear Creek that would be affected by the proposed Project did not appear to drain more than one square mile and therefore are not likely to be regulated by the IDNR Division of Water (Williams Creek Consulting, 2012). The proposed Project would result in minimal adverse effects to the streams within the Project Boundary. For compliance with Executive Order 11990 on Protection of Wetlands, there would be no impacts to wetlands from the proposed Project.

Appropriate best management practices would be implemented and maintained throughout construction to eliminate silt and sediments from washing into streams and wetlands that are located in the vicinity of the proposed Project. All areas disturbed by construction would be restored, reseeded, and mulched as necessary.

6.4.6 Floodplains

6.4.6.1 No Action

The No Action Alternative would have no short- or long-term impacts to floodplains since none exist at the proposed Project site.

6.4.6.2 Construction and Operation Impacts of the Proposed Project

As previously discussed, there are no floodplains within the vicinity of the proposed Project site and no adverse impacts to floodplains are anticipated. The project would be in compliance with Executive Order 11988 on Floodplain Management.

6.5 Vegetation

6.5.1 No Action

The No Action Alternative would have no short- or long-term impacts to the vegetation communities because no construction would occur. Community vegetation structure may continue to change within the area; however, it is assumed that the site would continue to remain forested.

6.5.2 Construction and Operation Impacts of the Proposed Project

Approximately 11.9 acres (88 percent) of the proposed Project site are forested. Approximately 4.5 acres (38 percent) of the forested area will be removed for the construction of the proposed Project.

6.6 Wildlife

Limited wildlife resources exist in the vicinity of the proposed Project, which consists primarily of woodlands; however, common wildlife species that are tolerant of human disturbances are likely to occur in relatively low densities within the area. Displacement of such common species that use the area for habitat may occur as a result of the proposed project.

6.6.1 No Action

The No Action alternative would have no effect on wildlife within the proposed Project because no construction would occur. Normal disturbances to existing species would continue to affect wildlife populations in the area.

6.6.2 Construction and Operation Impacts of the Proposed Project

The proposed Project is in an area of fragmented forest habitat within the city of Bloomington. Construction of the proposed Project would require the removal of approximately 4.5 acres forest habitat; however, the proposed Project would not result in the fragmentation of contiguous forest habitat or impede the movement of the common wildlife species that may occur within the forest habitats at or in the vicinity of the proposed Project. The proposed Project would be constructed along Grossman Boulevard and West Schmaltz Boulevard Noise and human activity that are associated with construction would result in short-term, temporary displacement impacts to wildlife species. The noise and human activity would temporarily deter wildlife species from using habitats within the immediate vicinity of construction; however, once construction is complete, the wildlife species would return.

6.7 Threatened and Endangered Species

The USFWS indicated that the proposed Project is within the range of the federally endangered Indiana bat and that the forest habitat on the proposed Project site contains suitable summer roosting habitat for the Indiana bat. The Indiana Natural Heritage Data Center database has occurrence records from 2004 for three state species of special concern (little brown bat, northern myotis, and eastern pipistrelle) that were documented north of the proposed Project site. No other state- or federally protected species were identified by the USFWS or Indiana Natural Heritage Data Center at or within the vicinity of the proposed Project site. Field surveys completed by WCC in May 2012 did not identify any state- or federal-protected species or critical habitat within the proposed Project site.

6.7.1 No Action

The No Action Alternative would have no short- or long-term impacts to state- or federal-protected species that could occur in the proposed Project site.

6.7.2 Construction and Operation Impacts of the Proposed Project

According to correspondence dated January 25, 2013 from the USFWS, the proposed Project is within the range of the federally endangered Indiana Bat (Appendix A). The proposed Project would impact 4.5 acres of forest habitat that could potentially be used as summer roosting habitat for the species. The USFWS stated that the proposed Project would not eliminate enough habitat to affect this species;

however, tree removal has the potential to cause incidental take of the species. In order to avoid this take, USFWS recommends the tree clearing be avoided during the period April 1 to September 30. If all tree removal cannot occur outside of this recommended time frame, USFWS recommends that a biologist familiar with Indiana bat roosting ecology conduct a survey to identify only those trees that are suitable for roosting. Those identified trees must be removed prior to prior to April 1 or after September 30. Hoosier Energy conducted a survey to identify potential roosting habitat trees that would require removal prior to April 1 in late January. Following the survey, Hoosier Energy also met with the IDNR at the proposed Project site on March 1, 2013, to show the trees marked for removal, present the latest site layout, and answer questions about the project given that the Indiana Bat is also a state listed endangered species. IDNR submitted a follow up letter to the meeting on March 13, 2013 (Appendix A). Hoosier Energy removed 43 trees that were identified by the survey as potential habitat on March 13 and 14, 2013 in order to ensure no effect to the Indiana Bat. These activities would also protect the three state species of special concern that have been identified by the Indiana Natural Heritage Data Center within 0.5 mile of the proposed Project site, including the little brown bat, northern myotis, and eastern pipistrelle. The tree removal activities have not caused an adverse environmental impact and in no way limit the choice of reasonable alternatives being considered in this environmental review process in accordance with 7 CFR § 1794.15 and 40 CFR § 1506.1.

Based on the removal of potential habitat trees prior to April 1st, the proposed Project is not expected to affect any other state- or federal-protected species or their critical habitats or result in short- or long-term impacts to protected species or critical habitats that may occur in Monroe County.

6.8 Socioeconomics and Community Resources

6.8.1 Employment and Population

6.8.1.1 No Action

The No Action Alternative would not generate permanent or temporary jobs and would not impact local communities.

6.8.1.2 Construction and Operation Impacts of the Proposed Project

Construction of the proposed Project could temporarily stimulate additional jobs in the construction trades such as electricians, laborers, and carpenters. The majority of the construction workforce would be drawn from the Bloomington MSA and would be a major source of labor for construction of the proposed Project, and would provide services and housing for construction workforce. With an estimated

construction schedule of 14 months; length of employment would range from a few weeks to several months dependent on skill and/or specialty. Construction of the proposed Project would not result in an increase in the number of permanent residents if workers are hired locally and commute to the site. Gas stations, convenience stores, and restaurants near the proposed Project site may experience increases in business during the construction period in response to activity from construction workers.

The operation staff will be approximately 116 permanent employees and up to 25 temporary employees after construction. Hoosier estimates a 2 percent annual employment growth over the next 20 years. The building is being designed for occupancy of approximately 200 people. Because of the location being near a major population center such as Bloomington, implementation of the proposed Project would not result in a large increase in the number of permanent residents in the communities near the new site.

6.8.2 Environmental Justice

As described in Section 5.8.4, the proposed Project is not considered to be in an area of environmental justice concern. The percentage of minority residents residing in the census tract where the proposed Project is located is only slightly higher compared to the percentage for Monroe County as a whole, and the poverty rate for the census tract is lower than the county rate.

6.8.2.1 No Action

The No Action Alternative would have no short- or long-term impacts to environmental justice issues at or in the vicinity of the proposed Project site because no construction would occur. The No Action Alternative would have no short- or long-term impacts on minority or low-income populations.

6.8.2.2 Construction and Operation Impacts of the Proposed Project

The proposed Project would be located in an urban area with mostly commercial property nearby. The nearest neighborhoods are located to the west of SR 37. Adverse human impacts as a result of the proposed Project would include additional noise and traffic impacts during construction, temporary visual impacts during construction, and long-term visual impacts during operation. However, because the site vicinity is not characterized by a high minority or low-income population, no disproportionate impacts would occur to minority or low-income populations as a result of the proposed Project and the project would be in compliance with Executive Order 12372 on Environmental Justice.

6.9 Aesthetics

6.9.1 No Action

The No Action Alternative would not change the aesthetics of the site and would have no short- or long-term impacts on the existing visual environment because no construction would occur.

6.9.2 Construction and Operation Impacts of the Proposed Project

Initial construction activities that may be seen at the site would include the installation of site security lighting, video surveillance cameras, a Hoosier Energy field construction office trailer, temporary construction electrical power, and connection to a temporary potable water service. In addition, a security trailer would be installed at the site to serve as the main point of entrance for construction workers, engineers, and Hoosier Energy employees. Security officers would patrol the site 24 hours per day, 7 days per week during construction activities. These initial construction activities would be an increase in the developed nature of the site and tree and vegetation removal is planned to occur where required for construction. Impacts to scenic resources during construction activities would be limited to the existence of typical construction operations, including site security, clearing, grading, and general construction activities relating to the development of office complex.

Following construction of the new office complex, the area would change from a mix of commercial operations and undeveloped forestland to a more developed viewshed, particularly when viewed from Tapp Road and SR 37. The proposed building would consist of two, three-story wings with center connecting two-story core. As previously discussed, the north wing would consist of three floors and the south wing with three floors over a basement, which takes advantage of the site topography. The central core of the building would consist of two stories and include the board room, lobby, large conference rooms, executive conference room, and executive offices. The facility would also include above-ground parking for 235 vehicles. A rendering of the proposed structure is included in Figure 6.2.

The site would be landscaped to meet zoning requirements and site security fencing, which would include a motor operated security gate at the entrance. Grounds and parking will be landscaped with native planting per LEED standards. Although tree and understory removal is planned for the main structures of the office complex and associated parking lot, a buffer of woodlands along SR 37 would further limit impacts to the viewshed at the site. Additionally, the presence of vegetation borders to the north, west, and east would further limit impacts to the viewshed from those locations. Hoosier Energy provided detailed site plans to the City of Bloomington Planning Department and the City has endorsed the plan for the proposed Project. Final city approval is anticipated on February 6, 2013.

Figure 6.2: Proposed Rendering of New Headquarters

The existence of the new facility in a previously undeveloped space would result in a substantial change to the existing viewshed of the area. However, much of the construction activities as well as the new headquarters facility itself would be buffered by existing woodlands to the west, north, and east of the site. In addition, the setback of the new facility from Tapp Road would serve to limit the direct impact to motorists and individuals viewing the site from Tapp Road, West Schmaltz Road, or SR 37. Much of the existing lands surrounding the site have been developed for retail, commercial, or mixed-use purposes, the construction of the new proposed office complex would not result in adverse impacts to the overall aesthetics of the area. Additionally, no registered scenic viewpoints or any of Indiana's Historic Pathways would he impacted by the proposed Project.

6.10 Transportation

6.10.1 No Action

The No Action Alternative would have no short- or long-term impacts to transportation at or near the proposed Project because no construction would occur.

6.10.2 Construction and Operation Impacts of the Proposed Project

Existing roads would be used for construction access to the site; no upgrades to off-site roads are anticipated. Construction of the proposed Project would have a minor and temporary impact on traffic within the immediate vicinity of the proposed Project site, particularly at the intersections of Tapp Road and South Tech Boulevard as well as SR 37 and Tapp Road. Travel by construction workers, and transport of equipment and materials would add to the current traffic volumes on SR 37 and Tapp Road.

The primary ingress to the Project site would be on South Tech Boulevard Indirect impacts to motorists travelling to and from the automotive repair business (Worldwide Automotive Service) on Schmaltz Road may result from increased construction traffic along South Tech Boulevard However, these impacts would be short term in nature and motorists may use a secondary ingress/egress to this business from South Deborah Drive, which is located just east of the entrance to South Tech Boulevard

Impacts to local travel would most likely occur around starting and quitting times of the construction workforce. Increased travel volumes may increase wait times for motorists accessing the medical care facility and casino, both of which are located on the south side of Tapp Road, directly across from the proposed Project site. As noted above, these potential delays would be dependent on motorists' travel times and may fluctuate depending on the phase of construction occurring at a given time. Currently, major construction operations are anticipated to begin the summer of 2013 and primary construction activities would decrease in the fall of 2014. The frequency of the daily auto traffic would be proportionate to on-site labor projections. Construction traffic would include all craft labor, construction management staff, contractors, contractor equipment, vendors, and material and equipment deliveries. In addition to the normal vehicle auto traffic, deliveries of construction materials can average approximately two large trucks per day. Special deliveries for such items as structural steel and concrete may occasionally exceed five deliveries on a given day; however, such truck deliveries would not coincide with early morning or late afternoon labor vehicle traffic at the proposed Project site.

Following major construction activities, there is not expected to be an increase in congestion for through traffic along SR 37 or Tapp Road. Traffic associated with operation of the facility would include traffic from staff, fleet, and occasional maintenance vehicles. The additional traffic resulting from the proposed Project will not significantly change traffic levels at the intersections of Tapp Road and South Tech Boulevard or SR 37 and Tapp Road.

6.11 Human Health and Safety

6.11.1 No Action

The No Action Alternative would have no short- or long-term impacts to human health and safety at or in the vicinity of the study area because no construction would occur.

6.11.2 Construction and Operation Impacts of the Proposed Project

Potential health and safety hazards associated with the proposed Project exist for construction personnel as related to heavy equipment operation, overhead materials and cranes, and use of construction tools. Construction-related hazards can be effectively mitigated by complying with all applicable Federal and

state occupational safety and health standards. Adherence to these standards, and applicable National Electrical Safety Code regulations and utility design and safety standards, would protect construction workers from unacceptable risks.

Hoosier Energy would develop a Health and Safety Plan to address public and worker safety during the construction and operation of the proposed Project. The Health and Safety Plan would identify requirements for minimum construction or operation distances from residences or businesses, as well as requirements for temporary fencing around staging, excavation, and laydown areas during construction. It would also include provisions for worker protection as is required under OSHA with emphasis on CFR 1926 – *Safety and Health Regulations for Construction.* During construction, all employees, contractors, and sub-contractors would be required to conform to OSHA safety procedures. Adequate training would be mandatory for all construction workers on site. Heavy equipment would be in compliance with OSHA requirements for safety devices such as back-up warnings, seat belts, and rollover protection. Personal safety equipment such as hard hats, ear and eye protection, and safety boots would be required for all workers on site. Accidents and injuries would be reported to the designated safety officer at each site.

Risk of accidental fire during construction would occur from human activities such as refueling, cigarette smoking, and use of vehicles and construction equipment in dry, grassy areas. The health and safety plan would address these risks, and the risks would be reduced to acceptable levels by restrictions or procedures regarding these activities. The proposed Project would have a built-in fire suppression system. However, if needed, fire services would be provided by the Bloomington Fire Department. The fire protection systems for the new headquarters facility would meet Indiana Building code and FM Global standards.

The construction site would be managed to prevent harm to the general public. As previously mentioned, there would be a manned security gate constructed at the entrance to the site and security personnel would monitor the site 24 hours a day, 7 days a week. The general public would not be allowed to enter any construction areas associated with the proposed Project. The major risk to the general public would be from increased traffic volume on the roadways near or adjacent to the proposed Project as a result of commuting construction workers and transportation of equipment and materials.

6.12 Cultural Resources

6.12.1 No Action

The No Action Alternative would have no short- or long-term impacts to cultural resources at or in the vicinity of the proposed Project site because no construction would occur.

6.12.2 Construction and Operation Impacts of the Proposed Project

The cultural resource survey performed at the proposed Project site discovered no archaeological sites. The project area had been both agriculturally and non-agriculturally disturbed. The results of the other cultural resource surveys conducted within the county suggest that sites contained within the region vary in size from small ephemeral lithic scatters to fairly significant prehistoric deposits. No archaeological resources were located during the survey; the proposed Project is not anticipated to affect any archaeological properties eligible for listing on the National Register of Historic Places, and no further archaeological work is warranted. If human remains, features, or midden deposits are encountered during the construction of the proposed Project, Hoosier would halt work and archaeologists from the IDNR-DHPA would be contacted for additional evaluation before work resumes.

The Indiana SHPO concurred with the proposed determinations of eligibility and finding of effect in a letter dated February 4, 2012 that there are no historic buildings, structures, districts, objects, or archaeological resources within the APE that will be adversely affected by the proposed Project (Appendix A). As of the date of this EA, only one of the thirteen tribes contacted responded; the Delaware Nation responded with no interest or objection to the Project (Appendix A).Based on the findings of the surveys and the responses from the SHPO and the Native American tribes, RUS has determined that a finding of no historic properties affected is appropriate for the proposed Project in accordance with 36 CFR **§ 800.4(d)(1).**

6.13 Cumulative Effects

This section describes the region of influence (ROI), or the physical area where the effects of the proposed Project would be noticeable. The ROI can vary for each resource assessed. This is followed by a listing of past, present, and reasonably foreseeable future actions (RFFAs) that have affected or may affect the same resources. Finally, an assessment of cumulative effects for each resource is included.

6.13.1 Region of Influence

To determine the contribution of the proposed Project to cumulative effects, impacts on each resource are analyzed for a geographic scope that includes a wider area than the footprint of the proposed Project. The expanded geographic scope for cumulative effects analysis for each resource or group of resources is described below.

For air resources, the area assessed includes a 50-kilometer radius of the site used for air quality modeling. Monroe County is located within the White River Drainage Basin with much of the northern portion of the county draining into the White River, primarily through Beanblossom Creek. As

previously mentioned, there is one drainage feature and two unnamed tributaries to Clear Creek within the site boundary. Clear Creek is a tributary of Salt Creek, which flows into the East Fork White River. The major aquatic resource assessed for cumulative impacts is the East Fork White River.

For terrestrial resources, the area assessed includes the ecoregion where the facilities are to be located. Ecoregions denote areas of general similarity in the type, quality, and quantity of environmental resources. The proposed Project is within the Interior Plateau Ecoregion. This Ecoregion is characterized by rolling to deeply dissected, rugged terrain with areas of karst topography common on the Mitchell Plain.

For socioeconomic resources, the area assessed is the commuting distance of 30 miles with an emphasis on Monroe County. Resources and issues with primarily local impacts from a cumulative standpoint, including environmental justice, land use, infrastructure, transportation, visual, noise, public health and safety, cultural resources, recreation, and waste, are assessed for Monroe County.

6.13.2 Past, Present, and Reasonably Foreseeable Future Actions

Past, present, and RFFAs that have affected the resources of the Monroe County area include:

- Private agricultural management.
- Residential and commercial development in the Bloomington area, with associated utility lines, railroads, and roads. No specific large-scale RFFAs have been identified in the vicinity of the proposed Project, but occasional small subdivisions are expected to be platted, especially along the area's major roads.
- Construction of I-69
- Improvements to Tapp Road

Air

Air quality in the region is generally considered good and there are no nearby non-attainment areas in the vicinity of the proposed Project. Construction activities would increase the level of exhaust emissions, fugitive dust, and other construction-related emissions above the current levels in the ROI. However, these increases are not anticipated to appreciably affect the area's overall air quality, and no cumulative impacts to air quality would occur as a result of construction activities. Overall, this proposed Project, when added to other past, present, and RFFAs, would not contribute to a violation of air quality standards and would not cause adverse cumulative effects to air quality.

Land Use

The proposed Project is consistent with the character of the area, and adjacent to other commercial properties. The proposed Project would be compatible with future land use. There are no other RFFAs identified that are incompatible with the proposed Project land use. Additional development could occur on vacant land to the north, east, or south; the cumulative impact of these developments when combined with the proposed Project would be dependent on the location, type, and size of the proposed development. Therefore, the proposed Project would not contribute to adverse cumulative land use impacts.

Geology, Soils, and Farmland

The proposed Project would not affect geological resources; therefore, there are no cumulative geological effects. During construction activities planned for the proposed Project, disturbed areas would be exposed to erosion. However, Hoosier Energy would implement soil erosion practices during construction activities that would have the potential to impact soils at the site; these activities would help prevent soils from leaving the construction site and limit the potential for erosion. Any disturbed areas would be stabilized and re-vegetated in the earliest timeframe. Because these projects would take a small amount of prime farmland out of production, the project would represent a minor contribution to ongoing cumulative effects from farmland depletion. This contribution would be less than one-tenth of one percent of the prime farmland in Monroe County and would not represent a cumulative impact to the area's important farmland resource. Overall, cumulative impacts to the area's geology, soils, and farmland are not anticipated under the proposed Project.

Surface Water

Approximately 131 linear feet of the one unnamed tributary to Clear Creek would be removed as this unnamed tributary falls within the footprint of ground disturbance for the project. However, as a result of the limited length and connectivity of these drainages, their removal is not anticipated to impact the region's surface water features and would not contribute to cumulative effects on surface water.

Groundwater

The proposed Project would have no impact on area groundwater; therefore, it would not contribute to cumulative effects on surface water.

Vegetation

A portion of vegetative communities (approximately 4.5 acres) on the proposed Project site would be permanently removed for required project components. However, when possible, areas not requiring

permanent structures and/or impervious surfaces would be re-vegetated as soon as it is feasible to do so, and with the minimization of impacts from invasive plants.

Wildlife

The proposed Project would primarily affect existing wildlife habitat at the site in the area proposed for clearing and grading (approximately 4.5 acres). Existing wildlife in the area that are sensitive to noise are likely to be impacted during extensive construction activities, but following major construction activities, wildlife are likely to return to the area. The proposed Project, when combined with other RFFAs, would not result in adverse cumulative impacts to valuable wildlife habitat.

Threatened and Endangered Species

The proposed Project would impact 4.5 acres of forest habitat that could potentially be used by roosting Indiana bats. However, there would be no anticipated effects to the species as all potential roost trees were cleared March 13-14 to avoid impacting any roosting Indiana bats on the project site. Similarly, no project-related impacts are anticipated to affect the three state species of special concern (little brown bat, northern myotis, and eastern pipistrelle) identified by the Indiana Natural Heritage Data Center within 0.5 mile of the proposed Project site because all potential roost trees have been cleared from the site. Therefore, the proposed Projects would not contribute to cumulative impacts on listed species.

Wetlands

Construction and operation of the proposed Project is anticipated to have no short- or long-term impacts to wetlands. The proposed Project would not contribute to any cumulative effects on wetlands.

Floodplains

The proposed Project would not take place in the floodplain or indirectly contribute to floodplain development; therefore, it would not contribute to cumulative effects on floodplains.

Socioeconomic and Community Resources

A majority of the construction work force would be expected to come from within a 60-mile commuting radius, and the remainder would be non-local workers expected to require temporary housing, most likely in Bloomington. Additional government revenues from taxes and fees would result from permanent jobs at the facility. These temporary and permanent employment levels would create additional demand for housing and public services, but would not create undue strain on existing community facilities in either the Monroe County or Bloomington area.

No reasonably foreseeable future actions have been identified that would add significantly to the direct and indirect employment increases generated by the proposed Project. The proposed Project would add generally positive socioeconomic impacts and would not contribute to any negative socioeconomic consequences such as losses of jobs in other industries.

Environmental Justice

There is not a substantial low-income population in the vicinity of the proposed Project site. No residents are being displaced by the proposed Project and noise and increased traffic from proposed Project operations would be minor. Therefore, there would not be disproportionate impacts to minority and low-income communities, and the proposed Project would not contribute to any disproportionate cumulative impacts.

Aesthetics

As indicated in Section 6.9.2, the proposed Project would introduce new elements into the predominantly woodland landscape at the site. However, as other types of similar development occur throughout the vicinity of the proposed Project, the overall visual contrast in the landscape would be minor. Additionally, the setback of the new facility combined with the presence of woodland buffers on the north, west, and east would limit the potential impact to sensitive visual resources. At longer distances, the proposed Projects would blend in to the larger landscape and would be a small part of the overall vistas.

Transportation

There are currently planned road improvement projects for Tapp Road by the City of Bloomington. These projects are listed as “in construction” and would likely be concluded prior to the initiation of major construction activities. No major reasonably foreseeable future traffic-generating actions have been identified in the county that would cumulatively contribute to increased auto or truck traffic on local or state highways. Although planned expansion activities for I-69 may connect the interstate with SR 37, the final timing and connection points have not been determined at this time. Should the connection occur, it may place additional traffic demands on the intersection of SR 37 and Tapp Road.

Noise

No additional RFFAs are proposed that would introduce additional noise into the existing setting. The proposed Project, when added to other past, present, and reasonably proposed future noise sources, would not create additional sound levels that require mitigation.

Human Health and Safety

No additional RFFAs are proposed that would introduce additional public health and safety concerns into the Bloomington area. The impacts of past and present actions on worker health and safety, traffic, and community services are addressed in the direct and indirect impacts section.

Cultural Resources

Existing and planned development in the Bloomington area has, and is likely to inadvertently affect some cultural sites; however, no past and present adverse impacts have been identified in the vicinity of the proposed Site. The proposed Project would not impact any National Register-eligible resources. No RFFAs have been identified that would have adverse effects on historic and cultural resources. Future impacts from federally funded or permitted actions would be addressed by Section 106 of the National Historic Preservation Act. As a result, there would be no adverse cumulative effects from the proposed Project.

Table 6.2 summarizes the results of the cumulative effects analysis.

Table 6.2: Summary of Cumulative Impacts Assessment

Resource Area	Region of Influence	Cumulative Impacts	Contribution of Project site to Cumulative Effects
Air	50 km radius	No non-attainment areas nearby; GHG emissions from traffic	Minor; no violation of NAAQS; not a net contributor to GHG emissions
Land Use	Monroe County	No conflicts	None
Geology, Soils and Farmland	Immediate site	None	No geological resource impacts; negligible soil and farmland impacts
Surface Water	Immediate site	None	None
Groundwater	Monroe County	None	Minimal
Vegetation	Immediate site	Limited contribution to removal of vegetation	Negligible
Wildlife	Immediate site	Limited removal of existing habitat on site	Negligible
Threatened and Endangered Species	Monroe County	None	None
Wetlands	Immediate site	No activities in wetlands; limited contribution to stream removal	None

Resource Area	Region of Influence	Cumulative Impacts	Contribution of Project site to Cumulative Effects
Floodplains	Immediate site	No activities in floodplain	None
Socioeconomic and Community Resources	Commuting distance (60 mi); emphasis on Bloomington, IN	Increases to the local workforce	Generally positive
Environmental Justice	Monroe County	No locally unwanted land uses with disproportionate impacts identified	No disproportionate impacts
Aesthetics	Monroe County	Few visual intrusions	Minor
Transportation	Monroe County	Few level of service problems	None
Noise	Monroe County	None	Negligible
Human Health and Safety	Monroe County	None	None
Cultural Resources	Monroe County	No adverse effects identified from past actions	None

* * * * *

7.0 PERMITTING

A list of potential permits, approval and authorizing actions for the project is provided in Table 7.1.

Table 7.1: Federal, State, Local Permits, Approvals, and Authorizing Actions

ISSUING AGENCY	PERMIT/APPROVAL NAME	NATURE OF PERMIT/APPROVAL	AUTHORITY
Federal Government			
U.S. Fish and Wildlife Service	Threatened and Endangered Species consultation	Consultation to ensure that federal listed protected species and/or their habitat would not be impacted	Endangered Species Act (16 USC §1531 et seq.) Section 7
State Government			
IDEM, Water Division	National Pollutant Discharge System (NPDES) Storm Water Discharges associated with Construction Activities and Storm Water Pollution Prevention Plan	Apply for coverage under General Permit in order to authorize storm water discharges to surface waters of the state associated with the construction of the project	Section 402 of the Clean Water Act
IDEM, Water Division	NPDES Storm Water Discharges associated with Facility Operation and SWPPP	If required, apply for coverage under General Permit in order to authorize stormwater discharges to surface waters of the state associated with the operation of the project	Section 402 of the Clean Water Act and 40 CFR 122.26
IDNR, DHPA	National Historic Preservation Act consultation	Consult with project applicants and state agencies regarding impacts on cultural resources that are either listed or eligible for listing on the NRHP	National Historic Preservation Act, Section 106
Indiana Department of Homeland Security, Fire and Building Safety Services	Construction Design Release Fire Suppression System Approval	Enables one to obtain construction permits Apply for approval of fire suppression system	675 IAC 12-6-2 (C) 675 IAC 12-6-2 4
Local Government			

ISSUING AGENCY	PERMIT/APPROVAL NAME	NATURE OF PERMIT/APPROVAL	AUTHORITY
Monroe County Planning & Zoning Office	Special Use Permit/Rezone from agricultural to industrial Site Plan Amendment Improvement Location Permit (commercial) Sign Permit	Obtain rezoning approval prior to construction Required for change in use/rezone Required for change in use/rezone Permit for sign placement during construction	Monroe County Planning and Zoning
City of Bloomington	Grading Permit Building Permit	Permit for clearing and grading Permit to construct buildings	City of Bloomington Department of Engineering Services, Department of Planning

* * * * *

8.0 REFERENCES

Alt & Witzig Consulting Services,

2012a. Phase I Environmental site Assessment, Sargent Trust site.

2012b. Preliminary Subsurface Investigation & Geotechnical Recommendations.

City of Bloomington,

2002. 2002 Growth Policies Plan – Part 5: Mater Thoroughfare Plan. Available: http://bloomington.in.gov/media/media/application/pdf/4282.pdf. Accessed January 21, 2013.

2012a. About the Bloomington Fire Department. http://bloomington.in.gov/sections/viewSection.php?section_id=267. Accessed January 15, 2013.

2012b. Police Department. http://bloomington.in.gov/sections/viewSection.php?section_id=267. Accessed January 15, 2013.

2012c. Wapehani Mountain Bike Park. http://bloomington.in.gov/documents/viewDocument.php?document_id=295. Accessed January 10, 2013.

Council on Environmental Quality (CEQ), 1997. Environmental Justice: Guidance Under the National Environmental Policy Act. Executive Office of the President. Washington, DC, USA.

Environmental Protection Agency (EPA).

2012a. 40 CFR Part 81 Designation of Areas for Air Quality Planning Purposes. http://www.epa.gov/airquality/greenbook/a40cfr81.html. Accessed January 2013.

2012b. Clean Air Interstate Rule: Indiana. Available: http://www.epa.gov/cair/in.html. Accessed January 23, 2013.

2012c. Ecoregions of Indiana and Ohio. ftp://ftp.epa.gov/wed/ecoregions/in/ohin_front.pdf. Accessed January 18, 2013.

Indiana Department of Environmental Management (IDEM), 2012. Impaired Waters – Integrated Reports. http://www.in.gov/idem/nps/2647.htm. Accessed January 25, 2013.

Indiana Department of Natural Resources (IDNR),

1989. Geology for Environmental Planning in Monroe County, Indiana. Available: https://scholarworks.iu.edu/dspace/bitstream/handle/2022/12952/Geology%20for%20Environment%20Planning%20in%20Monroe%20County,%20Indiana.pdf?sequence=1. Accessed January 22, 2013.

2003a. Bedrock Aquifer Systems of Monroe County, Indiana. Available: http://www.in.gov/dnr/water/files/monroe_bedrock.pdf. Accessed January 21, 2013.

2003b. Unconsolidated Aquifer Systems of Monroe County, Indiana. Available: http://www.in.gov/dnr/water/files/monroe_bedrock.pdf. Accessed January 23, 2013.

2010. Indiana County Endangered, Threatened and Rare Species List. http://www.in.gov/dnr/naturepreserve/files/np_owen.pdf. Accessed January 2013.

Indiana University Health (IUH),

2012a. Medical Services. http://iuhealth.org/medical-services/. Accessed January 21, 2013.

2012b. Morgan Hospital & Physicians. http://iuhealth.org/morgan/medical-services/. Accessed January 21, 2013

Monroe County. 2004. Unincorporated Monroe County Storm Water Quality Management Plan. Available: http://www.co.monroe.in.us/TSD/DesktopModules/Bring2mind/DMX/Download.aspx?TabID=140&Command=Core_Download&EntryId=5865&PortalId=0&TabId=140. Accessed January 28, 2013.

Natural Resources Conservation Service (NRCS). 2012. Web Soil Survey. http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm. Accessed January 2013.

State of Indiana. 2012. Impaired Waters – Integrated Reports. Available: http://www.in.gov/idem/nps/3889.htm. Accessed January 23, 2013.

Stillwell, Larry N., 2012. An Archaeological Field Reconnaissance of a Proposed Mill Creek Development in Bloomington, Monroe County, Indiana. Archaeological Consultants of Ossian, Muncie, IN.

U.S. Army Corps of Engineers (USACE). 2012. Monroe Lake. Available: http://www.lrl.usace.army.mil/monl/. Accessed January 23, 2013.

U.S. Census Bureau.

2010 Census. American Factfinder. http://factfinder2.census.gov. Accessed January 21, 2013.

2007-2011. American Community Survey Estimates. http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=ACS&_submenuId=datasets_2. January 21, 2013

U.S. Climate Data, 2012. Climate - Bloomington – Indiana. http://www.usclimatedata.com/climate.php?location=USIN0046. Accessed January 2013.

U.S. Fish and Wildlife, 2012. Critical Habitat Portal. http://criticalhabitat.fws.gov/crithab/. Accessed January 24, 2013

U.S. Department of Agriculture (USDA).

1981. Soil Survey of Monroe County. Natural Resource Conservation Service.

2007. 2007 Census of Agriculture. Monroe County Indiana. http://www.agcensus.usda.gov/Publications/2007/Online_Highlights/County_Profiles/Indiana/cp18105.pdf. Accessed January 2013.

2011a. Crider Series. Available: https://soilseries.sc.egov.usda.gov/OSD_Docs/C/CRIDER.html. Accessed January 23, 2013.

2011b. Hagerstown Series. Available: https://soilseries.sc.egov.usda.gov/OSD_Docs/H/HAGERSTOWN.html. Accessed January 23, 2013.

University of Indiana. 2008. Indiana Biological Survey. Interior Plateau Ecoregion. Available: http://www.indiana.edu/~inbsarc/ecoregions_files/ecoregions_plateau.html . Accessed January 21, 2013.

Wheeler, B.R., G.C. Steinhardt, and C.A. Sargent. 1983. Protecting Prime Farmland in Indiana. Purdue University. Cooperative Extension Service. http://www.extension.purdue.edu/extmedia/AY/AY-245.html Accessed January 2013.

Williams Creek Consulting (WCC), 2012. Natural Resource Assessment. Mill Creek Property, Bloomington Monroe County, Indiana.

Woods, Alan J., James M. Omernik, Scott C. Brockman, Timothy D. Gerber, William D. Hosteter, and Sandra H. Azevedo. 1998. Ecoregions of Indiana and Ohio. EPA, National Health and Environmental Effects Research Laboratory, Corvallis, Oregon. http://www.epa.gov/wed/pages/ecoregions/ohin_eco.htm. Accessed January 17, 2013.

* * * * *

APPENDIX A - AGENCY LETTERS AND CORRESPONDENCE

Hoosier New Headquarters Project Environmental Assessment
Agency Scoping Letter Responses
Comment Letters Received: as of 11 March 2013

FEDERAL

US Fish and Wildlife Service
- January 25, 2013
- December 7, 2012

US Department of the Army
- February 4, 2013

STATE

IDNR Division of Fish and Wildlife
- March 11, 2013
- January 7, 2013
- December 18, 2012

IDNR Division of Historic Preservation & Archaeology
- February 4, 2013

TRIBAL

Delaware Nation
- January 11, 2013

United States Department of the Interior
Fish and Wildlife Service

Bloomington Field Office (ES)
620 South Walker Street
Bloomington, IN 47403-2121
Phone: (812) 334-4261 Fax: (812) 334-4273

January 25, 2013

Ms. Carla Shinn
Burns and McDonnell
9400 Ward Parkway
Kansas City, Missouri 64114-3319

Dear Ms. Shinn:

This responds to your letter of January 4, 2013 requesting U.S. Fish and Wildlife Service (FWS) review of a proposed construction project for Hoosier Energy in Monroe County, Indiana. These comments are consistent with the intent of the National Environmental Policy Act of 1969, the Endangered Species Act of 1973, and the U. S. Fish and Wildlife Service's Mitigation Policy.

Your letter states that the project includes construction of an 83,000 square foot headquarters building and parking lot on a 13.5 acre site in Bloomington. The entire site is wooded except for 2 roads and a fenced tower compound. Additional information provided by Hoosier Energy stated that approximately 8 acres of trees would be removed. A natural resource assessment conducted in May, 2012 found 2 small headwater tributary streams and an isolated linear water feature, however your letter states that the project will not affect streams.

A biologist from this office inspected the project site on January 24, 2013. The forested portion of the site contains a diverse mixture of native hardwood tree species, including red oak, white oak, sugar maple, tuliptree, black cherry, American beech, hickory (2 species) and sycamore. Tree sized ranges mostly from small to medium, with several larger specimens, a few snags and regeneration of saplings. We could not determine the ground cover due to the dormant season but would expect a variety of native wildflowers. Invasive multiflora rose shrubs are present in some areas but are not abundant or pervasive. This forest provides good habitat for migratory birds.

The proposed project is in an area of karst geologic features, which often support unique cave ecosystems. A large sinkhole is present between the northern part of the project site and SR 37. We are not aware of any karst features on the project site, but if caverns or springs are encountered during excavation, all work should stop immediately and this office or the Indiana Department of Natural Resources should be contacted concerning proper mitigation measures. If sinkholes occur in construction areas they should be left undisturbed along with a 25 foot buffer around the highest closed contour. Existing volume of surface drainage to sinkholes should be

maintained, and drainage from construction sites should be filtered or treated prior to entering a sinkhole.

Endangered Species

The proposed project is within the range of the federally endangered Indiana bat (*Myotis sodalis*). Indiana bats hibernate in caves then disperse to reproduce and forage in relatively undisturbed forested areas associated with water resources during spring and summer. They will inhabit fragmented landscapes with adequate forest for roosting and foraging. Young are raised in nursery colony roosts in trees, typically near forested drainageways in undeveloped areas.

There are several Indiana bat hibernacula caves west of Bloomington which will not be affected by the proposed project. The forested portion of the project site provides summer habitat. The project will not eliminate enough habitat to affect this species, but to avoid incidental take from removal of an occupied roost tree we recommend that tree-clearing be avoided during the period April 1 - September 30. If this measure is implemented we concur that the proposed project is not likely to adversely affect the Indiana bat. If tree removal cannot be completed prior to April 1 it will be necessary for a biologist familiar with Indiana bat roosting ecology to conduct a roost tree survey and mark all suitable roost trees. Marked trees must be removed prior to April 1.

If the seasonal restriction is implemented this precludes the need for further consultation on this project as required under Section 7 of the Endangered Species Act of 1973, as amended. If project plans are changed significantly please contact our office for further consultation.

For further discussion, please contact Mike Litwin at (812) 334-4261 ext. 205.

Sincerely yours,

Michael L. Litwin

for Scott E. Pruitt
Field Supervisor

Jason Steckel

From: Litwin, Michael [michael_litwin@fws.gov]
Sent: Friday, December 07, 2012 10:00 AM
To: Jason Steckel
Subject: Re: ETR information request, Mill Creek Property

The project site is within the range of the federally endangered Indiana bat (*Myotis sodalis*). The site is heavily forested and contains suitable summer habitat for this species. There are several Indiana bat hibernacula caves in the surrounding area, and the site is within the 5 and 10 mile buffers of multiple hibernacula, however, it is separated from the caves by SR 37 and extensive development on the west side of the highway.

Michael Litwin
US Fish and Wildlife Service
620 South Walker Street
Bloomington, IN 47403
(812) 334-4261 ext. 205

On Thu, Dec 6, 2012 at 9:35 AM, Jason Steckel <jsteckel@williamscreek.net> wrote:

Mr. Litwin,

Please find attached a request for ETR species information for an undeveloped parcel located in Bloomington, Monroe County, Indiana.

Thank you,

Jason Steckel

Project Scientist

Williams Creek Consulting

Babeca Building

919 North East Street

Indianapolis, IN 46202

p. +1.317.423.0690

f. +1.317.423.0696

m. +1.317.605.8921

Telephone Memorandum

Called:	Jim Thomas
Organization:	US Army Corps of Engineers – Louisville District
Caller:	Carla Shinn
Organization:	Burns & McDonnell
Subject of Call:	Hoosier Headquarters Project EA
Call Date:	February 4, 2013
Call Time:	10:20 AM
Phone No. Called:	502-315-6710
Project Name:	Hoosier Headquarters Project
Project No.:	70913
Memo Prepared By:	Carla Shinn
Date Memo Issued:	February 4, 2013

Summary:

Below is a list the items discussed regarding the Hoosier Energy Headquarters Project and potential impacts to unnamed tributaries on the Project site.

1. One unnamed drainage feature, located to the west of Grossman Boulevard, will not be impacted.
2. Two unnamed stream tributaries to Clear Creek are located within the proposed Project site
3. Approximately 131 feet of one unnamed stream tributary will be removed for the Project.
4. Project does not require an Individual Permit or a Nationwide Permit.
5. Project would require a Regional General Permit. Mr. Thomas provided directions to the USACE website for information on regional general permits and the application form that would need to be submitted to the USACE.
6. Mr. Thomas recommended reviewing the Regional General Permit guidance on the website.
7. Because less than 300 linear feet would be impacted, no mitigation would be required.

cc: Emily Orler, RUS
Matt Mabrey, Hoosier Energy
John Humes, Hoosier Energy

March 11, 2013

Christie L. Stanifer
Environmental Coordinator
IDNR Division of Fish and Wildlife
402 W. Washington Street, Room W273
Indianapolis, IN 46204

Re: DNR# ER-16753, IDNR Comments on the Proposed Hoosier Energy New Headquarters Facility

Dear Ms. Stanifer:

We received your comments on the Hoosier Energy New Headquarters Facility and Hoosier Energy also met with Mr. Danny Gautier at the project site on March 1, 2013. Hoosier Energy provided the latest site layout (Attachment A) and walked the site with Mr. Gautier while answering his questions about the project. Listed below are items that provide further clarification of the project.

1. Coordination has been conducted with the US Fish and Wildlife on the proposed Project. The project is within the range of the federally endangered Indiana bat and that the forest habitat on the Project site contains suitable summer roosting habitat. Trees have been marked for clearing between October 1 and March 31. Should tree clearing need to occur after March 31, then pre-construction bat surveys would be conducted the night before any clearing activities would occur. If the survey is negative, then clearing would commence the following day. Should the clearing activities take more than one day, surveys would be completed each night before any clearing could occur. If the survey is positive, then clearing would be prohibited until after October 1.
2. The site is adjacent to the Wapehani Bike Park to the north, SR 37 to the west and Tapp Road to the south. Leonard Springs Nature Park, as noted in your January 28th letter, is located approximately 2.5 miles southwest of the Project Site.
3. The project site is approximately 13.5 acres in size; however, only 4.5 acres would be cleared for construction.
4. The Project is not located within any floodway. According to the Flood Insurance Rate Map (FIRM) for Monroe County unincorporated areas (Community – Panel Number 18105C0139D), the two closest designated 100-year flood zones are located along Sinking Creek floodplain approximately one mile west of the proposed Project site and West Fork Clear Creek approximately 0.5 mile east of the Project Site.
5. There are 2 unnamed tributaries that originate on the Project site. As can be seen in Attachment A, neither of these tributaries will be impacted by the proposed Project construction.
6. A karst assessment was conducted for the Project site and is attached (Attachment B). The assessment concluded that no karst features were found within the site boundaries.

Best management practices for construction in karst areas will be used to prevent sediment runoff from leaving the site and entering adjacent karst features.

If you or your staff have any further comments, please let us know and we will try to address them.

Sincerely,

Carla D. Shinn
Project Manager

CB
Enclosure Attachment A – Site Layout
Attachment B – Karst Assessment

cc: Matt Mabrey, Hoosier Energy
John Humes, Hoosier Energy

THIS IS NOT A PERMIT

State of Indiana
DEPARTMENT OF NATURAL RESOURCES
Division of Fish and Wildlife
Early Coordination/Environmental Assessment

DNR #: ER-16753-1 **Request Received:** March 5, 2013

Requestor: Bledsoe Riggert & Guerrettaz Incorporated
William S Riggert
1351 West Tapp Road
Bloomington, IN 47403-3238

Project: Construction of an 83,000 sq. ft. building and parking lot on a 13.5 acre Mill Creek property at the northeast corner of SR 37 and Tapp Road, Bloomington; Hoosier Energy Rural Electric Cooperative, Inc; plans provided

County/Site info: Monroe

The Indiana Department of Natural Resources has reviewed the above referenced project per your request. Our agency offers the following comments for your information and in accordance with the National Environmental Policy Act of 1969.

If our agency has regulatory jurisdiction over the project, the recommendations contained in this letter may become requirements of any permit issued. If we do not have permitting authority, all recommendations are voluntary.

Regulatory Assessment: Formal approval by the Department of Natural Resources under the regulatory programs administered by the Division of Water is not required for this project.

Natural Heritage Database: The Natural Heritage Program's data have been checked.
The state special concern bat species below have been recorded within 1/2 mile northeast of the project area:
1) Northern Myotis (Myotis septentrionalis)
2) Little Brown Bat (Myotis lucifugus)
3) Eastern Pipistrelle (Pipistrellus subflavus)

Fish & Wildlife Comments: To minimize impacts to the above bat species (and Indiana bat, which may also be present), do not cut any trees greater than 3 inches dbh, living or dead, from April 1 through September 30.

This project will result in the loss of several acres of closed-canopy forested habitat. Impacts to non-wetland forest over one (1) acre should be mitigated at a minimum 2:1 ratio. The DNR's Floodway Habitat Mitigation guidelines (and plant lists) can be found online at: http://www.in.gov/legislative/iac/20120801-IR-312120434NRA.xml.pdf.

Preservation of existing forested areas does not offset a loss of forested habitat since the habitat already exists, but it can be an acceptable form of mitigation. An alternative to replacing the forested habitat lost could be to permanently protect the forested areas and lots within the Hoosier Energy property from future clearing and/or development.

Due to the existence of karst features near the project site boundaries, best management practices for construction in karst areas should be used to prevent sediment-contaminated runoff from leaving the site and potentially entering adjacent karst features. The Division concurs with and encourages the implementation of long-term runoff treatment/pre-treatment such as the proposed rain gardens and underground detention. We recommend that locally-native plants be used for rain garden planting.

THIS IS NOT A PERMIT

State of Indiana
DEPARTMENT OF NATURAL RESOURCES
Division of Fish and Wildlife

Early Coordination/Environmental Assessment

The additional measures listed below should be implemented to avoid, minimize, or compensate for impacts to fish, wildlife, and botanical resources:

1. Revegetate all bare and disturbed areas with a mixture of native grasses, sedges, wildflowers, and native shrub and hardwood tree species as soon as possible upon completion. Do not use any varieties of Tall Fescue or other non-native plants (e.g. crown-vetch).
2. Minimize and contain within the project limits inchannel disturbance and the clearing of trees and brush.
3. Do not work in the waterway from April 1 through June 30 without the prior written approval of the Division of Fish and Wildlife.
4. Appropriately designed measures for controlling erosion and sediment must be implemented to prevent sediment from entering the stream or leaving the construction site; maintain these measures until construction is complete and all disturbed areas are stabilized.
5. Seed and protect all disturbed slopes and stream banks that are 3:1 or steeper with heavy duty biodegradable erosion control blankets (follow manufacturer's recommendations for selection and installation. Seed and apply mulch on all other disturbed areas.

Contact Staff: Christie L. Stanifer, Environ. Coordinator, Fish & Wildlife

Our agency appreciates this opportunity to be of service. Please contact the above staff member at (317) 232-4080 if we can be of further assistance.

Christie L. Stanifer
Environ. Coordinator
Division of Fish and Wildlife

Date: March 13, 2013

THIS IS NOT A PERMIT

State of Indiana
DEPARTMENT OF NATURAL RESOURCES
Division of Fish and Wildlife
Early Coordination/Environmental Assessment

DNR #: ER-16753 **Request Received:** January 7, 2013

Requestor: Burns & McDonnell
Carla D Shinn
9400 Ward Parkway
Kansas City, MO 64114-3319

Project: Construction of an 83,000 sq. ft. building and parking lot on a 13.5 acre Mill Creek property at the northeast corner of SR 37 and Tapp Road, Bloomington; Hoosier Energy Rural Electric Cooperative, Inc.

County/Site info: Monroe

The Indiana Department of Natural Resources has reviewed the above referenced project per your request. Our agency offers the following comments for your information and in accordance with the National Environmental Policy Act of 1969.

If our agency has regulatory jurisdiction over the project, the recommendations contained in this letter may become requirements of any permit issued. If we do not have permitting authority, all recommendations are voluntary.

Regulatory Assessment: Formal approval by the Department of Natural Resources under the regulatory programs administered by the Division of Water is not required for this project.

Natural Heritage Database: The Natural Heritage Program's data have been checked.
The state special concern bat species below have been recorded within 1/2 mile northeast of the project area.
1) Northern Myotis (Myotis septentrionalis)
2) Little Brown Bat (Myotis lucifugus)
3) Eastern Pipistrelle (Pipistrellus subflavus)

Fish & Wildlife Comments: To minimize impacts to the above bat species (and Indiana bat, which may also be present), do not cut any trees greater than 3 inches dbh, living or dead, from April 1 through September 30.

As project plans develop, we recommend submitting more information for further review. As currently proposed, this project will likely result in significant environmental impacts.

This project will result in a loss of up to 13.5 acres of closed-canopy forested habitat. Impacts to non-wetland forest over one (1) acre should be mitigated at a 2:1 ratio. The DNR's Floodway Habitat Mitigation guidelines (and plant lists) can be found online at: http://www.in.gov/legislative/iac/20120801-IR-312120434NRA.xml.pdf.

Leonard Springs Nature Park is located at the north boundary of the project site. Forest clearing adjacent to the nature park will likely negatively affect the park by reducing the amount and quality of habitat. Direct impacts could occur due to erosion and silt-contaminated runoff moving down-slope from the site into the park. To minimize direct and indirect impacts to the nature park, a forested buffer along the north property line should be established that is no less than 100' wide from the edge of the steep hill near the north property line or to elevation 825, whichever is greater.

Headwater streams or ephemeral creeks on the site are likely to be impacted due to the development through piping, stream burial, or removal through topography changes or

grading. Headwater streams can provide valuable aquatic (if flowing at least seasonally) and riparian habitat for wildlife. Impacts to headwater surface streams generally have an indirect negative effect on downstream river health.

The Ohio EPA maintains a website containing extensive information on the characteristics of headwater streams, the issues affecting headwater streams and their ecological and economic importance. (http://www.epa.ohio.gov/dsw/wqs/headwaters/index.aspx). We recommend spanning/bridging streams, rather than stream burial or the use of box or pipe culverts. Also, where forested cover adjacent to a stream or drainage system is removed, a native herbaceous buffer strip at least 5' wide should be established on each side of the drainage, which should not be mowed or sprayed.

We recommend that a karst assessment of the site be conducted. The site may contain karst features not apparent on the topographic maps due to the presence of numerous karst features in the general area and a large forested sinkhole being present immediately to the northwest of the site. Even if karst features are not found within the site boundaries, recognizable karst features exist beyond the site boundaries which could be negatively affected by construction activities taking place on the site. Best management practices for construction in karst areas must be used to prevent sediment-contaminated runoff from leaving the site and potentially entering adjacent karst features.

The additional measures listed below should be implemented to avoid, minimize, or compensate for impacts to fish, wildlife, and botanical resources:
1. Revegetate all bare and disturbed areas with a mixture of native grasses, sedges, wildflowers, and native shrub and hardwood tree species as soon as possible upon completion. Do not use any varieties of Tall Fescue or other non-native plants (e.g. crown-vetch).
2. Minimize and contain within the project limits inchannel disturbance and the clearing of trees and brush.
3. Do not work in the waterway from April 1 through June 30 without the prior written approval of the Division of Fish and Wildlife.
4. Plant native hardwood trees along the top of the bank and right-of-way to replace the vegetation destroyed during construction.
5. Post "Do Not Mow or Spray" signs along the right-of-way.
6. Appropriately designed measures for controlling erosion and sediment must be implemented to prevent sediment from entering the stream or leaving the construction site; maintain these measures until construction is complete and all disturbed areas are stabilized.
7. Seed and protect all disturbed slopes and stream banks that are 3:1 or steeper with heavy duty biodegradable erosion control blankets (follow manufacturer's recommendations for selection and installation; seed and apply mulch on all other disturbed areas.

Contact Staff: Christie L. Stanifer, Environ. Coordinator, Fish & Wildlife
Our agency appreciates this opportunity to be of service. Please contact the above staff member at (317) 232-4080 if we can be of further assistance.

Christie L. Stanifer

Date: January 28, 2013

Christie L. Stanifer
Environ. Coordinator
Division of Fish and Wildlife

DNR
Indiana Department of Natural Resources

Mitchell E. Daniels, Jr., Governor
Robert E. Carter, Jr., Director

Division of Nature Preserves
402 W. Washington St., Rm W267
Indianapolis, IN 46204-2739

December 18, 2012

Jason Steckel
Williams Creek Consulting
Babeca Building
919 North East Street
Indianapolis, IN 46202

Dear Jason Steckel:

I am responding to your request for information on the endangered, threatened, or rare (ETR) species, high quality natural communities, and natural areas documented from the Mill Creek Property, Bloomington, Indiana. The Indiana Natural Heritage Data Center has been checked and following you will find information on the ETR species documented within 0.5 mile of the project area.

1. In 2004, the state species of special concern bats *Myotis lucifugus*, little brown bat, *Myotis septentrionalis*, northern myotis, and *Pipistrellus subflavus*, eastern pipistrelle, were documented in the southwest quarter of Section 7, Township 8 North Range 1 West at Camp Wapahani.

For more information on the animal species mentioned, please contact Christie Stanifer, Environmental Coordinator, Division of Fish and Wildlife, 402 W. Washington Room W273, Indianapolis, Indiana 46204, (317)232-8163.

The information I am providing does not preclude the requirement for further consultation with the U.S. Fish and Wildlife Service as required under Section 7 of the Endangered Species Act of 1973. If you have concerns about potential Endangered Species Act issues you should contact the Service at their Bloomington, Indiana office.

U.S. Fish and Wildlife Service
620 South Walker St.
Bloomington, Indiana 47403-2121
812-334-4261

At some point, you may need to contact the Department of Natural Resources' Environmental Review Coordinator so that other divisions within the department have the opportunity to review your proposal.

For more information, please contact:

Department of Natural Resources
attn: Christie Stanifer
Environmental Coordinator
Division of Fish and Wildlife
402 W. Washington Street, Room W273
Indianapolis, IN 46204
(317)232-8163

Please note that the Indiana Natural Heritage Data Center relies on the observations of many individuals for our data. In most cases, the information is not the result of comprehensive field surveys conducted at particular sites. Therefore, our statement that there are no documented significant natural features at a site should not be interpreted to mean that the site does not support special plants or animals.

Due to the dynamic nature and sensitivity of the data, this information should not be used for any project other than that for which it was originally intended. It may be necessary for you to request updated material from us in order to base your planning decisions on the most current information.

Thank you for contacting the Indiana Natural Heritage Data Center. You may reach me at (317)232-8059 if you have any questions or need additional information.

Sincerely,

Ronald P. Hellmich

Ronald P. Hellmich
Indiana Natural Heritage Data Center

Enclosure: invoice

DNR Indiana Department of Natural Resources

Michael R. Pence, Governor
Robert E. Carter, Jr., Director

Division of Historic Preservation & Archaeology•402 W. Washington Street, W274 · Indianapolis, IN 46204-2739
Phone 317-232-1646•Fax 317-232-0693 · dhpa@dnr.IN.gov

February 4, 2013

Mark S. Plank, Director
Engineering & Environmental Staff
USDA Rural Utilities Service
1400 Independence Avenue, SW
Washington, D.C. 20250-1571

Federal Agency: USDA Rural Utilities Service

Re: Project information, archaeological field reconnaissance report (Stillwell, 5/17/13) and notification of Rural Utilities Service's finding of "no historic properties affected" regarding the construction of the proposed Mill Creek Development (DHPA #14494)

Dear Mr. Plank:

Pursuant to Section 106 of the National Historic Preservation Act (16 U.S.C. § 470f) and 36 C.F.R. Part 800, the staff of the Indiana State Historic Preservation Officer ("Indiana SHPO") has conducted an analysis of the materials dated January 4, 2013 and received on February 1, 2013, for the above indicated project in Bloomington, Monroe County, Indiana.

We concur with Rural Utilities Service's January 4, 2013 finding that there are no historic buildings, structures, districts, objects, or archaeological resources within the area of potential effects that will be affected by the above indicated project.

If any archaeological artifacts or human remains are uncovered during construction, demolition, or earthmoving activities, state law (Indiana Code 14-21-1-27 and 29) requires that the discovery must be reported to the Department of Natural Resources within two (2) business days. In that event, please call (317) 232-1646. Be advised that adherence to Indiana Code 14-21-1-27 and 29 does not obviate the need to adhere to applicable federal statutes and regulations.

If you have questions about archaeological issues please contact Amy Johnson at (317) 232-6982 or ajohnson@dnr.IN.gov. If you have questions about buildings or structures please contact Ashley Thomas at (317) 234-7034 or asthomas@dnr.IN.gov.

Very truly yours,

Chad W. Slider

Ron McAhron
Deputy Director
Indiana Department of Natural Resources

RM:ADT:ALJ:aj

emc: Carla Shin, Burns & McDonnell

The Delaware Nation
Cultural Preservation Office
P.O. Box 825 - 31064 State Highway 281- Anadarko, OK 73005
Phone: 405/247-2448 – Fax: 405/247-8905

NAGPRA ext. 1180
Section 106 ext. 1181
Museum ext. 1181
Library ext. 1196
Clerk ext. 1182

January 11, 2013

RE: Hoosier Energy Rural Electric Cooperative, Inc.
Headquarters Facility Project
Bloomington, Monroe County, Indiana

Dear Mr. Mark S. Plank,

Thank you for consulting with the Delaware Nation. We appreciate your willingness to conduct proper consultation with our nation. We received your letter regarding the Hoosier Energy Rural Electric Cooperative, Inc. However, this project does not lie within the Delaware Nation area of interest for the state of Oklahoma. Therefore, we will not be a consulting party.

Should you have any questions regarding this email or future consultation feel free to contact our offices at 405-247-2448 or by email tfrancis@delawarenation.com.

Sincerely,

Tamara Francis Fourkiller
Cultural Preservation Director

CC: Nikki Ahtone (Assistant Director) to Tamara Fourkiller Director of Cultural Preservation at Delaware Nation.

APPENDIX B - NATURAL RESOURCE ASSESSMENT

NATURAL RESOURCE ASSESSMENT

Mill Creek Property
Bloomington
Monroe County, Indiana

Prepared For:
Alt & Witzig Engineering , Inc.
4105 W. 99th Street
Carmel, Indiana 46032

May 2012

Williams Creek Consulting, Inc.
Corporate Office
919 North East Street
Indianapolis, Indiana 46202

Satellite Offices:
Columbus, Ohio
St. Louis, Missouri

1-877-668-8848
info@williamscreek.net

TABLE OF CONTENTS

FIGURES

APPENDICES

Executive Summary

Williams Creek Consulting, Inc. (WCC) performed a natural resource assessment (NRA) and wetland delineation of the Mill Creek Property located northeast of the intersection of State Route 37 and Tapp Road, Bloomington, Monroe County, Indiana (SITE) on May 15, 2012.

The following conclusions were reached by WCC based on review of available, and reasonably ascertainable federal, state, and local resources, and a SITE inspection conducted on the dates referenced above.

- No wetlands were identified within the SITE boundary.
- One (1) drainage Feature (Drainage Feature 1) was identified in the southwestern portion of the SITE. Drainage Feature 1 was not observed to have a direct hydrological connection to a "waters of the U.S." and therefore is not likely to be regulated by the U.S. Army Corps of Engineers (USACE) and Indiana Department of Environmental Management (IDEM).
- Two (2) unnamed tributaries to Clear Creek (Tributaries 1 and 2) were observed in the eastern portion of the SITE. Tributaries 1 and 2 exhibited an ordinary high water mark (OHWM) and appeared to have a direct hydrological connection to Clear Creek. Therefore, Tributaries 1 and 2 are anticipated to be considered jurisdictional "waters of the U.S." by the USACE and IDEM.
- Tributaries 1 and 2 do not appear to drain more than one (1) square mile each and therefore are not anticipated to be regulated by the Indiana Department of Natural Resources Division of Water.
- WCC requested information regarding the presence of endangered, threatened, and rare species near the site from the U.S. Fish and Wildlife Service (USFWS) and Indiana Department of Natural Resources (IDNR). At the time of this report, responses had not yet been received from these agencies. These responses will be provided upon receipt.
- Coordination with the Monroe County Drainage Board did not indicate the presence of County regulated drains located within the SITE boundary.
- A Rule 5 Stormwater Run-off Permit is required for land disturbance activities greater than one (1) acre.

A Regional General Permit (RGP) and Water Quality Certification (WQC) will likely be required for impacts to Tributaries 1 and 2 if proposed cumulative impacts are over 0.1 acre and below 1.0 acre or up to 150 linear feet (lf) of stream. If anticipated impacts are 1.0 acre or greater or exceed 150 lf of stream, then an Individual Permit (IP) may be necessary. Mitigation for impacts is required at a 1:1 ratio for drainage features and open water, 4:1 for forested wetlands, 3:1 for scrub/shrub wetlands, and 2:1 for emergent wetlands if verified as a USACE jurisdictional "waters of the U.S."

If development activities are proposed to impact any of these areas, WCC recommends that the final report and associated figures be submitted to the USACE for Jurisdictional Determination (JD).

1.0 INTRODUCTION

The purpose of this investigation was to conduct an NRA and wetland delineation of the SITE to evaluate potential land development permitting requirements regarding natural resources. In this report, WCC provides a detailed description of the information reviewed and collected as part of the scope of work for this project. WCC summarizes the jurisdictional framework applicable to this project, provides a desktop review of relevant and publicly available documents, and details information collected during the SITE reconnaissance including a wetlands determination, an evaluation of the potential presence of other natural resources within the SITE boundary. The Conclusions section summarizes WCC's findings, addresses potential concern areas and permitting, regulatory, and other relevant issues.

The SITE is located in the Bloomington, Indiana, United States Geological Survey (USGS) 7.5-Minute Quadrangle Map in Section 7, Township 8 North, and Range 1 West. The SITE is more specifically located northeast of the intersection of State Route 37 and Tapp Road, Bloomington, Monroe County, Indiana (Figure 1).

2.0 JURISDICTIONAL RESOURCES

2.1 U.S. Army Corps of Engineers

Through the Clean Water Act (CWA) of 1972, Section 404, the USACE maintains authority over "waters of the U.S." as defined in the Code of Federal Regulations (33 CFR 328.3). The limit of jurisdiction described in 33 CFR 328.4 for non-tidal waters is the "ordinary high water mark" if no adjacent wetlands are present. If wetlands are present, the limit of jurisdiction applies to the boundary of the adjacent wetland. Any wetland that has a hydrological connection to a "waters of the U.S." is also included. Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403) also serves as a base of federal authority over certain waters. Definitions and permitting requirements for jurisdictional waters under Section 10 can be found in 33 CFR Parts 322 and 329.

A Section 404 permit must be obtained from the USACE before any fill or dredging activities are conducted within the boundary of a "waters of the U.S." including federal jurisdictional wetlands. The USACE uses three (3) types of permits: nationwide permits, regional general permits for Indiana, and individual permits. Furthermore, a Section 401 WQC must be filed with the IDEM concurrently with the Section 404 permit(s). Each permit is discussed in the following paragraphs.

Nationwide Permits have been developed for projects that meet a specific criterion and are deemed to have minimal impacts to the aquatic environment. There are 44 Nationwide Permits created to streamline the permit process for smaller, repetitive, low impact projects including, but not limited to Aids to Navigation, Fish and Wildlife Harvesting, Outfall Structures and Maintenance, Utility Line Activities, Stream and Wetland Restoration, Maintenance Dredging of Existing Basins, Agriculture Activities, and Mining Activities.

Regional General Permits (RGP) for Indiana authorize proposed impacts associated with any construction activities including agriculture and mining activities. Wetland impacts must be less than one (1) acre to qualify for this type of permit.

RGP Notification to IDEM may be used for impacts that are less than 0.1 acre of wetland or 300 linear feet of stream, and are deemed to have minimal impacts to the aquatic environment.

Individual Permits (IP) are required for proposed wetland impacts of one (1) acre and greater. The review process for this type of permit may take up to one (1) year due to the higher level of scrutiny by the regulatory agencies.

The Louisville District of the USACE developed new mitigation guidelines in September 2004 for the federal jurisdictional wetlands and "waters of the U.S." The guidelines require stream and wetland characterizations for all drainage features and wetlands proposed to be impacted. The document required for permitting must contain extensive detail of the proposed impact sites, the proposed mitigation sites, and information regarding the construction and monitoring of the mitigation sites.

Impacts to USACE jurisdictional wetlands or other "waters of the U.S." will require in-kind mitigation. The USACE and the IDEM prefer the mitigation to be on-site, but may allow off-site mitigation in some cases due to certain constraints of a property. The mitigation ratios for impacts to federally jurisdictional wetlands and other "waters of the U.S." are as follows:

Impact Type	Replacement
Emergent Wetland	2:1 Acres
Scrub-Shrub Wetland	3:1 Acres
Forested Wetland	4:1 Acres
Stream/Drainage Ways	1:1 Linear feet
Open Water	1:1 Acres

2.1.1 Waters of the U.S.

A "waters of the U.S." can be described as any waterway that appears to have a "clear, natural line impressed on the bank"[1] that is caused by variations in water levels over a period of time. The USACE is the final authority on the determination of whether a waterway qualifies for jurisdiction under the Clean Water Act, but jurisdictional "waters of the U.S." can include ephemeral streams and drainage ditches, as well as large rivers. Several indicators that may be considered in determining an ordinary high water mark include, but are not limited to, changes in soil character, destruction of terrestrial vegetation, historical or recorded data, presence of litter and/or debris, scour, and water staining.

2.1.2 Wetlands

Wetlands offer a variety of functions and values that may include, but are not limited to, groundwater recharge/discharge, flood flow alteration, sediment/toxicant retention, and fish and wildlife habitat. Because of the perceived functions and values of wetlands, the USACE developed the Wetlands Delineation Manual, (*1987 Manual*)[2] to identify wetlands.

Wetlands are defined in the *1987 Manual* as, "Those areas that are inundated or saturated by

[1] U.S. Army Corps of Engineers, *Regulatory Guidance Letter*, No. 05-05, date 7-12-05
[2] U.S. Army Corps of Engineers, Wetlands Delineation Manual, (*1987 Manual*).

surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."[2] The *1987 Manual* outlines the protocol for distinguishing wetland areas from "upland" areas. Wetland areas are delineated according to three (3) primary criteria: vegetation, soil, and hydrology. An area is determined to qualify as a wetland if it meets the following "general diagnostic environmental characteristics:"

- Hydrophytic vegetation
- Hydrology
- Hydric Soil

Hydrophytic Vegetation

The 1987 Manual defines hydrophytic vegetation as, "…the sum total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present…"

The USFWS and the National Plant List Panel developed the following categories to establish the relative probability of species occurring within the ranges between upland and wetland:

Obligate Wetland Plants (OBL) – Probability of >99% occurrence in wetlands with a 1% probability of occurrence in upland areas.

Facultative Wetland Plants (FACW) – Probability of 67% - 99% occurrence in wetlands with a 1% - 33% probability of occurrence in upland areas.

Facultative Plants (FAC) - Probability of 34% - 66% occurrence in either wetlands or upland areas.

Facultative Upland Plants (FACU) - Probability of 67% - 99% occurrence in upland areas with a 1% - 33% probability of occurrence in wetland areas.

Obligate Upland Plants (UPL) - Probability of >99% occurrence in upland areas with a 1% probability of occurrence in wetland areas.

The hydrophytic vegetation criterion is met if greater than 50% of dominant species are FAC, FACW, or OBL.

Hydrology

Areas which are inundated or saturated to the surface for a significant time during the growing season will typically exhibit characteristics of wetland hydrology. Careful examination of the site conditions is needed to adequately identify wetland areas. The anaerobic and reducing conditions in inundated or saturated soils influence the plant community and may favor a dominance of hydrophytic species. It should be noted that the *1987 Manual* further defines the growing season and methodology for determining evidence of hydrology.

There are two (2) types of hydrologic indicators: primary and secondary. Primary indicators of hydrology are discussed in the *1987 Manual* and include, but are not limited to, inundation, and saturation within the upper 12 inches of soil, water marks, drift lines, sediment deposits, and drainage patterns. Secondary indicators may include, but are not limited to, oxidized root channels, water stained leaves, local soil survey data, FAC-Neutral test, etc. One (1) primary or two (2) secondary indicators are required to meet this criterion.

Hydric Soil

"A hydric soil is formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part." [3] All organic soils (except Folists) are considered hydric, while mineral soils must be carefully examined to qualify as hydric. There are several indicators that suggest a soil is hydric. An inspection of the soil profile to a minimum depth of 16 inches below ground surface is required in order to make this determination. The soil data used is the horizon of soil immediately below the A-horizon, or at 10 inches below the soil surface. Hydric soils may be present in an upland position; however, there may be insufficient evidence of hydrology or vegetation for the area to qualify as wetland.

2.1.3 Regional Supplement Manuals

A series of regional supplements[4] to the 1987 manual are developed by the Army Engineer Research and Development Center (ERDC) to be more specific to regionally geographical conditions. Each supplement manual is developed to account for regional differences in climate, geology, soils, hydrology, plant and animal communities, etc. The intent of the regional supplements is to update the 1987 Manual with current information and technology rather than change the definition or manner that wetlands were delineated. The procedures for completing a wetland delineation is to use a combination of the 1987 Manual and the correct regional supplement manual.

Sections that replace the 1987 Manual for the Midwest supplement are summarized below:

Item	Replaced Portions of the 1987 Manual	Replacement Guidance
Hydrophitic Vegetation Indicators	Paragraph 35, all subparts, and all reference to specific indicators in Part IV.	Chapter 2
Hydric Soil Indicators	Paragraphs 44 and 45, all subparts, and all references to specific indicators in Park IV.	Chapter 3
Wetland Hydrology Indicators	Paragraph 49(b), all subparts, and all references to specific indicators in Part IV.	Chapter 4
Growing Season Definition	Glossary	Chapter 4, Growing Season; Glossary
Hydrology Standard for Highly	Paragraph 48, including Table	Chapter 5, Wetlands that

[3] USDA-NRCS, HYDRIC SOIL TECH. NOTE 1: Proper use of Hydric Soil Terminology,

[4] U. S. Army Corps of Engineers. 2008. *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region,* ed. J. S. Wakeley, R. W. Lichvar, and C. V. Noble. ERDC/EL TR-08-27.Vicksburg, MS: U.S. Army Engineer Research and Development Center

Disturbed or Problematic Wetland Situations	5 and the accompanying User note in the online version of the Manual.	Periodically Lack Indicators of Wetland Hydrology, Procedure item 3(g).

Regional Supplement Manuals will continue to be development and revised electronically with the improvement of technology and procedures.

2.2 United States Fish and Wildlife Service

The Endangered Species Act (ESA) of 1973 intends to conserve the habitats of federally endangered or threatened species and to assist in the recovery of species listed. The USFWS is the regulating authority for this act and works with the states to provide additional conservation measures. The USFWS[5] defines two (2) classifications of protected species, endangered and threatened. An endangered species is an organism that is in danger of extinction throughout all or a significant portion of its range. A threatened species is an organism that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. All species of plants and animals are eligible for listing.

Any activity that may incidentally harm federally threatened or endangered species is prohibited by the ESA. For proposed development areas that contain listed species, private landowners may create a Habitat Conservation Plan to minimize the impact on the listed species. This plan should include the protection of breeding, foraging, and shelter requirements for the listed species. The USFWS may then grant an Incidental Take Permit for the project. In the event that any person knowingly violates any provision of the Act or Permit, the person may be assessed penalties.

Projects that involve federal funding or permitting on a site where endangered or threatened species are known to occur or where significant habitat is present will require an alternatives analysis and extensive documentation of agency coordination.

2.3 Indiana Department of Environmental Management

The IDEM is the State agency that reviews and issues permits regarding isolated wetlands (IAC 13-18). The law recognizes three (3) types of wetlands: Class I, Class II, and Class III. Class I isolated wetlands occur in areas that have been disturbed by human activity/development, have low species diversity or greater than 50% nonnative species, do not provide critical habitat for the support of significant wildlife or aquatic vegetation, or do not possess significant hydrologic function. Class III isolated wetlands are located in areas that are undisturbed or minimally disturbed by human activity/development, are composed of rare or important ecological types, and support more than minimal wildlife or aquatic habitat and hydrologic function. Class II isolated wetlands are those that do not fit the criteria set for either Class I or Class III isolated wetlands.

Exemptions are in place to allow impacts to Class I and Class II wetlands without requiring permitting and mitigation. Class I wetlands qualify for the exemption if the entire wetland does not exceed 0.5 acre. Any Class I wetland exceeding 0.5 acre will require mitigation. Class II wetlands qualify for the exemption if the entire wetland acreage does not exceed 0.25 acre. Any Class II wetland exceeding 0.25 acre will require mitigation. Any proposed impacts to Class III or nonexempt Class I or Class II wetlands will require an isolated wetlands and/or “waters of the

[5] U.S. Fish and Wildlife Service, ESA Basics, 2004

State" permit through IDEM. Such isolated wetland permit applications will be submitted concurrently with any USACE Section 404 jurisdictional wetland permits and IDEM Section 401 WQC if necessary.

According to IAC 13-18, impacts to isolated wetlands will require some form of compensatory mitigation. The law specifically states the amount of mitigation that must be created to offset impacts to isolated wetlands. These mitigation ratios do not apply to USACE jurisdictional wetlands. The mitigation ratios for impacts to state regulated wetlands (isolated) are as follows:

Impact Type	Replacement	On Site Ratio	Off -Site Ratio
Class I	Class I	1.5:1 Acres	1.5:1 Acres
Class I	Class II or III	1:1 Acres	1:1 Acres
Class II	Class II or III	Non-forested	Non-forested
		1.5:1 Acres	2:1 Acres
		Forested	Forested
		2:1 Acres	2.5:1 Acres
Class III	Class III	Non-forested	Non-forested
		2:1 Acres	2.5:1 Acres
		Forested	Forested
		2.5:1 Acres	3:1 Acres

2.4 Indiana Department of Natural Resources

The IDNR Division of Water has authority over the floodways of waterways that have a watershed greater than one (1) square mile. If construction activities are proposed in a regulated floodway then a Construction in a Floodway permit would be required. A watershed analysis would be required to determine the actual drainage for each waterway proposed to be impacted. In addition, trees cleared within a regulated floodway will require compensatory mitigation.

The IDNR Division of Nature Preserves provides a Natural Heritage Datacenter for the documentation of state and federally listed endangered, threatened, and rare species and high quality natural communities. The IDNR serves to identify, protect, and manage significant natural areas and ETR species through coordination with the land owner. Currently over 23,000 acres of dedicated Nature Preserves are located throughout the state. The preservation of natural communities supports species diversity and provides examples of historic conditions for recreational, educational, and scientific opportunities.

2.5 Soil and Water Conservation District

A Rule 5 Stormwater Run-off Permit is required for construction related activities that will disturb one (1) or more acres of land that is not within a designated Municipal Separate Storm Sewer System (MS4) entity or is in a MS4 entity that does not have a stormwater ordinance established. The purpose of Rule 5 is to reduce pollutants, mainly sediment from soil erosion, in stormwater discharges into surface waters of the State for the protection of public health, existing water uses, and aquatic biota.

A Construction Plan, including a Storm Water Pollution Prevention Plan, must be reviewed and approved by the Monroe County Soil and Water Conservation District (SWCD) as part of the Rule 5 permit process. A public notice of the intent to operate under Rule 5 must be submitted in a newspaper of general circulation. A Notice of Intent (NOI) letter must then be submitted to IDEM

including a $100 application fee, proof of the public notice, and the Construction Plan Review Approval Verification Form as received from the SWCD. A Rule 5 Stormwater Run-off Permit will be issued by IDEM if all materials are approved.

2.6 Monroe County Surveyor/Drainage Board

The Monroe County Surveyor has authority over designated regulated drains. Drains could include subdivision drains, field tiles, or open ditches and creeks, within Monroe County. The Monroe County Surveyor would require authorization for any work conducted within the easement of a regulated drain. Any construction affecting a regulated drain, and/or the corresponding easement on either side of the drain must be reviewed and approved by the County Surveyor prior to disturbance.

3.0 DESKTOP REVIEW

WCC reviewed applicable, readily available and accessible historical information for the potential presence of wetlands, "waters of the U.S.", and natural resources. The findings are presented below.

3.1 United States Geological Survey 7.5-Minute Quadrangle Map

A USGS 7.5-Minute Quadrangle map displays contour lines to portray the shape and elevation of the land surface. Quadrangle maps render the three-dimensional changes in elevation of the terrain on a two-dimensional surface. The maps usually portray both manmade and natural topographic features. Although they show lakes, rivers, various surface water drainage trends, vegetation, etc., they typically do not provide the level of detail needed for accurate evaluation of wetlands. However, the existence of these features may suggest the potential presence of wetlands.

The SITE is located in the Bloomington, Indiana USGS 7.5-Minute Quadrangle Map, Section 7, Township 8 North, and Range 1 West. WCC evaluated the topography and concluded that the elevation ranges from approximately 830 feet above mean sea level (AMSL) in the central portion of the SITE to approximately 780 feet AMSL in the southwestern portion of the SITE. No aquatic features are mapped within the SITE boundary (Figure 1).

3.2 National Wetlands Inventory Map

National Wetlands Inventory (NWI) maps were developed to meet a USFWS mandate to map the wetland and deepwater habitats of the U.S. These maps were developed using high altitude aerial photographs and USGS Quadrangle maps as a topographic base. Indicators noted in the photographs which exhibited pre-determined wetland characteristics were identified according to a detailed classification system. The NWI map retains some of the detail of the Quadrangle map; however, it is used primarily for demonstration of wetland areas identified by the agency. The maps are accurate to a scale of 1:24,000. In general, the NWI information requires field verification.

National Wetland Inventory data for the Bloomington USGS Quadrangle map is included as Figure 2, and the associated key is provided as Figure 3. Based upon review of the NWI data, no aquatic features are mapped within the SITE boundary.

3.3 United States Department of Agriculture Soil Survey

WCC reviewed NRCS soils data pertinent to the project SITE from the NRCS Geospatial Data Gateway. This data is presented in Figure 4, projected over aerial photography to depict distinct soil map unit boundaries. Other information contained within the soil survey may be used to further characterize the SITE for wetland characteristics, drainage features, or land use for example.

Three (3) soil units are classified on SITE: Crider silt loam, 2 to 6 percent slopes (CrB); Crider silt loam, 6 to 12 percent slopes (CrC); and Hagerstown silt loam, 12 to 18 percent slopes (HaD). None of the soils mapped on-SITE are included on the NRCS list of soils considered hydric in Monroe County.

3.4 Aerial Photography

Aerial photography provides a visual overview of the SITE and can provide information to assist in identifying land use practices, terrain, drainage, vegetated areas, wetlands, habitats, etc. Certain features, such as variegated soil patterns, may suggest the presence of wetlands.

WCC reviewed 2010 aerial photography of the SITE from the Indiana University Spatial Data Portal website (Figure 5). With the exception of the areas occupied by Grossman Boulevard and Schmaltz Boulevard, the SITE appears to be an entirely forested parcel. No aquatic features are visible within the SITE boundary.

3.5 Flood Insurance Rate Map

The Federal Emergency Management Agency (FEMA) was developed in 1979 to reform disaster relief and recovery, civil defense, and to prepare and mitigate for natural hazards. The Mitigation Division of FEMA manages the National Flood Insurance Program which provides guidance on how to lessen the impact of disasters on communities through flood insurance, floodplain management, and flood hazard mapping. Proper floodplain management has the ability to minimize the extent of flooding and flood damage and improve stormwater quality by reducing stormwater velocities and erosion. The one (1) percent annual chance flood (100 year flood) boundary must be kept free of encroachment as the national standard for the program.

WCC reviewed FEMA Flood Insurance Rate Map (FIRM) data applicable to the SITE, which was retrieved from the Indiana GIS Atlas (Figure 6). The FIRM indicates that the SITE is located entirely outside the flood zone, indicating that the SITE is not likely to be subject to flooding.

3.6 Endangered, Threatened, and Rare Species Evaluation

WCC filed a request with the USFWS and IDNR Division of Nature Preserves for documentation of any federal ETR species on SITE. At the time of this report, responses from these agencies had not yet been received.

4.0 SITE RECONNAISSANCE

4.1 Methodology

WCC conducted a field investigation at the SITE on May 15, 2012. During this investigation, WCC noted the presumed land use of the SITE and surrounding area, as well as evaluated the SITE for the potential presence of wetlands, “waters of the U.S.”, and natural resources using the findings of

the desktop review and field observations. Photographs were taken during the field investigation and are provided in Appendix B.

WCC used the Routine Determination Method (RDM) with an established baseline and transects as described in the *1987 Manual* for typical sites over five (5) acres. WCC recorded data from a number of data points (DP) along the transect as a function of diversity of vegetation, property size, soil types, habitat variability, and other SITE features as deemed appropriate by WCC. Where evidence of a wetland was suspected, three (3) wetland criteria were applied to determine if the area in question was representative of a wetland using the methodology set forth by the USACE. More specifically, WCC visually examined and recorded the dominant vegetation, recorded soil properties such as texture and color using the Munsell Soil Color Chart (Munsell Color Chart), excavated soil pits and evaluated the primary and secondary hydrologic indicators as discussed in Section 2.1.2.

If all three (3) criteria were met, i.e. vegetation, soil properties, and hydrologic indicators, a second DP was established adjacent to the wetland DP in an area outside of the presumed wetland boundary for the purpose of delineating between the wetland and non-wetland areas. Once delineated, WCC continued the RDM to evaluate the remainder of the SITE.

4.2 SITE and Adjacent Property Land Use

The area of the SITE subject to this assessment was approximately 16 acres in size and was observed to be entirely forested, with the exception of the areas of Grossman Boulevard, Schmaltz Boulevard, and a cellular communications tower located in the northern portion of the SITE (Figure 5).

4.3 Wetland Summary

No wetland areas were identified during this investigation based upon methodology set forth in the *1987 Manual* and the *Midwest Regional Supplement*. Information collected at each DP on May 15, 2012 is described in the appropriate sections below. This information is summarized on the forms provided in Appendix C and the DP locations are shown on Figure 7.

DP-1

This DP was located in the southeastern portion of the SITE. The dominant vegetation present was green ash (*Fraxinus pennsylvanica*, FACW); American elm (*Ulmus americana*, FACW); white oak (*Quercus alba*, FACU); eastern redbud (*Cercis canadensis*, FAC-); pawpaw (*Asimina triloba*, FAC); multiflora rose (*Rosa multiflora*, FACU); and Virginia creeper (*Parthenocissus quinquefoli*, FAC-), which met the hydrophytic vegetation criterion for a wetland. No evidence of hydrology was observed that would suggest the potential presence of a wetland. Examination of the soil profile using a Munsell Color Chart revealed a matrix color of 10YR 4/2 to a depth of 2 inches, a color of 10YR 4/4 from 2 to 10 inches and a color of 5YR 5/8 from 10 to 18 inches, which did not meet the hydric soil criterion. Since all three (3) criteria were not met, this area did not qualify as a wetland.

DP-2

This DP was located in the southwestern portion of the SITE. The dominant vegetation present was white oak (FACU); American beech (*Fagus grandifolia*, FACU); sugar maple (*Acer saccharum*, FACU); American elm (FAC); and Virginia creeper (FAC-), which did not meet the hydrophytic vegetation criterion for a wetland. No evidence of hydrology was observed that would suggest the

potential presence of a wetland. Examination of the soil profile using a Munsell Color Chart revealed a matrix color of 10YR 4/2 to a depth of 12 inches and a color of 5YR 5/8 from 12 to 18 inches, which did not meet the hydric soil criterion. Since all three (3) criteria were not met, this area did not qualify as a wetland.

DP-3
This DP was located in the western portion of the SITE. The dominant vegetation present was eastern redbud (FAC-); sugar maple (FACU); poison ivy (*Toxicodendron radicans*, FAC+); and greenbrier (*Smilax glauca*, FACU), which did not meet the hydrophytic vegetation criterion for a wetland. No evidence of hydrology was observed that would suggest the potential presence of a wetland. Examination of the soil profile using a Munsell Color Chart revealed a matrix color of 10YR 4/2 to a depth of 8 inches and a color of 5YR 5/8 from 8 to 18 inches, which did not meet the hydric soil criterion. Since all three (3) criteria were not met, this area did not qualify as a wetland.

DP-4
This DP was located in the eastern portion of the SITE. The dominant vegetation present was green ash (FACW); pawpaw (FAC); sugar maple (FACU); stinging nettle (*Urtica dioica*, FAC+); and eastern woodland sedge (*Carex blanda*, FAC), which met the hydrophytic vegetation criterion for a wetland. No evidence of hydrology was observed that would suggest the potential presence of a wetland. Examination of the soil profile using a Munsell Color Chart revealed a matrix color of 10YR 4/2 to a depth of 9 inches and a color of 5YR 5/8 from 9 to 18 inches, which did not meet the hydric soil criterion. Since all three (3) criteria were not met, this area did not qualify as a wetland.

DP-5
This DP was located in the eastern portion of the SITE. The dominant vegetation present was white oak (FACU); sugar maple (FACU); multiflora rose (FACU); and mayapple (*Podophyllum pelatatum*, FACU), which did not meet the hydrophytic vegetation criterion for a wetland. No evidence of hydrology was observed that would suggest the potential presence of a wetland. Examination of the soil profile using a Munsell Color Chart revealed a matrix color of 10YR 4/2 to a depth of 10 inches and a color of 5YR 5/8 from 10 to 18 inches, which did not meet the hydric soil criterion. Since all three (3) criteria were not met, this area did not qualify as a wetland.

DP-6
This DP was located in the northeastern portion of the SITE. The dominant vegetation present was sugar maple (FACU); white oak (FACU); pawpaw (FAC); poison ivy (FAC+); mayapple (FACU); and greenbrier (*Smilax glauca*, FACU), which did not meet the hydrophytic vegetation criterion for a wetland. No evidence of hydrology was observed that would suggest the potential presence of a wetland. Examination of the soil profile using a Munsell Color Chart revealed a matrix color of 10YR 4/2 to a depth of 3 inches, a color of 10YR 4/4 from 3 to 6 inches, and a color of 5YR 5/8 from 6 to 18 inches, which did not meet the hydric soil criterion. Since all three (3) criteria were not met, this area did not qualify as a wetland.

DP-7
This DP was located in the northeastern portion of the SITE. The dominant vegetation present was sugar maple (FACU); pawpaw (FAC); multiflora rose (FACU); and greenbrier (FACU), which did not meet the hydrophytic vegetation criterion for a wetland. No evidence of hydrology was observed that would suggest the potential presence of a wetland. Examination of the soil profile using a Munsell Color Chart revealed a matrix color of 10YR 4/2 to a depth of 12 inches and a

color of 5YR 5/8 from 12 to 18 inches, which did not meet the hydric soil criterion. Since all three (3) criteria were not met, this area did not qualify as a wetland.

4.5 Drainage Features, Streams, and Other Potential "Waters of the U.S."

One (1) unnamed drainage feature (Drainage Feature 1) and two (2) unnamed tributaries to Clear Creek (Tributaries 1 and 2) were observed on-SITE (Figure 7).

Drainage Feature 1 originates in the southwestern portion of the SITE and was observed to drain off-SITE to the southwest, into the road right of way adjacent to State Route 37 and Tapp Road. Drainage Feature 1 did not appear to have a direct hydrological connection to a "waters of the U.S." and therefore is not likely to be regulated by the USACE and IDEM.

Tributaries 1 and 2 were observed to originate within the SITE boundary in the eastern portion of the SITE (Figure 7) and each exhibited an ordinary high water mark (OHWM). Although both were dry at the time of the SITE inspection, Tributary 1 flows into Tributary 2, which exits the SITE to the east and flows into an unnamed tributary to Clear Creek. Therefore, Tributaries 1 and 2 are likely to be considered jurisdictional "waters of the U.S." by the USACE and IDEM.

Tributaries 1 and 2 do not appear to drain more than one (1) square mile and therefore are not likely to be regulated by the Indiana Department of Natural Resources Division of Water.

5.0 CONCLUSIONS

WCC performed a NRA and wetland delineation at the SITE located in the Bloomington, Indiana USGS 7.5-Minute Quadrangle Map, Section 7, Township 8 North, and Range 1 West on May 15, 2012. The SITE is more specifically located northeast of the intersection of State Route 37 and Tapp Road, Bloomington, Monroe County, Indiana. The SITE was approximately 16 acres in size and was observed to be comprised entirely of forest, with the exception of Grossman Boulevard and Schmaltz Boulevard, at the time of the inspection.

Based on review of publicly available and reasonably ascertainable federal, state, and local resources, and a SITE inspection, no wetlands were identified on SITE. However, one (1) unnamed drainage feature (Drainage Feature 1) and two (2) unnamed tributaries to Clear Creek (Tributaries 1 and 2) were identified within the SITE boundary. Drainage Feature 1 did not appear to have a direct hydrological connection to a "waters of the U.S." and, therefore, is not likely to be regulated by the USACE and IDEM. Tributaries 1 and 2 appeared to have a direct hydrological connection to an unnamed tributary to Clear Creek. Therefore, Tributaries 1 and 2 are likely to be considered jurisdictional "waters of the U.S." by the USACE and IDEM.

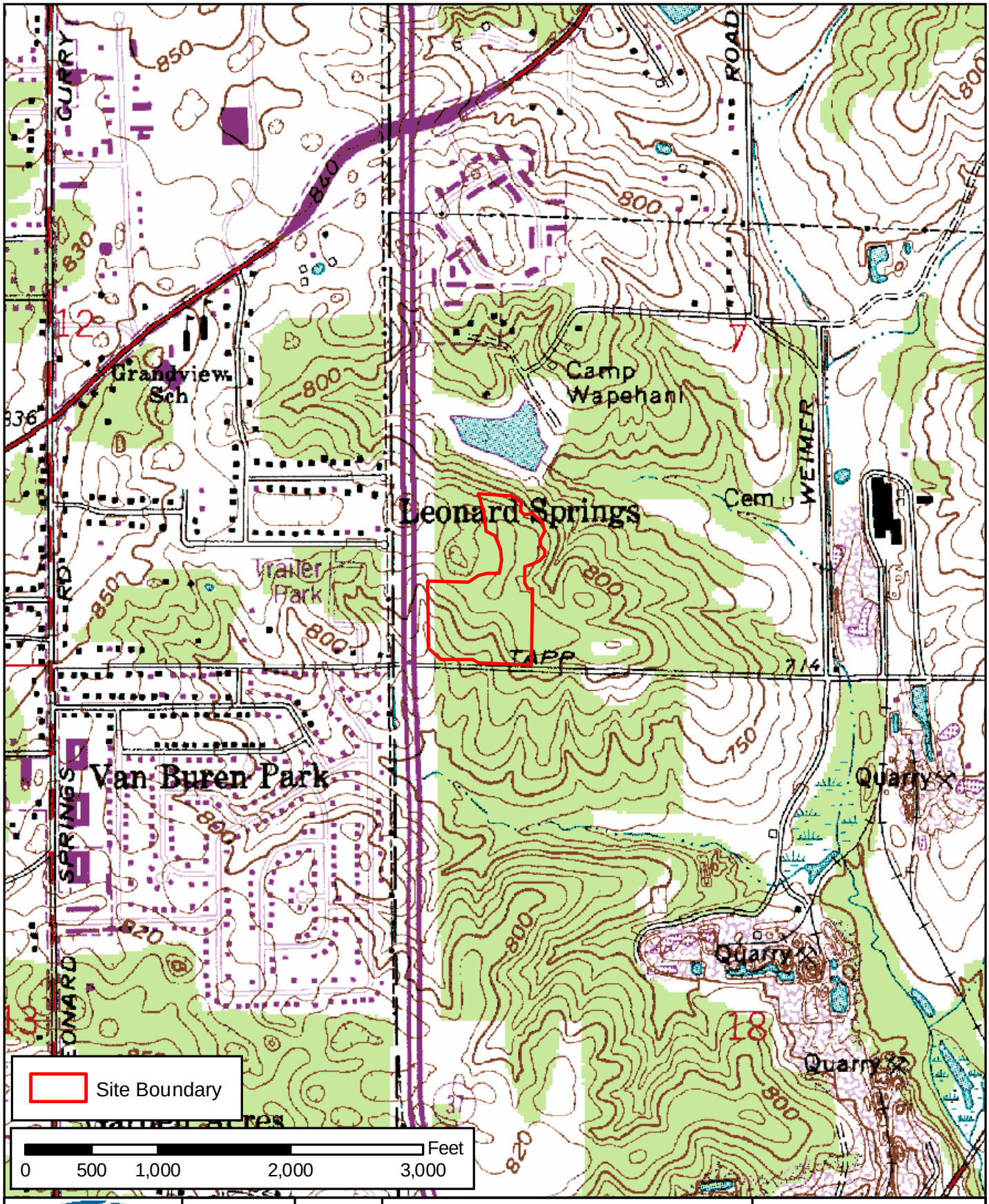
A Regional General Permit (RGP) and Water Quality Certification (WQC) will likely be required for impacts to Tributaries 1 and 2 if proposed cumulative impacts are over 0.1 acre and below 1.0 acre or up to 150 linear feet (lf) of stream. If anticipated impacts are 1.0 acre or greater or exceed 150 lf of stream, then an Individual Permit (IP) may be necessary. Mitigation for impacts is required at a 1:1 ratio for drainage features and open water, 4:1 for forested wetlands, 3:1 for scrub/shrub wetlands, and 2:1 for emergent wetlands if verified as a USACE jurisdictional "waters of the U.S."

Correspondence from the USFWS and IDNR regarding the presence or absence of ETR species on the SITE had not yet been received at the time of this report. This information will be provided upon receipt from the respective agencies.

If proposed development activities will disturb one (1) or more acres of land, then a Rule 5 Stormwater Run-off Permit may be required.

If development activities are proposed to impact any of the aquatic features identified in this report, WCC recommends that the final report, and associated figures be submitted to the USACE for Jurisdictional Determination.

Figures



WILLIAMS CREEK CONSULTING

Babecca Building
919 N. East St.
Indianapolis, IN 46202

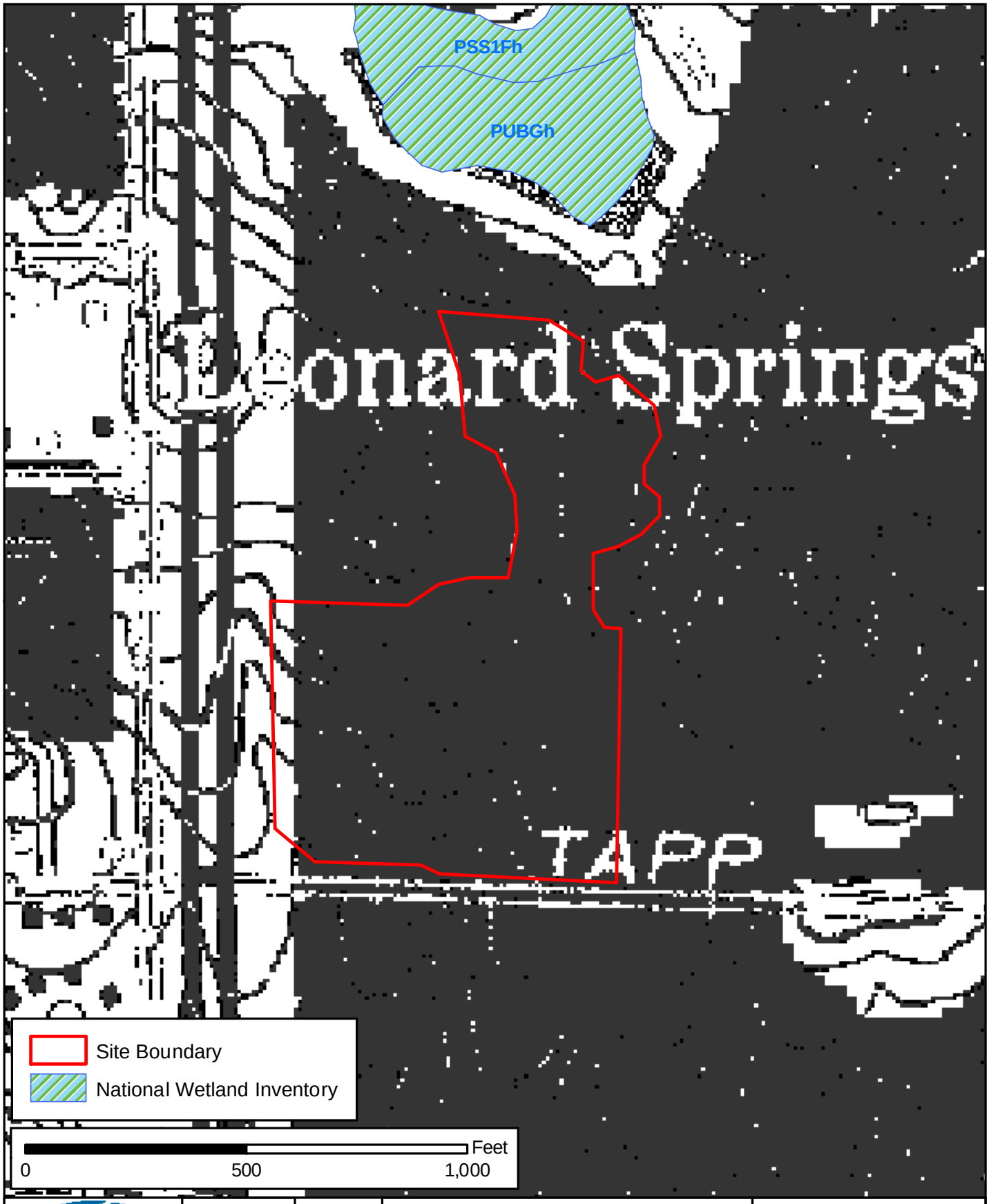
P: 317-423-0690
F: 317-423-0696

N
W E
S

Figure 1
USGS Topographic Map
Bloomington, Indiana Quadrangle
Mill Creek Property
Monroe County, IN

Prepared for:
Alt & Witzig Engineering, Inc.

Date:
May, 2012



WILLIAMS CREEK CONSULTING

Babecca Building
919 N. East St.
Indianapolis, IN 46202

P: 317-423-0690
F: 317-423-0696

N
W E
S

Figure 2
National Wetland Inventory Map
Bloomington, Indiana Quadrangle
Mill Creek Property
Monroe County, IN

Prepared for:
Alt & Witzig
Engineering, Inc.

Date:
May, 2012

SYSTEM

P-PALUSTRINE

CLASS	RB-ROCK BOTTOM	UB-UNCONSOLIDATED BOTTOM	AB-AQUATIC BED	US-UNCONSOLIDATED SHORE	ML-MOSS-LICHEN	EM-EMERGENT	SS-SCRUB-SHRUB	FO-FORESTED	OW-OPEN WATER/ *UNKNOWN BOTTOM*
Subclass	1 Bedrock 2 Rubble 3 Mud 4 Organic	1 Cobble-Gravel 2 Sand	1 Algal 2 Aquatic Moss 3 Rooted Vascular 4 Floating Vascular 5 *Unknown Submergent* 6 *Unknown Surface*	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated	1 Moss 2 Lichen	1 Persistent 2 Nonpersistent	1 Broad-Leaved Deciduous 2 Needle-Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6 *Deciduous* 7 *Evergreen*	1 Broad-Leaved Deciduous 2 Needle –Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6 *Deciduous* 7 *Evergreen*	

MODIFIERS

In order to more adequately describe wetland and deepwater habitats one or more of the water regime, water chemistry, soil, or special modifiers may be applied at the class or lower level in the hierarchy. The farmed modifier may also be applied to the ecological system.

WATER REGIME

Non-Tidal

A Temporarily Flooded
B Saturated
C Seasonally Flooded
D Seasonally Flooded/ *Well Drained*
E *Seasonally Flooded/ Saturated*
F Semipermanently Flooded
G Intermittently Exposed
H Permanently Flooded
J Intermittently Flooded
L Artificially Flooded
W Intermittently Flooded/Temporary
Y Saturated/Semipermanent/ Seasonal
Z Intermittently Exposed/ Permanent
U *Unknown*

Tidal

K *Artificially Flooded*
L Subtidal
M Irregularly Exposed
N Regularly Flooded
P Irregularly Flooded
*S Temporary-Tidal
*R Seasonal-Tidal
*T Semipermanent-Tidal
V Permanent-Tidal
U *Unknown*

*These water regimes are only used in tidally influenced, freshwater systems.

WATER CHEMISTRY

Coastal Halinity

1 Hyperhaline
2 Euhaline
3 Mixohaline *(Brackish)*
4 Polyhaline
5 Mesohaline
6 Oligohaline
0 Fresh

Inland Salinity

7 Hypersaline
8 Eusaline
9 Mixosaline
0 Fresh

pH Modifiers for All Fresh Water

a Acid
t Circumneutral
i Alkaline

SOIL

g Organic
n Mineral

SPECIAL MODIFIERS

b Beaver
d *Partially Drained/Ditched*
f Farmed
h Diked/Impounded
r Artificial Substrate
s Spoil
x Excavated

NOTE: Italicized items were added for mapping by National Wetlands Inventory program.

WILLIAMS CREEK CONSULTING

Babeca Building
919 North East Street
Indianapolis, Indiana 46202
Tel: 317-423-0690
Fax: 317-423-0696

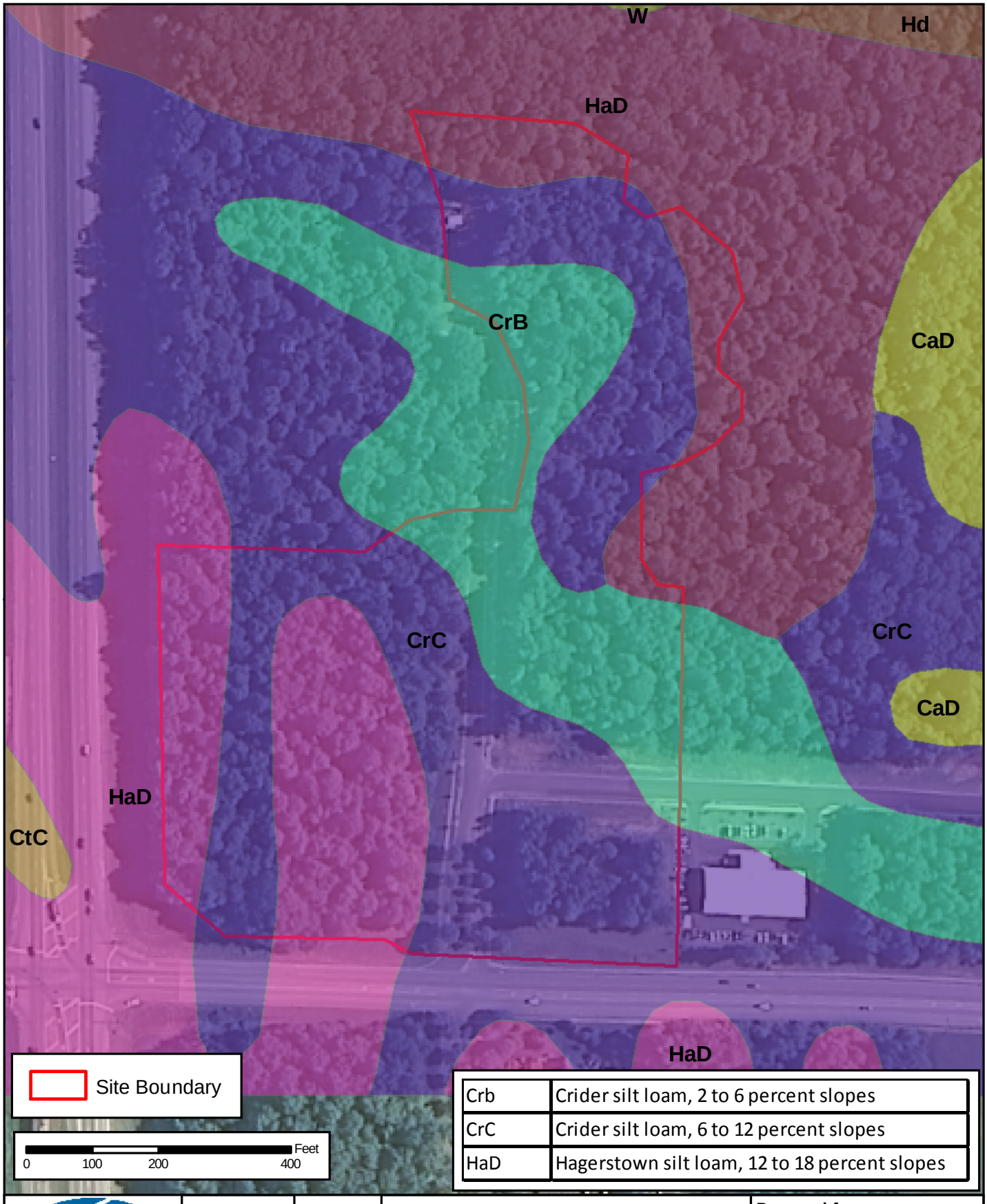
FIGURE 3
KEY TO NATIONAL WETLANDS INVENTORY MAP
Palustrine

Mill Creek Property
Bloomington, Monroe County, Indiana

Prepared for:
Alt & Witzig Engineering, Inc.

Project No.
01.0584.A.2

Date:
May 2012



Crb	Crider silt loam, 2 to 6 percent slopes
CrC	Crider silt loam, 6 to 12 percent slopes
HaD	Hagerstown silt loam, 12 to 18 percent slopes

WILLIAMS CREEK CONSULTING

Babecca Building
919 N. East St.
Indianapolis, IN 46202

P: 317-423-0690
F: 317-423-0696

N
W E
S

Figure 4
NRCS Soil Survey
Mill Creek Property
Monroe County, IN

Prepared for:
Alt & Witzig
Engineering, Inc.

Date:
May, 2012

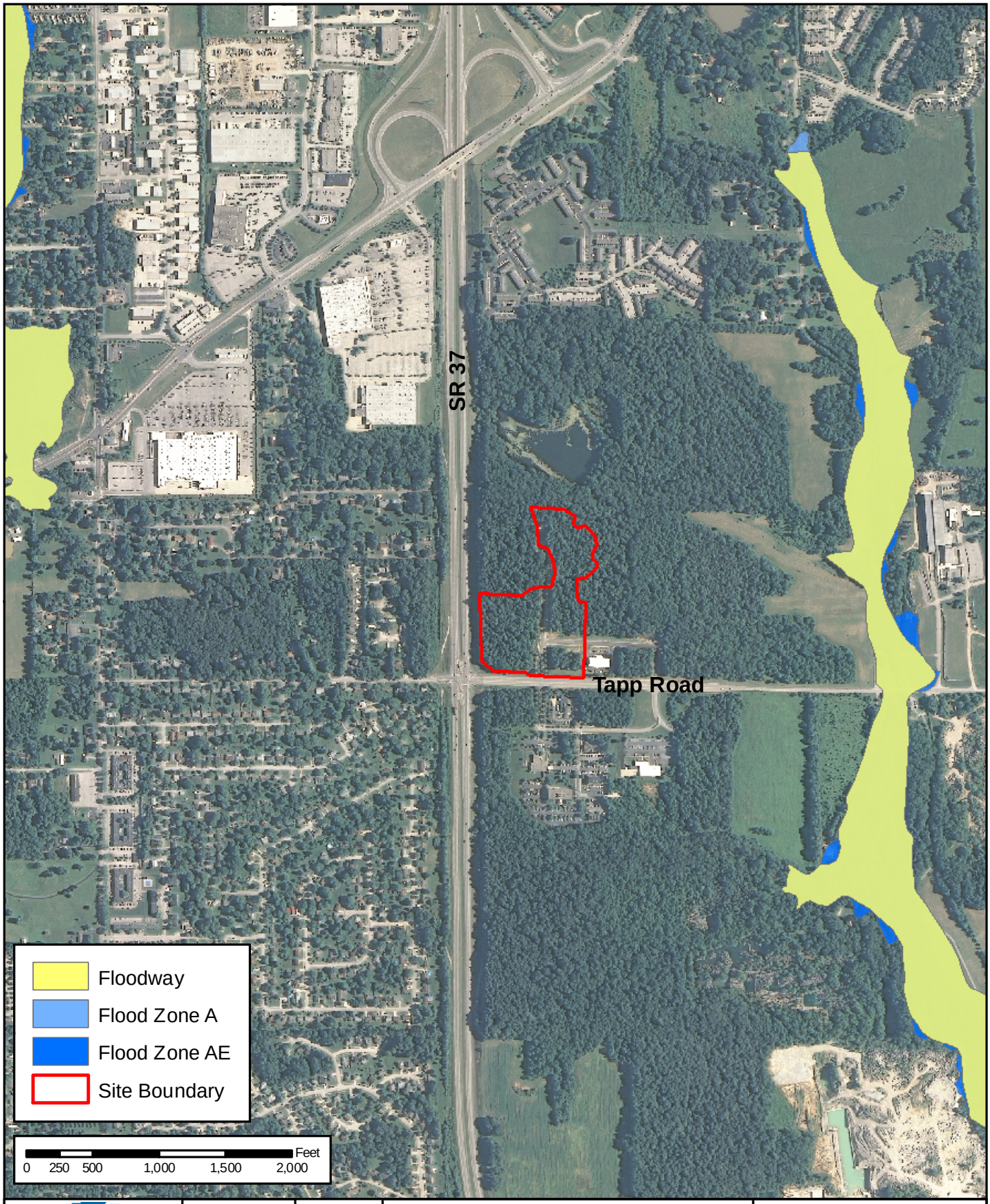
WILLIAMS CREEK CONSULTING
Babecca Building
919 N. East St.
Indianapolis, IN 46202
P: 317-423-0690
F: 317-423-0696

N
W E
S

Figure 5
2010 Aerial Photo
Indiana Spatial Data Portal
Mill Creek Property
Monroe County, IN

Prepared for:
Alt & Witzig Engineering, Inc.

Date:
May, 2012



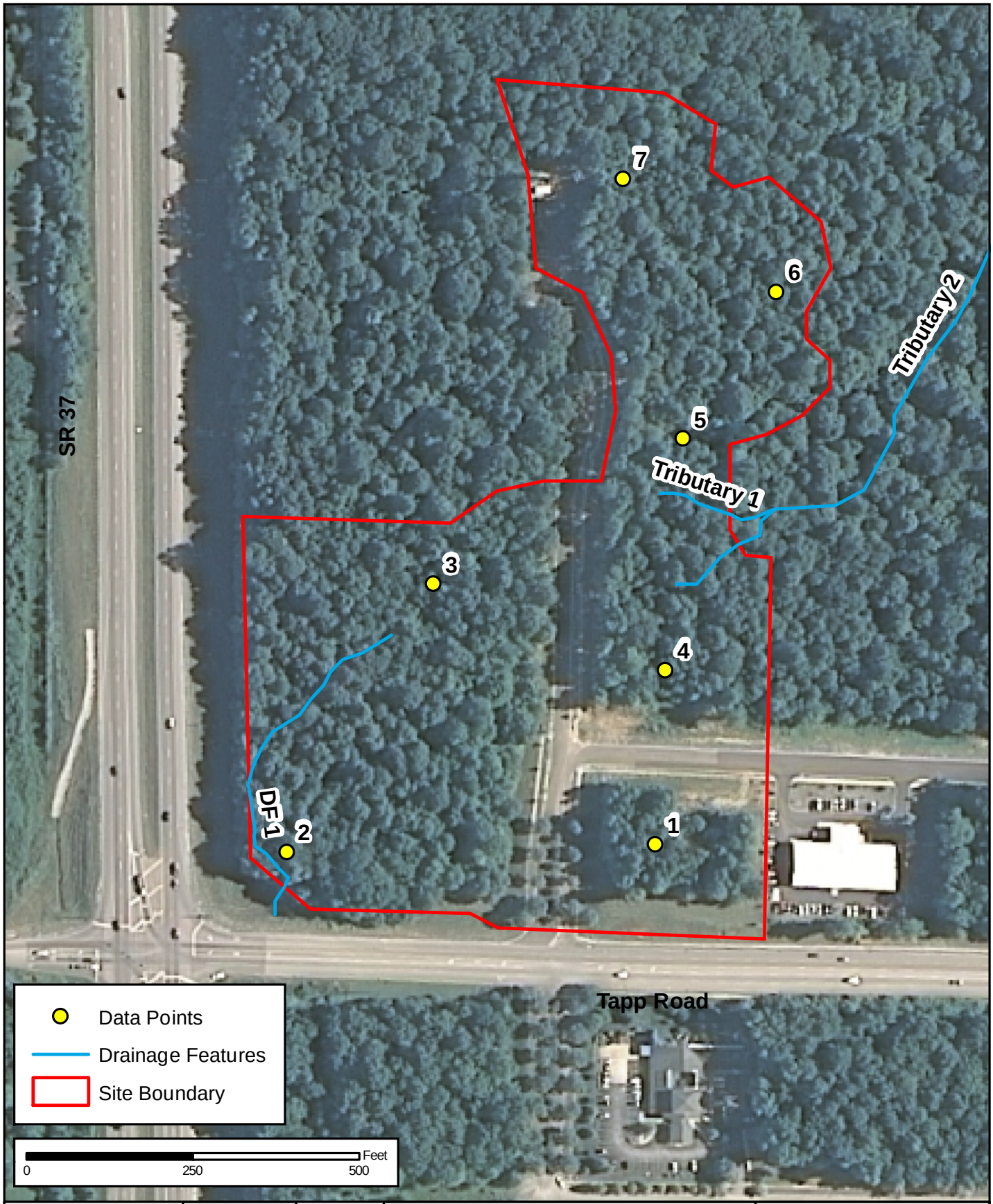
WILLIAMS CREEK CONSULTING
Babecca Building
919 N. East St.
Indianapolis, IN 46202
P: 317-423-0690
F: 317-423-0696

N
W E
S

Figure 6
FEMA Flood Insuarance Rate Map
Indiana GIS Atlas
Mill Creek Property
Monroe County, IN

Prepared for:
Alt & Witzig
Engineering, Inc.

Date:
May, 2012



WILLIAMS CREEK CONSULTING
Babecca Building
919 N. East St.
Indianapolis, IN 46202
P: 317-423-0690
F: 317-423-0696

N
W E
S

Figure 7
Data Point Location Map
Mill Creek Property
Monroe County, IN

Prepared for:
Alt & Witzig Engineering, Inc.

Date:
May, 2012

Appendix A

ETR Species Correspondence & County Species List

Correspondence to be included upon receipt from USFWS and IDNR

Indiana County Endangered, Threatened and Rare Species List

County: Monroe

Species Name	Common Name	FED	STATE	GRANK	SRANK
Diplopoda					
Conotyla bollmani	Bollman's Cave Milliped		WL	G5	S4
Crustacean: Malacostraca					
Caecidotea jordani	Jordan's groundwater isopod		SE	G2G3	S1
Crangonyx packardi	Packard's Cave Amphipod		WL	G4	S4
Orconectes inermis testii	Troglobitic Crayfish		SR	G5T3	S3
Crustacean: Ostracoda					
Sagittocythere barri	Barr's Commensal Cave Ostracod		WL	G5	S3S4
Mollusk: Bivalvia (Mussels)					
Villosa lienosa	Little Spectaclecase		SSC	G5	S3
Mollusk: Gastropoda					
Fontigens cryptica	Hidden Springs Snail		SE	G1	S1
Ellipluran: Collembola					
Pseudosinella collina	Hilly Springtail		SR	GNR	S2?
Pseudosinella fonsa	Fountain Cave Springtail		ST	G3G4	S2
Sinella alata	Springtail		WL	G5	S4
Insect: Coleoptera (Beetles)					
Aleochara lucifuga	Rove beetle		WL	GNR	S4
Nicrophorus americanus	American Burying Beetle	LE	SX	G2G3	SH
Pseudanophthalmus shilohensis mayfieldensis	Monroe cave ground beetle		SE	G1G2T1T2	S1S2
Insect: Lepidoptera (Butterflies & Moths)					
Celastrina nigra	Sooty Azure		ST	G4	S2
Insect: Odonata (Dragonflies & Damselflies)					
Aeshna mutata	Spatterdock Darner		ST	G4	S1S2
Insect: Tricoptera (Caddisflies)					
Agapetus gelbae	An Agapetus Caddisfly		ST	G3	S2
Diplectrona metaqui	A Diplectronan Caddisfly		ST	G4G5	S2
Goera stylata	A Northern Casemaker Caddisfly		SE	G5	S1
Homoplectra doringa	A Homoplectran Caddisfly		SE	G5	S1
Arachnida					
Dolomedes scriptus	Lined Nursery Web Spider			GNR	S1?
Nesticus carteri	Carter's Cave Spider			GNR	S1
Fish					
Amblyopsis spelaea	Northern Cavefish		SE	G4	S1
Amphibian					
Acris crepitans blanchardi	Northern Cricket Frog		SSC	G5	S4
Hemidactylium scutatum	Four-toed Salamander		SE	G5	S2
Rana areolata circulosa	Northern Crawfish Frog		SE	G4T4	S2
Reptile					

Indiana Natural Heritage Data Center
Division of Nature Preserves
Indiana Department of Natural Resources
This data is not the result of comprehensive county surveys.

Fed: LE = Endangered; LT = Threatened; C = candidate; PDL = proposed for delisting

State: SE = state endangered; ST = state threatened; SR = state rare; SSC = state species of special concern; SX = state extirpated; SG = state significant; WL = watch list

GRANK: Global Heritage Rank: G1 = critically imperiled globally; G2 = imperiled globally; G3 = rare or uncommon globally; G4 = widespread and abundant globally but with long term concerns; G5 = widespread and abundant globally; G? = unranked; GX = extinct; Q = uncertain rank; T = taxonomic subunit rank

SRANK: State Heritage Rank: S1 = critically imperiled in state; S2 = imperiled in state; S3 = rare or uncommon in state; G4 = widespread and abundant in state but with long term concern; SG = state significant; SH = historical in state; SX = state extirpated; B = breeding status; S? = unranked; SNR = unranked; SNA = nonbreeding status unranked

Indiana County Endangered, Threatened and Rare Species List

County: Monroe

Species Name	Common Name	FED	STATE	GRANK	SRANK
Clonophis kirtlandii	Kirtland's Snake		SE	G2	S2
Crotalus horridus	Timber Rattlesnake		SE	G4	S2
Opheodrys aestivus	Rough Green Snake		SSC	G5	S3
Terrapene carolina carolina	Eastern Box Turtle		SSC	G5T5	S3
Thamnophis proximus proximus	Western Ribbon Snake		SSC	G5T5	S3
Bird					
Accipiter striatus	Sharp-shinned Hawk	No Status	SSC	G5	S2B
Ardea alba	Great Egret		SSC	G5	S1B
Bartramia longicauda	Upland Sandpiper		SE	G5	S3B
Buteo lineatus	Red-shouldered Hawk		SSC	G5	S3
Buteo platypterus	Broad-winged Hawk	No Status	SSC	G5	S3B
Dendroica cerulea	Cerulean Warbler		SE	G4	S3B
Haliaeetus leucocephalus	Bald Eagle	LT,PDL	SE	G5	S2
Helmitheros vermivorus	Worm-eating Warbler		SSC	G5	S3B
Ixobrychus exilis	Least Bittern		SE	G5	S3B
Mniotilta varia	Black-and-white Warbler		SSC	G5	S1S2B
Wilsonia citrina	Hooded Warbler		SSC	G5	S3B
Mammal					
Lasiurus borealis	Eastern Red Bat		SSC	G5	S4
Lasiurus cinereus	Hoary Bat	No Status	SSC	G5	S4
Lutra canadensis	Northern River Otter		SSC	G5	S2
Lynx rufus	Bobcat	No Status	SSC	G5	S1
Mustela nivalis	Least Weasel		SSC	G5	S2?
Myotis lucifugus	Little Brown Bat		SSC	G5	S4
Myotis septentrionalis	Northern Myotis		SSC	G4	S3
Myotis sodalis	Indiana Bat or Social Myotis	LE	SE	G2	S1
Neotoma magister	Eastern Woodrat		SE	G3G4	S2
Pipistrellus subflavus	Eastern Pipistrelle		SSC	G5	S4
Taxidea taxus	American Badger		SSC	G5	S2
Vascular Plant					
Acalypha deamii	Mercury		SR	G4?	S2
Armoracia aquatica	Lake Cress		SE	G4?	S1
Castanea dentata	American Chestnut		WL	G4	S3
Catalpa speciosa	Northern Catalpa		SR	G4?	S2
Epigaea repens	Trailing Arbutus		WL	G5	S3
Hydrastis canadensis	Golden Seal		WL	G4	S3
Juglans cinerea	Butternut		WL	G4	S3
Linum striatum	Ridged Yellow Flax		WL	G5	S3
Lithospermum incisum	Narrow-leaved Puccoon		SE	G5	S1
Malaxis unifolia	Green Adder's-mouth		SE	G5	S1

Indiana Natural Heritage Data Center
Division of Nature Preserves
Indiana Department of Natural Resources
This data is not the result of comprehensive county surveys.

Fed: LE = Endangered; LT = Threatened; C = candidate; PDL = proposed for delisting

State: SE = state endangered; ST = state threatened; SR = state rare; SSC = state species of special concern; SX = state extirpated; SG = state significant; WL = watch list

GRANK: Global Heritage Rank: G1 = critically imperiled globally; G2 = imperiled globally; G3 = rare or uncommon globally; G4 = widespread and abundant globally but with long term concerns; G5 = widespread and abundant globally; G? = unranked; GX = extinct; Q = uncertain rank; T = taxonomic subunit rank

SRANK: State Heritage Rank: S1 = critically imperiled in state; S2 = imperiled in state; S3 = rare or uncommon in state; G4 = widespread and abundant in state but with long term concern; SG = state significant; SH = historical in state; SX = state extirpated; B = breeding status; S? = unranked; SNR = unranked; SNA = nonbreeding status unranked

Indiana County Endangered, Threatened and Rare Species List

County: Monroe

Species Name	Common Name	FED	STATE	GRANK	SRANK
Oryzopsis racemosa	Black-fruit Mountain-ricegrass		SR	G5	S2
Oxalis illinoensis	Illinois Woodsorrel		WL	G4Q	S2
Panax quinquefolius	American Ginseng		WL	G3G4	S3
Potamogeton pusillus	Slender Pondweed		WL	G5	S2
Rubus centralis	Illinois Blackberry		SE	G2?Q	S1
Zannichellia palustris	Horned Pondweed		SR	G5	S2
Zizia aptera	Golden Alexanders		SR	G5	S2
High Quality Natural Community					
Forest - floodplain mesic	Mesic Floodplain Forest		SG	G3?	S1
Forest - upland dry	Dry Upland Forest		SG	G4	S4
Forest - upland dry-mesic	Dry-mesic Upland Forest		SG	G4	S4
Forest - upland mesic	Mesic Upland Forest		SG	G3?	S3
Primary - cave aquatic	Aquatic Cave		SG	GNR	SNR
Primary - cliff limestone	Limestone Cliff		SG	GU	S1
Other					
Geomorphic - Nonglacial Erosional Feature - Water Fall and Cascade	Water Fall and Cascade			GNR	SNR

Indiana Natural Heritage Data Center
Division of Nature Preserves
Indiana Department of Natural Resources
This data is not the result of comprehensive county surveys.

Fed: LE = Endangered; LT = Threatened; C = candidate; PDL = proposed for delisting

State: SE = state endangered; ST = state threatened; SR = state rare; SSC = state species of special concern; SX = state extirpated; SG = state significant; WL = watch list

GRANK: Global Heritage Rank: G1 = critically imperiled globally; G2 = imperiled globally; G3 = rare or uncommon globally; G4 = widespread and abundant globally but with long term concerns; G5 = widespread and abundant globally; G? = unranked; GX = extinct; Q = uncertain rank; T = taxonomic subunit rank

SRANK: State Heritage Rank: S1 = critically imperiled in state; S2 = imperiled in state; S3 = rare or uncommon in state; G4 = widespread and abundant in state but with long term concern; SG = state significant; SH = historical in state; SX = state extirpated; B = breeding status; S? = unranked; SNR = unranked; SNA = nonbreeding status unranked

Appendix B

SITE Photographs

Photo 1. Tributary 1
Facing west

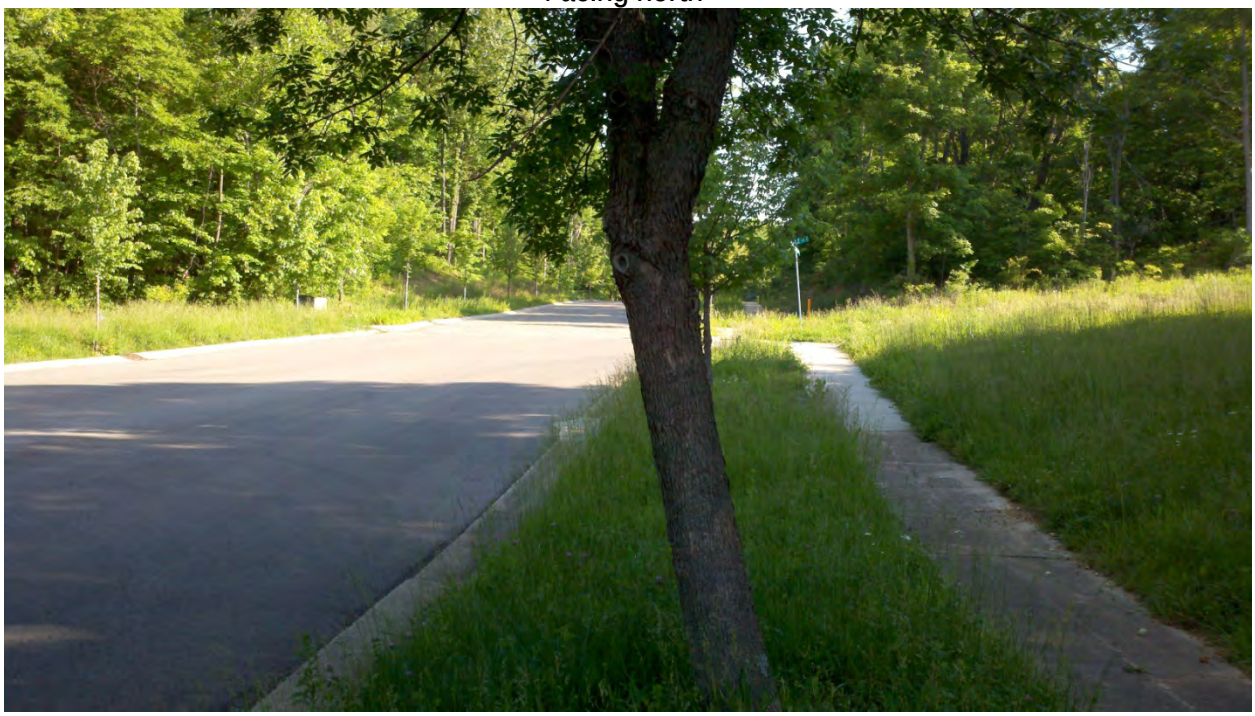
Photo 2. Confluence of Tributaries 1 and 2
Facing east

Photo 3. Drainage Feature 1
Facing south

Photo 4. Typical forested upland
Facing west

Photo 5. Area adjacent to cellular communications tower
Facing south

Photo 6. Area adjacent to Grossman Boulevard
Facing north



Appendix C

Wetland
Data Forms

Site: Mill Creek Property City/County: Bloomington/Monroe Date: 5/15/2012 Data Point: 1

Client: Alt & Witzig State: IN Section, Township, Range: 8N 1W Section 7

Investigator(s): J. Steckel

Slope (%): 0 Nor. 4332171 Eas. 537041 Datum: 16NAD83 NWI Class:

Soil Map Unit Name: Ross silt loam

Climatic/hydrologic conditions typical for time of year? Y/N Y

Vegetation ____, Soil ____ or Hydrology ____ significantly disturbed

Vegetation ____, Soil ____ or Hydrology ____ naturally problematic

Are Normal Circumstances Present? Yes x No ____

SUMMARY OF FINDINGS

Hydrophytic Vegetation Present?	Yes	x	No	
Hydric Soil Present?	Yes		No	x
Wetland Hydrology Present?	Yes		No	x

Is the DP within a Wetland? **Yes** **No** x

Remarks:

VEGETATION

		Absolute % Cover	Dominant Species	Indicator Status	
Tree Stratum	Plot size:				
1.	*Fraxinus pennsylvanica*	20	Y	FACW	2
2.	*Ulmus americana*	15	Y	FACW	2
3.	*Quercus alba*	15	Y	FACU	4
4.	*Cercis canadensis*	15	Y	FAC-	3
5.					
		65	Total Cover		
Shrub Stratum	Plot size:				
1.	*Asimina triloba*	25	Y	FAC	3
2.	*Rosa multiflora*	15	Y	FACU	4
3.					
4.					
5.					
		40	Total Cover		
Herb Stratum	Plot size:				
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
		0	Total Cover		
Woody Vine Stratum	Plot size:				
1.	*Parthenocissus quinquefolia*	5		FAC-	3
2.					
		5	Total Cover		

Remarks:

Dominance Test Worksheet

Number of dominant species that are OBL, FACW, or FAC: 4

Total number of dominant species across all strata: 6

Percent of dominant species that are OBL, FACW, or FAC: 66.67

Prevalence Index Worksheet

Total % cover of:

OBL species	0	x 1	0
FACW species	35	x 2	70
FAC species	45	x 3	135
FACU species	30	x 4	120
UPL species	0	x 5	0
Total	110		325

Prevalence Index: 2.95454545

Hydrophytic Vegetation Indicators:

- ____ Rapid Test for Hydrophytic Veg.
- x Dominance Test is >50%
- x Prevalence Index is ≤3.0*
- ____ Morphological Adaptations*
- ____ Problematic Hydrophytic Vegetation*

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetaion Present?

Yes x **No** ____

SOIL

Profile Description: (Describe to depth needed to document the indicator or confirm absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color	%	Color	%	Type*	Loc**	Texture	Remarks
0-2	10YR 4/2	100					silt loam	
2-10	10YR 4/4	100					silt loam	
10-18	5YR 5/8	100					clay loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Coated Sand grains **Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:				**Indicators for Problematic Soils**	
	Histosol (A1)		Sandy Gleyed Matrix (S4)		Coast Prairie Redox (A16)
	Histic Epipedon (A2)		Sandy Redox (S5)		Iron-Manganese Masses (F12)
	Black Histic (A3)		Stripped Matrix (S6)		Other
	Hydrogen Sulfide (A4)		Loamy Mucky Mineral (F1)		
	Stratified Layers (A5)		Loamy Gleyed Matrix (F2)		
	2 cm Muck (A10)		Depleted Matrix (F3)		
	Depleted Below Dark Surface (A11)		Redox Dark Surface (F6)		
	Thick Dark Surface (A12)		Depleted Dark Surface (F7)		
	Sandy Mucky Mineral (S1)		Redox Depressions (F8)		
	5cm Mucky Peat or Peat				

Restrictive Layer (if observed)

Type:

Depth (inches):

Remarks:

Hydric Soil Present? **Yes** ____ **No** x

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (check all that apply)				Secondary Indicators	
	Surface Water (A1)		Water Stained Leaves (B9)		Surface Soil Cracks (B6)
	High Water Table (A2)		Aquatic Fauna (B13)		Drainage Patterns (B10)
	Saturation (A3)		True Aquatic Plants (B14)		Dry-Season Water Table (C2)
	Water Marks (B1)		Hydrogen Sulfide Odor (C1)		Crayfish Burrows (C8)
	Sediment Deposits (B2)		Oxidized Rhizospheres on Living		Saturation Visible on Aerial Imagery (C9)
	Drift Deposits (B3)		Roots (C3)		Stunted or Stressed Plants (D1)
	Algal Mat or Crust (B4)		Presence of Reduced Iron (C4)		Geomorphic Position (D2)
	Iron Deposits (B5)		Recent Iron Reduction in Tilled		FAC-Neutral Test (D5)
	Inundation Visible on Aerial		Soil (C6)		
	Imagery (B7)		Thin Muck Surface (C7)		
	Sparsely Vegetated Concave		Guage or Well Data (D9)		
	Surface (B8)		Other		

Field Observations:

Surface Water Present? Yes ____ No x Depth (inches) ____

Water Table Present? Yes ____ No x Depth (inches) ____

Saturation Present? Yes ____ No x Depth (inches) ____

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Site: Mill Creek Property City/County: Bloomington/Monroe Date: 5/15/2012 Data Point: 2

Client: Alt & Witzig State: IN Section, Township, Range: 8N 1W Section 7

Investigator(s): J. Steckel

Slope (%): 0 Nor. 4332171 Eas. 537041 Datum: 16NAD83 NWI Class:

Soil Map Unit Name: Ross silt loam

Climatic/hydrologic conditions typical for time of year? Y/N Y

Vegetation ____, Soil ____ or Hydrology ____ significantly disturbed

Vegetation ____, Soil ____ or Hydrology ____ naturally problematic

Are Normal Circumstances Present? Yes x No ____

SUMMARY OF FINDINGS

Hydrophytic Vegetation Present? Yes ____ No x

Hydric Soil Present? Yes ____ No x **Is the DP within a Wetland?**

Wetland Hydrology Present? Yes ____ No x **Yes** **No** x

Remarks:

VEGETATION

		Absolute % Cover	Dominant Species	Indicator Status	
Tree Stratum	Plot size:				
1.	*Quercus alba*	25	Y	FACU	4
2.	*Fagus grandifolia*	20	Y	FACU	4
3.	*Acer saccharum*	25	Y	FACU	4
4.	*Ulmus americana*	20	Y	FACW	2
5.					
		90	Total Cover		
Shrub Stratum	Plot size:				
1.	*Asimina triloba*	30	Y	FAC	3
2.					
3.					
4.					
5.					
		30	Total Cover		
Herb Stratum	Plot size:				
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
		0	Total Cover		
Woody Vine Stratum	Plot size:				
1.	*Parthenocissus quinquefolia*	10	Y	FAC-	3
2.					
		10	Total Cover		

Remarks:

Dominance Test Worksheet

Number of dominant species that are OBL, FACW, or FAC: 3

Total number of dominant species across all strata: 6

Percent of dominant species that are OBL, FACW, or FAC: 50.00

Prevalence Index Worksheet

Total % cover of:

OBL species	0	x 1	0
FACW species	20	x 2	40
FAC species	40	x 3	120
FACU species	70	x 4	280
UPL species	0	x 5	0
Total	130		440

Prevalence Index: 3.38461538

Hydrophytic Vegetation Indicators:

____ Rapid Test for Hydrophytic Veg.

____ Dominance Test is >50%

____ Prevalence Index is ≤3.0*

____ Morphological Adaptations*

____ Problematic Hydrophytic Vegetation*

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetaion Present?

Yes ____ **No** x

SOIL

Profile Description: (Describe to depth needed to document the indicator or confirm absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color	%	Color	%	Type*	Loc**	Texture	Remarks
0-12	10YR 4/2	100					silt loam	
12-18	5YR 5/8	100					clay loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Coated Sand grains **Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:				Indicators for Problematic Soils	
	Histosol (A1)		Sandy Gleyed Matrix (S4)		Coast Prairie Redox (A16)
	Histic Epipedon (A2)		Sandy Redox (S5)		Iron-Manganese Masses (F12)
	Black Histic (A3)		Stripped Matrix (S6)		Other
	Hydrogen Sulfide (A4)		Loamy Mucky Mineral (F1)		
	Stratified Layers (A5)		Loamy Gleyed Matrix (F2)		
	2 cm Muck (A10)		Depleted Matrix (F3)		
	Depleted Below Dark Surface (A11)		Redox Dark Surface (F6)		
	Thick Dark Surface (A12)		Depleted Dark Surface (F7)		
	Sandy Mucky Mineral (S1)		Redox Depressions (F8)		
	5cm Mucky Peat or Peat				

Restrictive Layer (if observed)

Type:

Depth (inches):

Remarks:

Hydric Soil Present? **Yes** ____ **No** x

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (check all that apply)				Secondary Indicators	
	Surface Water (A1)		Water Stained Leaves (B9)		Surface Soil Cracks (B6)
	High Water Table (A2)		Aquatic Fauna (B13)		Drainage Patterns (B10)
	Saturation (A3)		True Aquatic Plants (B14)		Dry-Season Water Table (C2)
	Water Marks (B1)		Hydrogen Sulfide Odor (C1)		Crayfish Burrows (C8)
	Sediment Deposits (B2)		Oxidized Rhizospheres on Living		Saturation Visible on Aerial Imagery (C9)
	Drift Deposits (B3)		Roots (C3)		Stunted or Stressed Plants (D1)
	Algal Mat or Crust (B4)		Presence of Reduced Iron (C4)		Geomorphic Position (D2)
	Iron Deposits (B5)		Recent Iron Reduction in Tilled		FAC-Neutral Test (D5)
	Inundation Visible on Aerial		Soil (C6)		
	Imagery (B7)		Thin Muck Surface (C7)		
	Sparsely Vegetated Concave		Guage or Well Data (D9)		
	Surface (B8)		Other		

Field Observations:

Surface Water Present? Yes ____ No x Depth (inches) ____

Water Table Present? Yes ____ No x Depth (inches) ____

Saturation Present? Yes ____ No x Depth (inches) ____

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Site: Mill Creek Property City/County: Bloomington/Monroe Date: 5/15/2012 Data Point: 3

Client: Alt & Witzig State: IN Section, Township, Range: 8N 1W Section 7

Investigator(s): J. Steckel

Slope (%): 0 Nor. 4332171 Eas. 537041 Datum: 16NAD83 NWI Class:

Soil Map Unit Name: Ross silt loam

Climatic/hydrologic conditions typical for time of year? Y/N Y

Vegetation ____, Soil ____ or Hydrology ____ significantly disturbed

Vegetation ____, Soil ____ or Hydrology ____ naturally problematic

Are Normal Circumstances Present? Yes x No ____

SUMMARY OF FINDINGS

Hydrophytic Vegetation Present? Yes ____ No x

Hydric Soil Present? Yes ____ No x **Is the DP within a Wetland?**

Wetland Hydrology Present? Yes ____ No x **Yes** **No** x

Remarks:

VEGETATION

		Absolute % Cover	Dominant Species	Indicator Status	
Tree Stratum	Plot size:				
1.	*Cercis canadensis*	30	Y	FAC-	3
2.	*Acer saccharum*	40	Y	FACU	4
3.	*Aesculus glabra*	15		FAC+	3
4.					
5.					
		85	Total Cover		
Shrub Stratum	Plot size:				
1.					
2.					
3.					
4.					
5.					
		0	Total Cover		
Herb Stratum	Plot size:				
1.	*Toxicodendron radicans*	60	Y	FAC+	3
2.					
3.					
4.					
5.					
6.					
7.					
8.					
		60	Total Cover		
Woody Vine Stratum	Plot size:				
1.	*Smilax glauca*	15	Y	FACU	4
2.					
		15	Total Cover		

Remarks:

Dominance Test Worksheet

Number of dominant species that are OBL, FACW, or FAC: 2

Total number of dominant species across all strata: 4

Percent of dominant species that are OBL, FACW, or FAC: 50.00

Prevalence Index Worksheet

Total % cover of:

OBL species	0	x 1	0
FACW species	0	x 2	0
FAC species	105	x 3	315
FACU species	55	x 4	220
UPL species	0	x 5	0
Total	160		535

Prevalence Index: 3.34375

Hydrophytic Vegetation Indicators:

____ Rapid Test for Hydrophytic Veg.

____ Dominance Test is >50%

____ Prevalence Index is ≤3.0*

____ Morphological Adaptations*

____ Problematic Hydrophytic Vegetation*

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetaion Present?

Yes ____ **No** x

SOIL

Profile Description: (Describe to depth needed to document the indicator or confirm absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color	%	Color	%	Type*	Loc**	Texture	Remarks
0-8	10YR 4/2	100					silt loam	
8-18	5YR 5/8	100					clay loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Coated Sand grains **Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:				Indicators for Problematic Soils	
	Histosol (A1)		Sandy Gleyed Matrix (S4)		Coast Prairie Redox (A16)
	Histic Epipedon (A2)		Sandy Redox (S5)		Iron-Manganese Masses (F12)
	Black Histic (A3)		Stripped Matrix (S6)		Other
	Hydrogen Sulfide (A4)		Loamy Mucky Mineral (F1)		
	Stratified Layers (A5)		Loamy Gleyed Matrix (F2)		
	2 cm Muck (A10)		Depleted Matrix (F3)		
	Depleted Below Dark Surface (A11)		Redox Dark Surface (F6)		
	Thick Dark Surface (A12)		Depleted Dark Surface (F7)		
	Sandy Mucky Mineral (S1)		Redox Depressions (F8)		
	5cm Mucky Peat or Peat				

Restrictive Layer (if observed)

Type:

Depth (inches):

Remarks:

Hydric Soil Present? **Yes** ____ **No** x

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (check all that apply)				Secondary Indicators	
	Surface Water (A1)		Water Stained Leaves (B9)		Surface Soil Cracks (B6)
	High Water Table (A2)		Aquatic Fauna (B13)		Drainage Patterns (B10)
	Saturation (A3)		True Aquatic Plants (B14)		Dry-Season Water Table (C2)
	Water Marks (B1)		Hydrogen Sulfide Odor (C1)		Crayfish Burrows (C8)
	Sediment Deposits (B2)		Oxidized Rhizospheres on Living		Saturation Visible on Aerial Imagery (C9)
	Drift Deposits (B3)		Roots (C3)		Stunted or Stressed Plants (D1)
	Algal Mat or Crust (B4)		Presence of Reduced Iron (C4)		Geomorphic Position (D2)
	Iron Deposits (B5)		Recent Iron Reduction in Tilled		FAC-Neutral Test (D5)
	Inundation Visible on Aerial		Soil (C6)		
	Imagery (B7)		Thin Muck Surface (C7)		
	Sparsely Vegetated Concave		Guage or Well Data (D9)		
	Surface (B8)		Other		

Field Observations:

Surface Water Present? Yes ____ No x Depth (inches) ____

Water Table Present? Yes ____ No x Depth (inches) ____

Saturation Present? Yes ____ No x Depth (inches) ____

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Site: Mill Creek Property City/County: Bloomington/Monroe Date: 5/15/2012 Data Point: 4

Client: Alt & Witzig State: IN Section, Township, Range: 8N 1W Section 7

Investigator(s): J. Steckel

Slope (%): 0 Nor. 4332171 Eas. 537041 Datum: 16NAD83 NWI Class:

Soil Map Unit Name: Ross silt loam

Climatic/hydrologic conditions typical for time of year? Y/N Y

Vegetation _____, Soil _____ or Hydrology _____ significantly disturbed

Vegetation _____, Soil _____ or Hydrology _____ naturally problematic

Are Normal Circumstances Present? Yes x No _____

SUMMARY OF FINDINGS

Hydrophytic Vegetation Present?	Yes x	No		
Hydric Soil Present?	Yes	No x	**Is the DP within a Wetland?**	
Wetland Hydrology Present?	Yes	No x	**Yes**	**No** x

Remarks:

VEGETATION

Tree Stratum Plot size:	Absolute % Cover	Dominant Species	Indicator Status	
1. *Fraxinus pennsylvanica*	25	Y	FACW	2
2. *Asimina triloba*	20	Y	FAC	3
3. *Acer saccharum*	45	Y	FACU	4
4.				
5.				
	90	Total Cover		
Shrub Stratum Plot size:				
1.				
2.				
3.				
4.				
5.				
	0	Total Cover		
Herb Stratum Plot size:				
1. *Urtica dioica*	60	Y	FAC+	3
2. *Carex blanda*	15	Y	FAC	3
3.				
4.				
5.				
6.				
7.				
8.				
	75	Total Cover		
Woody Vine Stratum Plot size:				
1.				
2.				
	0	Total Cover		

Remarks:

Dominance Test Worksheet

Number of dominant species that are OBL, FACW, or FAC: 4

Total number of dominant species across all strata: 5

Percent of dominant species that are OBL, FACW, or FAC: 80.00

Prevalence Index Worksheet

Total % cover of:

OBL species	0	x 1	0
FACW species	25	x 2	50
FAC species	95	x 3	285
FACU species	45	x 4	180
UPL species	0	x 5	0
Total	165		515

Prevalence Index: 3.12121212

Hydrophytic Vegetation Indicators:

_____ Rapid Test for Hydrophytic Veg.

x Dominance Test is >50%

_____ Prevalence Index is ≤3.0*

_____ Morphological Adaptations*

_____ Problematic Hydrophytic Vegetation*

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetaion Present?

Yes x **No** _____

SOIL

Profile Description: (Describe to depth needed to document the indicator or confirm absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color	%	Color	%	Type*	Loc**	Texture	Remarks
0-9	10YR 4/2	100					silt loam	
9-18	5YR 5/8	100					clay loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Coated Sand grains **Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:				Indicators for Problematic Soils	
	Histosol (A1)		Sandy Gleyed Matrix (S4)		Coast Prairie Redox (A16)
	Histic Epipedon (A2)		Sandy Redox (S5)		Iron-Manganese Masses (F12)
	Black Histic (A3)		Stripped Matrix (S6)		Other
	Hydrogen Sulfide (A4)		Loamy Mucky Mineral (F1)		
	Stratified Layers (A5)		Loamy Gleyed Matrix (F2)		
	2 cm Muck (A10)		Depleted Matrix (F3)		
	Depleted Below Dark Surface (A11)		Redox Dark Surface (F6)		
	Thick Dark Surface (A12)		Depleted Dark Surface (F7)		
	Sandy Mucky Mineral (S1)		Redox Depressions (F8)		
	5cm Mucky Peat or Peat				

Restrictive Layer (if observed)

Type:

Depth (inches):

Remarks:

Hydric Soil Present? **Yes** ____ **No** x

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (check all that apply)				Secondary Indicators	
	Surface Water (A1)		Water Stained Leaves (B9)		Surface Soil Cracks (B6)
	High Water Table (A2)		Aquatic Fauna (B13)		Drainage Patterns (B10)
	Saturation (A3)		True Aquatic Plants (B14)		Dry-Season Water Table (C2)
	Water Marks (B1)		Hydrogen Sulfide Odor (C1)		Crayfish Burrows (C8)
	Sediment Deposits (B2)		Oxidized Rhizospheres on Living		Saturation Visible on Aerial Imagery (C9)
	Drift Deposits (B3)		Roots (C3)		Stunted or Stressed Plants (D1)
	Algal Mat or Crust (B4)		Presence of Reduced Iron (C4)		Geomorphic Position (D2)
	Iron Deposits (B5)		Recent Iron Reduction in Tilled		FAC-Neutral Test (D5)
	Inundation Visible on Aerial		Soil (C6)		
	Imagery (B7)		Thin Muck Surface (C7)		
	Sparsely Vegetated Concave		Guage or Well Data (D9)		
	Surface (B8)		Other		

Field Observations:

Surface Water Present? Yes ____ No x Depth (inches) ____

Water Table Present? Yes ____ No x Depth (inches) ____

Saturation Present? Yes ____ No x Depth (inches) ____

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Site: Mill Creek Property City/County: Bloomington/Monroe Date: 5/15/2012 Data Point: 5

Client: Alt & Witzig State: IN Section, Township, Range: 8N 1W Section 7

Investigator(s): J. Steckel

Slope (%): 0 Nor. 4332171 Eas. 537041 Datum: 16NAD83 NWI Class:

Soil Map Unit Name: Ross silt loam

Climatic/hydrologic conditions typical for time of year? Y/N Y

Vegetation ____, Soil ____ or Hydrology ____ significantly disturbed

Vegetation ____, Soil ____ or Hydrology ____ naturally problematic

Are Normal Circumstances Present? Yes x No ____

SUMMARY OF FINDINGS

Hydrophytic Vegetation Present?	Yes		No	x
Hydric Soil Present?	Yes		No	x
Wetland Hydrology Present?	Yes		No	x

Is the DP within a Wetland? **Yes** **No** x

Remarks:

VEGETATION

		Absolute % Cover	Dominant Species	Indicator Status	
Tree Stratum	Plot size:				
1.	*Quercus alba*	30	Y	FACU	4
2.	*Ulmus americana*	15		FACW	2
3.	*Asimina triloba*	15		FAC	3
4.	*Acer saccharum*	40	Y	FACU	4
5.					
		100	Total Cover		
Shrub Stratum	Plot size:				
1.	*Rosa multiflora*	30	Y	FACU	4
2.					
3.					
4.					
5.					
		30	Total Cover		
Herb Stratum	Plot size:				
1.	*Podophyllum pelatatum*	30	Y	FACU	4
2.					
3.					
4.					
5.					
6.					
7.					
8.					
		30	Total Cover		
Woody Vine Stratum	Plot size:				
1.					
2.					
		0	Total Cover		

Remarks:

Dominance Test Worksheet

Number of dominant species that are OBL, FACW, or FAC: 0

Total number of dominant species across all strata: 4

Percent of dominant species that are OBL, FACW, or FAC: 0.00

Prevalence Index Worksheet

Total % cover of:

OBL species	0	x	1	0
FACW species	15	x	2	30
FAC species	15	x	3	45
FACU species	130	x	4	520
UPL species	0	x	5	0
Total	160			595

Prevalence Index: 3.71875

Hydrophytic Vegetation Indicators:

____ Rapid Test for Hydrophytic Veg.

____ Dominance Test is >50%

____ Prevalence Index is ≤3.0*

____ Morphological Adaptations*

____ Problematic Hydrophytic Vegetation*

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetaion Present?

Yes ____ **No** x

SOIL

Profile Description: (Describe to depth needed to document the indicator or confirm absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color	%	Color	%	Type*	Loc**	Texture	Remarks
0-10	10YR 4/2	100					silt loam	
10-18	5YR 5/8	100					clay loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Coated Sand grains **Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:				Indicators for Problematic Soils	
	Histosol (A1)		Sandy Gleyed Matrix (S4)		Coast Prairie Redox (A16)
	Histic Epipedon (A2)		Sandy Redox (S5)		Iron-Manganese Masses (F12)
	Black Histic (A3)		Stripped Matrix (S6)		Other
	Hydrogen Sulfide (A4)		Loamy Mucky Mineral (F1)		
	Stratified Layers (A5)		Loamy Gleyed Matrix (F2)		
	2 cm Muck (A10)		Depleted Matrix (F3)		
	Depleted Below Dark Surface (A11)		Redox Dark Surface (F6)		
	Thick Dark Surface (A12)		Depleted Dark Surface (F7)		
	Sandy Mucky Mineral (S1)		Redox Depressions (F8)		
	5cm Mucky Peat or Peat				

Restrictive Layer (if observed)

Type:

Depth (inches):

Remarks:

Hydric Soil Present? **Yes** ____ **No** x

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (check all that apply)				Secondary Indicators	
	Surface Water (A1)		Water Stained Leaves (B9)		Surface Soil Cracks (B6)
	High Water Table (A2)		Aquatic Fauna (B13)		Drainage Patterns (B10)
	Saturation (A3)		True Aquatic Plants (B14)		Dry-Season Water Table (C2)
	Water Marks (B1)		Hydrogen Sulfide Odor (C1)		Crayfish Burrows (C8)
	Sediment Deposits (B2)		Oxidized Rhizospheres on Living		Saturation Visible on Aerial Imagery (C9)
	Drift Deposits (B3)		Roots (C3)		Stunted or Stressed Plants (D1)
	Algal Mat or Crust (B4)		Presence of Reduced Iron (C4)		Geomorphic Position (D2)
	Iron Deposits (B5)		Recent Iron Reduction in Tilled		FAC-Neutral Test (D5)
	Inundation Visible on Aerial		Soil (C6)		
	Imagery (B7)		Thin Muck Surface (C7)		
	Sparsely Vegetated Concave		Guage or Well Data (D9)		
	Surface (B8)		Other		

Field Observations:

Surface Water Present? Yes ____ No x Depth (inches) ____

Water Table Present? Yes ____ No x Depth (inches) ____

Saturation Present? Yes ____ No x Depth (inches) ____

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Site: Mill Creek Property City/County: Bloomington/Monroe Date: 5/15/2012 Data Point: 6

Client: Alt & Witzig State: IN Section, Township, Range: 8N 1W Section 7

Investigator(s): J. Steckel

Slope (%): 0 Nor. 4332171 Eas. 537041 Datum: 16NAD83 NWI Class:

Soil Map Unit Name: Ross silt loam

Climatic/hydrologic conditions typical for time of year? Y/N Y

Vegetation ____, Soil ____ or Hydrology ____ significantly disturbed

Vegetation ____, Soil ____ or Hydrology ____ naturally problematic

Are Normal Circumstances Present? Yes x No ____

SUMMARY OF FINDINGS

Hydrophytic Vegetation Present?	Yes		No	x
Hydric Soil Present?	Yes		No	x
Wetland Hydrology Present?	Yes		No	x

Is the DP within a Wetland? **Yes** **No** x

Remarks:

VEGETATION

		Absolute % Cover	Dominant Species	Indicator Status	
Tree Stratum	Plot size:				
1.	*Acer saccharum*	40	Y	FACU	4
2.	*Fagus grandifolia*	10		FACU	4
3.	*Quercus alba*	25	Y	FACU	4
4.					
5.					
		75	Total Cover		
Shrub Stratum	Plot size:				
1.	*Asimina triloba*	35	Y	FAC	3
2.					
3.					
4.					
5.					
		35	Total Cover		
Herb Stratum	Plot size:				
1.	*Toxicodendron radicans*	40	Y	FAC+	3
2.	*Podophyllum pelatatum*	20	Y	FACU	4
3.					
4.					
5.					
6.					
7.					
8.					
		60	Total Cover		
Woody Vine Stratum	Plot size:				
1.	*Smilax glauca*	15	Y	FACU	4
2.					
		15	Total Cover		

Remarks:

Dominance Test Worksheet

Number of dominant species that are OBL, FACW, or FAC: 2

Total number of dominant species across all strata: 6

Percent of dominant species that are OBL, FACW, or FAC: 33.33

Prevalence Index Worksheet

Total % cover of:

OBL species	0	x 1	0
FACW species	0	x 2	0
FAC species	75	x 3	225
FACU species	110	x 4	440
UPL species	0	x 5	0
Total	185		665

Prevalence Index: 3.59459459

Hydrophytic Vegetation Indicators:

____ Rapid Test for Hydrophytic Veg.

____ Dominance Test is >50%

____ Prevalence Index is ≤3.0*

____ Morphological Adaptations*

____ Problematic Hydrophytic Vegetation*

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetaion Present?

Yes ____ **No** x

SOIL

Profile Description: (Describe to depth needed to document the indicator or confirm absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color	%	Color	%	Type*	Loc**	Texture	Remarks
0-3	10YR 4/2	100					silt loam	
3-6	10YR 4/4	100					silt loam	
6-18	5YR 5/8	100					clay loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Coated Sand grains **Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:				**Indicators for Problematic Soils**	
	Histosol (A1)		Sandy Gleyed Matrix (S4)		Coast Prairie Redox (A16)
	Histic Epipedon (A2)		Sandy Redox (S5)		Iron-Manganese Masses (F12)
	Black Histic (A3)		Stripped Matrix (S6)		Other
	Hydrogen Sulfide (A4)		Loamy Mucky Mineral (F1)		
	Stratified Layers (A5)		Loamy Gleyed Matrix (F2)		
	2 cm Muck (A10)		Depleted Matrix (F3)		
	Depleted Below Dark Surface (A11)		Redox Dark Surface (F6)		
	Thick Dark Surface (A12)		Depleted Dark Surface (F7)		
	Sandy Mucky Mineral (S1)		Redox Depressions (F8)		
	5cm Mucky Peat or Peat				

Restrictive Layer (if observed)

Type:

Depth (inches):

Remarks:

Hydric Soil Present? **Yes** ____ **No** x

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (check all that apply)				Secondary Indicators	
	Surface Water (A1)		Water Stained Leaves (B9)		Surface Soil Cracks (B6)
	High Water Table (A2)		Aquatic Fauna (B13)		Drainage Patterns (B10)
	Saturation (A3)		True Aquatic Plants (B14)		Dry-Season Water Table (C2)
	Water Marks (B1)		Hydrogen Sulfide Odor (C1)		Crayfish Burrows (C8)
	Sediment Deposits (B2)		Oxidized Rhizospheres on Living		Saturation Visible on Aerial Imagery (C9)
	Drift Deposits (B3)		Roots (C3)		Stunted or Stressed Plants (D1)
	Algal Mat or Crust (B4)		Presence of Reduced Iron (C4)		Geomorphic Position (D2)
	Iron Deposits (B5)		Recent Iron Reduction in Tilled		FAC-Neutral Test (D5)
	Inundation Visible on Aerial		Soil (C6)		
	Imagery (B7)		Thin Muck Surface (C7)		
	Sparsely Vegetated Concave		Guage or Well Data (D9)		
	Surface (B8)		Other		

Field Observations:

Surface Water Present? Yes ____ No x Depth (inches) ____

Water Table Present? Yes ____ No x Depth (inches) ____

Saturation Present? Yes ____ No x Depth (inches) ____

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Site: Mill Creek Property City/County: Bloomington/Monroe Date: 5/15/2012 Data Point: 7

Client: Alt & Witzig State: IN Section, Township, Range: 8N 1W Section 7

Investigator(s): J. Steckel

Slope (%): 0 Nor. 4332171 Eas. 537041 Datum: 16NAD83 NWI Class:

Soil Map Unit Name: Ross silt loam

Climatic/hydrologic conditions typical for time of year? Y/N Y

Vegetation ____, Soil ____ or Hydrology ____ significantly disturbed

Vegetation ____, Soil ____ or Hydrology ____ naturally problematic

Are Normal Circumstances Present? Yes x No ____

SUMMARY OF FINDINGS

Hydrophytic Vegetation Present?	Yes		No	x
Hydric Soil Present?	Yes		No	x
Wetland Hydrology Present?	Yes		No	x

Is the DP within a Wetland? **Yes** **No**

Remarks:

VEGETATION

		Absolute % Cover	Dominant Species	Indicator Status	
Tree Stratum	Plot size:				
1.	*Acer saccharum*	60	Y	FACU	4
2.	*Ulmus rubra*	10		FAC	3
3.					
4.					
5.					
		70	Total Cover		
Shrub Stratum	Plot size:				
1.	*Asimina triloba*	40	Y	FAC	3
2.	*Rosa multiflora*	25	Y	FACU	4
3.					
4.					
5.					
		65	Total Cover		
Herb Stratum	Plot size:				
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
		0	Total Cover		
Woody Vine Stratum	Plot size:				
1.	*Smilax glauca*	25	Y	FACU	4
2.					
		25	Total Cover		

Remarks:

Dominance Test Worksheet

Number of dominant species that are OBL, FACW, or FAC: 1

Total number of dominant species across all strata: 4

Percent of dominant species that are OBL, FACW, or FAC: 25.00

Prevalence Index Worksheet

Total % cover of:

OBL species	0	x 1	0
FACW species	0	x 2	0
FAC species	50	x 3	150
FACU species	110	x 4	440
UPL species	0	x 5	0
Total	160		590

Prevalence Index: 3.6875

Hydrophytic Vegetation Indicators:

____ Rapid Test for Hydrophytic Veg.

____ Dominance Test is >50%

____ Prevalence Index is ≤3.0*

____ Morphological Adaptations*

____ Problematic Hydrophytic Vegetation*

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetaion Present?

Yes ____ **No** x

SOIL

Profile Description: (Describe to depth needed to document the indicator or confirm absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color	%	Color	%	Type*	Loc**	Texture	Remarks
0-12	10YR 4/2	100					silt loam	
12-18	5YR 5/8	100					clay loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Coated Sand grains **Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:				Indicators for Problematic Soils	
	Histosol (A1)		Sandy Gleyed Matrix (S4)		Coast Prairie Redox (A16)
	Histic Epipedon (A2)		Sandy Redox (S5)		Iron-Manganese Masses (F12)
	Black Histic (A3)		Stripped Matrix (S6)		Other
	Hydrogen Sulfide (A4)		Loamy Mucky Mineral (F1)		
	Stratified Layers (A5)		Loamy Gleyed Matrix (F2)		
	2 cm Muck (A10)		Depleted Matrix (F3)		
	Depleted Below Dark Surface (A11)		Redox Dark Surface (F6)		
	Thick Dark Surface (A12)		Depleted Dark Surface (F7)		
	Sandy Mucky Mineral (S1)		Redox Depressions (F8)		
	5cm Mucky Peat or Peat				

Restrictive Layer (if observed)

Type:

Depth (inches):

Remarks:

Hydric Soil Present? **Yes** ____ **No** x

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (check all that apply)				Secondary Indicators	
	Surface Water (A1)		Water Stained Leaves (B9)		Surface Soil Cracks (B6)
	High Water Table (A2)		Aquatic Fauna (B13)		Drainage Patterns (B10)
	Saturation (A3)		True Aquatic Plants (B14)		Dry-Season Water Table (C2)
	Water Marks (B1)		Hydrogen Sulfide Odor (C1)		Crayfish Burrows (C8)
	Sediment Deposits (B2)		Oxidized Rhizospheres on Living		Saturation Visible on Aerial Imagery (C9)
	Drift Deposits (B3)		Roots (C3)		Stunted or Stressed Plants (D1)
	Algal Mat or Crust (B4)		Presence of Reduced Iron (C4)		Geomorphic Position (D2)
	Iron Deposits (B5)		Recent Iron Reduction in Tilled		FAC-Neutral Test (D5)
	Inundation Visible on Aerial		Soil (C6)		
	Imagery (B7)		Thin Muck Surface (C7)		
	Sparsely Vegetated Concave		Guage or Well Data (D9)		
	Surface (B8)		Other		

Field Observations:

Surface Water Present? Yes ____ No x Depth (inches) ____

Water Table Present? Yes ____ No x Depth (inches) ____

Saturation Present? Yes ____ No x Depth (inches) ____

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

APPENDIX C - CULTURAL RESOURCES ASSESSMENT

An Archaeological Field Reconnaissance of the Proposed Mill Creek Development in Bloomington, Monroe County, Indiana

by
Larry N. Stillwell
Principal Investigator

Submitted by:

Archaeological Consultants of Ossian
P.O. Box 2374
Muncie, IN 47307

Submitted to:

Alt-Witzig Engineering, Inc.
Carmel, IN

May 17, 2012

Introduction

As a result of a request by Alt-Witzig Engineering, Inc., Archaeological Consultants of Ossian (ACO) was contracted to evaluate the effects on cultural resources of the proposed Mill Creek development in Bloomington, Monroe County, Indiana (Figure 1). On May 12, 2012, personnel from Archaeological Consultants of Ossian conducted an archaeological reconnaissance survey of a combined approximate 13.54 acre tract selected for development. The area surveyed is located in portions of the SW 1/4 of the SW 1/4 of Section 7, Township 8 North, Range 1 West (Perry Township) in Bloomington, Monroe County, Indiana (Figure 2). No archaeological sites were discovered or relocated as a result of the survey. This report is a summary of the background review and the results of the Phase I archaeological investigation.

Physical Environment

Monroe County has a continental climate with moderately cold winters and hot summers (average daily low in January = 23 degrees F, average daily high in July = 85 degrees F), with approximately 42 inches of precipitation per year (Thomas 1981). Almost 60% of the annual precipitation falls between the months of April and September. The average number of days per year with minimum temperatures above 32 degrees (five in ten year probability) in Monroe County is 189 (Thomas 1981).

The project area lies within the Norman Upland of southern Indiana (Homoya 1985; Schneider 1966). The Norman Upland is characterized generally by flat-topped narrow divides, steep slopes, and deep V-shaped valleys. Most of the shorter tributary streams within the upland have developed only incipient floodplains, or none at all. However, the larger streams are marked by conspicuous narrow valley flats. The upland is nearly all in slope and is well drained by an almost perfect dendritic drainage system. The heart of the Norman Upland is located within Brown County. The upland, also called the Knobstone Escarpment, is the most prominent regional feature within Indiana (Wayne 1963, 1966). It is 300-feet higher than the Scottsburg Lowland that borders the upland to the east. Two other areas of flat relief border the Norman Upland. They are the Mitchell Plain to the west, and the Tipton Till Plain to the north. Bedrock geology of the project area is composed primarily of resistant siltstones and interbedded softer shales of the Borden Group as well as Middle Mississippian age limestones (Gutschick 1966; Schaal 1966). Owing to the thin mantle of glacial drift (10-30 feet deep in the Norman Upland), the underlying bedrock has had an effect on present-day topographic features. The thin till deposits overlying bedrock have resulted in a relatively chert-rich environment. Although bedrock exposures of cherts are known to exist in the study area, many chert types are known from nearby areas. Some of the cherts known to exist in the region, but not necessarily in the county, include Darby, Indian Creek, Bryantsville, Haney, Lost River, St. Genevieve, New Holland, and Plummer (Cantin 1994; Tomak 1981).

Soils in the project area fall within the Crider-Caneyville Association (Thomas 1981; Ulrich 1966). The Crider-Caneyville Association is comprised of deep and moderately deep, gently sloping to strongly sloping, well drained soils formed in loess and residuum from limestone on uplands (Thomas 1981). Specific soils in the project

area include the deep, well drained Crider silt loam, 2-12% slopes; and the deep, well drained Hagerstown silt loam, 6-18% slopes (Thomas 1981). Crider and Hagerstown soils are created in loess and in the underlying limestone residuum. They are found on uplands (Thomas 1981).

The hydrology of the area suggests that lack of water would not have been a concern for prehistoric and early historic occupants of the project area. Monroe County is drained by a mosaic of creeks (i.e. Indian Creek, Salt Creek, Bean Blossom Creek, etc.) that feed into either the West Fork or the East Fork of the White River. However, only the West Fork of the White River actually passes through a portion (the northwest tip) of the county. The project area is considered to be within the watershed known as the West Fork of the Lower White River. The project area is immediately drained by intermittent tributaries of Clear Creek. Other sources of water located near the survey area include Jackson Creek.

Presettlement vegetation of the area was a transitional zone between western mesophytic and oak-hickory hardwood forest (Petty and Jackson 1966). The General Land Office survey notes of the township documented oak as the dominant tree species. Other tree species noted were maple, ironwood, hornbeam, cherry, buckeye, redbud, hackberry, hickory, basswood, etc. (GLO 1820). Lindsey (1965 et. al.) cites similar vegetation for the project area.

Taken as a whole, the environmental data (soils, hydrologic, and vegetational) all suggest that the area has a probability to contain archaeological sites and was likely to have been occupied and/or exploited by prehistoric Native Americans as well as Euroamerican settlers. The combination of well drained upland soils (i.e. Hagerstown soils) near constant waterways (i.e. Clear Creek), in a vegetational zone that provides abundant resources has consistently yielded relatively moderate densities of archaeological sites in previous surveys (e.g., Hart and Jeske 1988, 1991; Jeske 1992, 1996). Climatological, vegetational, and edaphic variables all point to the probability that the area would have been an attractive draw to both hunter-gatherers and early horticulturalists in this portion of the Midwest.

Culture Sequence

The archaeology of Monroe County is somewhat poorly known, although some study has been conducted as a result of cultural resource management surveys and sponsored research. The following section, largely taken from data compiled by the Indiana Department of Natural Resources-Division of Historic Preservation and Archaeology's cultural resources management plan, attempts to organize certain salient information on the archaeology of the region. Because of a lack of knowledge specific to the project area, this discussion is seated within a general prehistory of Indiana. The discussion of the culture history of Indiana is not intended to be an exhaustive synthesis of past research in the area. Rather, it is meant to serve as a contextual framework for the archaeological sites discussed later in this report. The interpretations and dates given here are tentative and meant to serve as general guides.

Paleoindian Period (10,000— 8,000 B.C.)

The first people to reach the interior of the New World are known to archaeologists as PaleoIndians. The PaleoIndian peoples lived in a changing environment during the last stages of the last glacial advance on through to a time where the climate began to resemble that of today. These people produced an efficient chipped-stone tool kit, which included distinctive tools such as lanceolate spear points, fluted points, blades, and scrapers. These tools are almost always made of high quality cherts that were often imported to other parts of Indiana (Dorwin 1984; Tankersley 1987). Lanceolate blades and fluted projectile points are found throughout North America and much of South America. One of the earlier fluted points found in Indiana is the Clovis point. Other PaleoIndian projectile point types found in the state include Folsom, Holcombe, Cumberland, Quad, Agate Basin, Beaver Lake, Hi-Lo, Plainview, and Dalton (Justice 1987; Tankersley et. al. 1990). These tools were first found at sites on the Great Plains in association with the remains of mammoths and bison, giving rise to the mistaken notion that PaleoIndians were primarily big-game hunters. From sites found all over the continent, we now know that PaleoIndian peoples hunted and gathered a variety of foods, including deer, small mammals, and nuts (Fagan 1991). Large mammals were most likely a rare or seasonally taken resource; in fact, there are disproportionately few sites east of the Mississippi River with evidence for the hunting of elephants or other megafauna by humans as compared to the western United States. Evidence also suggests that PaleoIndian groups were highly mobile, and traveled across large territories in order to exploit resources when and where they became available. Population size was small, and local groups were likely no larger than 25 or 30 related individuals with a relatively simple social structure. One consequence of this highly mobile lifestyle is that little trash accumulated in one spot, making the location and identification of PaleoIndian sites very difficult. Identification of intact PaleoIndian materials have been further compromised by almost 150 years of often intensive agricultural activity that has taken place within the state and has disturbed the context of the shallow deposits. PaleoIndian sites are usually located on high river terraces or in upland areas on wetland edges (Haynes 1983). These locations did not flood, offered easy access to aquatic plant and animal resources and served as vantage points for locating larger game. An example of one these sites is the Magnet or Alton site located in southern Indiana (Smith 1984). The site is situated on a terrace of the Ohio River near a high quality (Wyandotte) chert resource.

Archaic Period (8,000— 700 B.C.)

The Archaic is a long period of time during which important long-term trends in Indiana prehistory are begun. One of these trends is increasing regional specialization/stabilization brought on by a post-glacial environment. Archaeologists usually divide the Archaic into three parts (Kellar 1993).

The Early Archaic (8,000-6.000 B.C.) is separated from the preceding PaleoIndian period primarily by a marked shift in tool technology and a more intensive exploitation of the land. Projectile points from the Early Archaic period exhibit a different hafting technology from their predecessors through either notching or through the use of bifurcate bases. This change in technology may have been born out of necessity as the large Pleistocene megafauna from the glacial period began to be replaced by modern woodland fauna (Collins 1979). Many of the spear points or knives from the period

contain beveled edges from tool resharpening and may exhibit pronounced blade serration (Broyles 1969; Justice 1987; Springer, Karch, and Harrison 1978). Early Archaic tool kits not only included projectile points and scrapers, but also saw the introduction of the atlatl as well as grinding slabs and pitted stone. These later tools are significant in that they demonstrate an increased utilization of plant species within the environment (Bailey 1972; Binford 1980). Specific projectile points from the Early Archaic include: St. Charles, Thebes, Lost Lake, Big Sandy, Charleston, Kirk, MacCorkle, St. Albans, LeCroy, Stilwell, etc. (DeRegnaucourt 1992; Justice 1987). Sites from this time period are commonly found throughout the state as well as the rest of the midwest (Springer 1985). In fact, Early Archaic sites have been found on virtually every type of topography within the state. Division of Historic Preservation site records indicate at least two Early Archaic ceremonial/mortuary sites are present within the state. This indicates growing prehistoric populations within the region as well as growing reverence for the dead.

The Middle Archaic (6,000-3,500 B.C.) is a period of continued population growth in Indiana. New projectile point forms appear such as Matanzas, Godar, and Radditz (Justice 1987). Many of the point types of the period tend to be manufactured with side notches and straight bases. T-shaped drills are also common. In addition, a wide variety of polished and ground stone tools such as milling stones, pestles and grooved axes are found from this period. During the Middle Archaic, a long-term warming and drying period, called the hypsithermal, reached its peak. This warming and drying trend led to the eastward expansion of the prairie in the state. In the northern and eastern portions of Indiana this climatic change caused the growth of savannah dotted with stands of oak (Williams 1974). Previously pine dominated forests were replaced by deciduous forests dominated by oak, hickory, and elm, which is more productive for human needs. In addition, all of the major rivers and their associated floodplains in the region were established by this time. Because of the rich resources available on river floodplains, people settled into larger, more permanent villages. Also, there is increased evidence of mortuary activities (or at least more sites are known). Evidence of at least some of these trends can be found at the Bluegrass site in Indiana, where Anslinger (1988) noted human and dog burials as well as sustained trash pits and hearths. Foods utilized during the Middle Archaic included deer, small mammals, fish, migratory waterfowl, a wide variety of nuts, and some domesticated plants such as squash.

Shell middens also appear during the Middle Archaic period. It is also during this period of increased sedentism and regional diversification that two distinct influences appear to emerge within the state that may have had their roots in the Early Archaic period. These influences are associated with the Ohio River Valley and the Lake Erie Basin. In fact, Matanzas points appear to be indicative of the growing western Ohio River Valley Tradition in southern Indiana, while the manufacture of bifurcate points from the Early Archaic period appear to be influenced by the Lake Erie Basin Tradition in northern Indiana.

The Late Archaic (3,500-1,500 B.C.) is a period in which a number of trends (e.g., increased population, decreased mobility, domestication of plants) initiated in the Middle

Archaic period are refined to more efficient subsistence strategies. The Late Archaic period in Indiana is related to the Midcontinental Archaic Tradition. This tradition is characterized by grave offerings, mortuary or cemetery sites, dog burials, shell middens, large semi-permanent camps, and trade of exotic goods. The trade network developed during the Late Archaic in Indiana exchanged resources such as galena and copper. These traded materials often were deposited in burials (Fagan 1991; Kellar 1993). Late Archaic phases in the state include French Lick, Stalcup, Scherschel, Bluegrass, Maple Creek, Glacial Kame, and Early Red Ochre. These latter two complexes appear to be directly influenced by Great Lakes cultures and appear to continue a divisional trend between the Lake Erie Basin Tradition in northern Indiana and traditions emerging in the Ohio River Valley (Cunningham 1948; Faulkner 1966; Lilly 1942; Mason 1981). Several technological innovations were introduced during the Late Archaic period. Most notably the manufacture of pottery (which is still disputed) as well as a proliferation of tools (i.e. axes, adzes, pestles, celts, mortars, etc.). There is also increased emphasis on ornamental items such as beads (manufactured from shell, copper, or pearl), gorgets, hairpins, and pendants. Tool kits also include specialized items made of bone and antler. Typical projectile points from the period include Lamoka, Brewerton, and McWhinney (DeRegnaucourt 1992; Justice 1987). Generally, projectile points from the period lack the sophisticated craftsmanship seen in previous periods of Indiana prehistory, and the raw materials from which they are manufactured consist of inferior or lower quality cherts.

Resources utilized during the Late Archaic include all those mentioned for the Middle Archaic, with an increasing utilization of seed plants such as goosefoot (lamb's quarters) and sumpweed. The Late Archaic is probably best described as a period marking the transition from a hunting-gathering way of life to one where subsistence is at least partially dependent upon agriculture. The Late Archaic is well represented in Indiana, with sites located on virtually every topographic landform (i.e. flood plain, lake plains, till plains, moraines, etc.). Late Archaic sites tend to be larger and contain more tools and debris than sites of any preceding time period. They are usually located on well-drained soil near water. The McCain site in Dubois County is a notable Late Archaic site (Miller 1941).

The Terminal Late Archaic (ca. 1,500-700 B.C.) is best described as a transitional period between the Late Archaic period and the Early Woodland periods in Indiana. However, the Terminal Late Archaic period in Indiana appears to be a phase of the Late Archaic period which is restricted to portions of the southern half of the state. The period is marked by the use of Terminal Archaic Barbed projectile points (i.e. Buck Creek Barbed) as well as larger more ornate forms such as Turkeytail points. Perhaps the best represented culture of the Terminal Late Archaic period in Indiana is that of the Riverton (Anslinger 1988; Winters 1967). The Riverton Culture is described as a riverine-based complex with small projectile points (i.e. Merom and Trimble points) that was predominantly situated within the Lower Wabash River Valley, the Ohio River Valley, and the East and West Forks of the White River Valley. Although point types from the period can be found in northern Indiana, they are not found in the same density or frequency as in the Lower Wabash River drainage. Examination of burials by Winters

(1967) at a Riverton site also noted trauma to human skeletons most likely caused by warfare.

Woodland Period (700 B.C.—1,200 A.D.)

The Woodland period was a time of major changes in food choices and social organization in the Midwest. Like the Archaic, the Woodland period is divided into three parts. Until recently, one of the defining characteristics that separated the Archaic period from the Woodland period was the use of pottery. However, in the southern Midwest, pottery is now known to have been utilized as early as 2550 B.C. (well within the Late Archaic period) (Reid 1984). Another ongoing excavation taking place on Stallings Island in Georgia has also carbon dated pottery sherds to 2500 B.C.

The Early Woodland (700-200 B.C.) period in Indiana coincides with a shift from a hunter-gatherer way of life to a more agriculturally based economy. Large bladed projectile point forms also appear during this period. Some of these point types include Adena, Kramer, Motley, and Meadowood (Justice 1987). Pottery of the period tends to be thick and porous manufactured with fiber or course grit temper. Pottery types of the period include Marion Thick, Fayette Thick, and Early Crab Orchard. It is also during this period that mortuary activities first included the building of earthen mounds (some that contain log tombs) with grave goods (Kellar 1993). Other earthworks such as large rectangular or circular enclosures are constructed during this period, and the people who built these structures are referred to as Adena. Adena culture is well represented in Indiana with numerous structures and mounds located along the Ohio, White, and Whitewater River Valleys (Kolbe 1992).

There is little doubt that Adena peoples channeled significant resources and labor into the construction of their mounds and enclosures as well as into the cult of the dead. This is reflected by the remnants of earthworks located in New Castle, Cambridge City, and Anderson. Until recently, these large complexes were thought to be primarily ceremonial. However, recent evidence suggests that these earthworks were much more. Cochran (1992) notes that mounds and other earthworks of the period were laid out along various astrological alignments. These alignments were not only important in Adena (and Hopewell) cosmology, but they also served as markers for seasonal change. This latter practical aspect of the earthworks would have been extremely important for a culture that was growing increasingly reliant on agriculture for stability to deal with increasing population growth.

The Middle Woodland (200 B.C.-500 A.D.) is most notable for the extensive use of large burial mounds and geometric earthworks that were more complex or were continuations of building phases that were initiated during the Early Woodland period (Cochran 1992). A widespread trading network known as the Hopewell Interaction Sphere was also established. Artifacts and raw materials such as obsidian from the Rocky Mountains, copper from northern Michigan, mica from the Appalachians, shark teeth and marine shells from the Gulf of Mexico, and a wide variety of cherts were exchanged throughout most of the eastern United States. Some of these materials have been documented in the GE Mound site in southwestern Indiana (Tomak 1993). Centers

for this activity were the Scioto River Valley in south-central Ohio, and the Illinois River Valley in west-central Illinois (Struever 1964). Specific phases that have been identified in Indiana include Crab Orchard, Mann, Allison-Lamotte, Havanna, Scioto, and Goodall (Bettarel and Smith 1973; Ruby 1993). Projectile points of the period include Snyders, Steuben, Lowe Flared, and Chesser (Justice 1987). Pottery was grit tempered, better made, and more often decorated than in the Early Woodland period. Pottery types of the period consist of Havana Hopewell, Crab Orchard, Scioto, and Mann Phase sherds (Wolforth 1996). Goosefoot, sumpweed, and sunflower were important plants which were actively cultivated during the period. Maize (corn), a tropical import, was beginning to become an important part of the diet at this time. Northern Indiana, while not a central region of the Hopewell phenomenon, has a number of Middle Woodland villages, earthworks, and mound sites (Quimby 1941).

The Late Woodland (ca. 500-1,200 A.D.) is a period of decreased emphasis on both ceremonial and mortuary activities. The Hopewell Interaction Sphere of the Middle Woodland period was no longer a part of the social and economic lives of Midwesterners. Intrusive burials can be found in mounds of the preceding period. New mounds are rare and small in size. Subsistence strategies not only rely on agricultural (increasing dependence on maize cultivation), but hunting and gathering seasonal rounds appear to become necessary and may explain why large nucleated villages shift to smaller habitation sites (McCord & Cochran 1994). Conjecture as to why this happened includes change of climate resulting in shorter growing seasons; subsistence technology could not support the increasing population size; or disease and warfare caused from increasing populations. At least six Late Woodland enclosures known in central Indiana demonstrate defensive fortifications or postures (Cochran 1980). It was also during this time period that the bow and arrow was introduced along with true arrowheads (Justice 1987). Tool kits from the period include Madison and Jack's Reef projectile points as well as Commissary knives.

Pottery was typically grit-tempered or grog-tempered, and is harder and thinner than Middle Woodland pottery (Redmond 1986). Although the Albee Phase or complex appears to be the most dominant culture in the state during the period, other phases known to be contemporary in Indiana at the time include Yankeetown, Allison-Lamotte, and Newtown.

Mississippian (ca. 1,000-1,700 A.D.)

After A.D. 1000, people in the Ohio river valley of the Midwest began to follow a lifestyle termed Mississippian. Classic Mississippian culture in Indiana is generally characterized by a dependence on agriculture which intensively cultivated corn, beans, squash, as well as lesser seed crops and tobacco; the use of shell-tempered pottery; the building of flat topped pyramid-shaped mounds; nucleated villages and towns (often palisaded) with central plaza areas; large cemeteries; public ceremonial structures; and a hierarchically ordered social structure which may have dominated over populations of several thousand (Black 1967, Kellar 1993). The settlements were permanently established, with a population that was tied to ceremonial and/or trade centers like those found at Cahokia and Angel Mounds. The placement of these centers appears to indicate

long-range planning. Unlike previous periods in prehistory, stylistic changes in artifact forms such as projectile points and pottery occur on a more rapid scale and the quantity of goods appear in greater numbers. Artifacts from this period include Nodena points, Cahokia points, ceramic ladles, trowels, balls, effigies, discs, discoidals, and balls (Black 1967; Justice 1987). However, classic Mississippian culture appears confined to southern Indiana along the Ohio and Wabash River Valleys. Classic Mississippian culture in southwestern Indiana includes the Angel Phase (1,050-1,450 A.D.), the Caborn-Welborn Phase (c.a. 1,400 A.D.-1,700 A.D.), and the Vincennes Phase (Black 1967; Munson 1995; Stafford, Anslinger, Cantin, and Pace 1988; Tomak 1970; Winters 1967).

In northern Indiana, classic Mississippian cultural manifestations evolved to a different degree and are termed "Upper Mississippian." These Upper Mississippian groups appear to live a more basic lifestyle that lack the large earthworks and mounds that are present at places like the Angel site (Brown 1961; Brown and O'Brien 1990; Faulkner 1972). Upper Mississippian groups from northwestern Indiana include Huber and Fisher. The is little archaeological evidence to suggest that Mississippian tradition was present in northeastern Indiana especially north of the St. Mary's River Valley (Jeske 1996). Instead, it appears that Native Americans in the region continued to live a basic Late Woodland lifestyle.

In central and southeastern Indiana, Fort Ancient culture is the best known of the Upper Mississippian groups. The Oliver Phase and Yankeetown Phase are part of Fort Ancient culture. Many of the Oliver Phase sites in Indiana are contained in the White River drainage (Dorwin 1971; Redmond and McCullough 1993). Oliver Phase occupations are often characterized as horticultural villages.

Historic Native Americans (c.a. 1660— A.D. 1846)

The Historic Native American Period (ca. A.D. 1660-1846) begins as European explorers, trappers, missionaries, and traders initially penetrate the region and begin to record their dealings with the Native Americans. Prior to European contact Upper Mississippian groups of the Midwest appear to have suffered a dramatic population decline. This decline may have been the result of increased warfare, the spread of European disease, and a shortened growing season caused by the Little Ice Age after A.D. 1450 (Hicks 1992). By the time of European contact in the late seventeenth century, the indigenous (?) Mississippian and Upper Mississippian groups of Indiana had been replaced by the historic Potawatomi and Miami (including Piankashaw, Wea, and Shawnee) Indians, along with smaller groups such as the Ottawa and Fox (Kinietz 1995). Shortly after encountering European culture, most native artifacts such as pottery and stone tools were abandoned in favor of trade goods such as brass kettles, crockery, and steel knives. Evidence from the "Mouth of the Wabash Site" in Posey County indicates that Mississippian material culture was starting to be impacted by European trade goods probably through trade routes to the southern United States. In 1973, Munson and Green reexamined artifacts from the site and noted that at least one brass artifact was contained within the assemblage (Higginbotham 1983).

The Potawatomi were Algonquian speakers who began expanding their control of trade and territory south from Green Bay along the western shore of Lake Michigan by 1670. In 1695, they moved around the southern end of the Lake, eventually extending their territory across all of northern Indiana and southern Michigan to Detroit (Berthrong 1974). The Miami also were Algonquian speakers with close ties to the peoples of the Illini confederacy. Widely dispersed throughout the western Great Lakes region, the Miami originally comprised at least six bands or groups: the Atchatchakonguen (Crane), Kilatika, Mengakonkia, Pepicokea, Wea and Piankashaw. By 1680, the Atchatchakonguen were referred to as the Miami by the French. Some Miami-speakers were living near Chicago/South Bend and the area around southern Lake Michigan, although other Miami-speaking groups were scattered throughout northern Indiana, Illinois, and Wisconsin. The Mengakonkia, Kilatika, and Pepicokea disappear from historical documents during the next century, probably incorporated into the Crane, Wea, and Piankashaw bands (Berthrong 1974; Goddard 1978). The Miami were displaced from the Lake Michigan area by the aggressive Potawatomi and migrated east into northern Indiana after 1695, eventually settling along the Upper Wabash River Valley and at the three rivers junction in Fort Wayne. The area is the continental divide between the Mississippi River Drainage and the Lake Erie Basin, and the Miami were able to take advantage of their control of this strategic portage area in their relationships with Europeans and other historic tribes.

EuroAmerican westward expansion resulted in the conflict between the Native Americans and EuroAmerican invaders. Despite the victories of Little Turtle over the American army in the late 18th century, the Miami were broken by military forces of the United States in 1795. The Wea were removed in 1805, the Piankashaw in 1820. Most of the bands of Potawatomi were removed to reservations in Wisconsin and Kansas by 1841. The last remaining bands of Miamis were resettled in Kansas in 1846, although many of the tribe evaded removal, thanks to the negotiations of Jean Baptiste de Richardville, the Miami Civil chief who engineered land grants to individual Miami families in exchange for territory. A small number of Miami retained personal reservations or reserves (i.e., Richardville, Cicott, Seek) and continued to reside in the state. Nonetheless, the settlement of Indiana after 1846 by EuroAmericans was swift and complete, effectively ending a successful and rich cultural Native American tradition that spanned some 14,000 years. The Eastern Miami, those left with private landholdings, became largely assimilated into White Society, and in 1898, they were removed illegally from the Department of Interior's roll of Indian Tribes.

Euroamerican Historic (ca. 1660-present)

The first Europeans who came to what is known as Indiana were French traders, missionaries, and trappers. LaSalle portaged near South Bend in 1679 (Lockridge 1980). Shortly after, other Frenchmen came to the river valleys of the area to trap fur and trade with the Native Americans. Set astride the most direct link between the St. Lawrence and the Mississippi, the French had established three main centers to help control the flow of goods and people through the territory. Fort Miamis (Fort Wayne) was established at the junction of the St. Joseph, St. Mary's, and Maumee River in northeastern Indiana before 1700, while Fort Ouiatanon, on the Wabash River near modern Lafayette, was settled in

1717 (Carmony 1966). These two forts were within Canada. Fort Vincennes, established in 1732, was located on the lower Wabash, and was considered part of the Louisiana Territory. Although there was no permanent settlement at Indianapolis, it is highly likely that the French exploited the area.

The French lost control of this strategic territory to the British after the French and Indian War (1754-1763). The British never had a strong presence in the region, not occupying Vincennes until 1777 (Barnhart and Riker 1971). They lost control of the region to the American Colonists in 1783, who began to exert their power in the area. Known as the Northwest Territory, the region included all of the area which was to become Ohio, Indiana, Illinois, Michigan, Wisconsin, and eastern Minnesota. Gaining military victory and political control of the territory in 1795, the Americans began to settle the region in earnest.

The settlement of Indiana was part of a westward flow of immigrants into the valley of the Mississippi between 1792 and 1860 that resulted in 15 new states admitted to the Union (Carmony 1966). Indiana was settled initially by people from the upper south (i.e. Virginia, North Carolina, and Kentucky), along with some smaller number from the middle atlantic states (Hudson 1988). White settlement in Indiana generally was a northward flow from which began in the Ohio Valley. Most of the settlers of central Indiana were American-born protestants of British descent, and moved to central Indiana from southern Indiana (Rudolph 1980).

The population grew quickly, and in 1816, Indiana entered the Union with its capitol at Corydon. Corydon was far too south for convenience, and Indianapolis, at the confluence of the White River and Fall Creek was established by commission as the new capitol in January, 1821. After 1830, non-American born immigrants began to arrive in Indiana in greater numbers, principally from Germany and Ireland. The growth of the largely Catholic immigrant population was viewed with alarm by the protestant residents from the upper south, and paved the way for the rise of the Ku Klux Klan within the state (Carmony 1966).

The Civil War impacted the state politically and economically. While considered by some an "ambiguous" state, Indiana sent over 200,000 men to the Union cause, and was a critical supplier of food and other war-related material (Rudolph 1980). Along with other impacts, the state began a long, slow transition from a strictly agricultural economy to an industrial economy.

Immigration into the state peaked during the years between the Civil War and World War I (Carmony 1966). These immigrants were still principally Germans and Irish, but included southern and eastern Europeans as well. In addition, the African American population increased. The large immigrant population and the changing economy resulted in enough fear among long-established protestant populations that the Ku Klux Klan became a dominant political force in the 1920's, but whose influence waned shortly after (Carmony 1966). By World War II, Indiana had made the transition to an industrialized economy and the Klan was no longer a major political force.

Background Review

The archaeological site files and maps at the Indiana Department of Historic Preservation and at Archaeological Consultants of Ossian were examined as part of the background review for this project. Historical documents such as county plat maps (Anonymous 1876) and notes and maps of the General Land Office were also examined. Additional information about the region has been acquired from interviews with private collectors. Cultural resources are also known from historic sources (e.g., Guernsey 1932), while other archaeological sites have been discovered as a result of cultural resource management projects (i.e. Baltz 1984, 1986; Beard 1979, 1991; Bennett 1997, 2000; Burkett 1990; Fitting 1979; French and Smith 1990; Guendling 1976; Kearney and Bailey 1993; Meadows and Bair 1997; Munson 1976; Myers 1986; Natt 1999; Noel 1986; Pace 1979; Parmalee et. al. 1978; Purtill and Vehling 2010; Tomak 1986, 1995; Will and Pope 2004; etc.). All of these were reviewed for comparative data. Additionally, the author has also conducted numerous field survey projects within Monroe County (Stillwell 1999, 2000a, 2000b, 2001a, 2001b, 2003a, 2003b, 2004, 2005a, 2005b, 2005c, 2008, 2010a, 2010b, 2010c, 2011a, 2011b, 2012a, 2012b).

The results of cultural resource management surveys conducted in the area suggest that sites contained within the region vary in size from small ephemeral lithic scatters to fairly significant prehistoric deposits often situated in either deep alluvial context or along the terraces of major drainages.

As of 2012, at least 1,386 archaeological sites had been recorded for Monroe County. Records maintained by the Indiana Division of Historic Preservation and Archaeology Office indicated that at least 42 of the known cultural resources on file for the county were located within an approximate 1.0 mile radius of the project area. The sites included 12-Mo-60, 12-Mo-61, 12-Mo-76, 12-Mo-78, 12-Mo-124, 12-Mo-205, 12-Mo-254, 12-Mo-255, 12-Mo-633, 12-Mo-659, 12-Mo-665 through 12-Mo-671, 12-Mo-700, 12-Mo-701, 12-Mo-769, 12-Mo-791, 12-Mo-792, 12-Mo-924, 12-Mo-980 through 12-Mo-983, 12-Mo-988 through 12-Mo-1000, 12-Mo-1123, and 12-Mo-1386.

All periods of prehistoric occupation are represented in Monroe County, including at least 15 Paleo-indian sites (Tankersley et. al. 1990). Other phases of prehistoric occupation are noted in Tomak's (1970) survey of neighboring Greene County with some sites like the Beehunter site showing multicomponent features. Tomak (1970) notes many archaeological manifestations during his survey of the region. They include Albee, Yankeetown, and Oliver. Many of the Albee Phase cemeteries in the region are located in neighboring Greene County. Cantin (1991) states, "...All periods of Indiana prehistory are represented by archaeological sites in the Monroe County region, reflecting some 12,000 years of human habitation. Perhaps most frequently identified in the relatively well drained, upland interior are sites of Early Archaic (ca. 10,000-8,000 BP), Middle-Late Archaic (ca 6,000-4,500 BP), and Late Woodland/Albee (ca 1,500-1,000 BP) affiliation. Nearer to major drainages Terminal Archaic/Riverton (ca 3,500-2,700 BP), Early Woodland (ca 2,700-2,200 BP), and Middle Woodland (ca 2,200-1,500 BP) sites increase in relative frequency. Most typically occurring along former marshes are Middle-Late Archaic, Middle Woodland/Allison-Lamotte (ca 1,900-1,400 BP), and Late

Woodland/Albee sites. A full range of site types from small transient camps to base camps, villages, cemeteries, mounds, lithic reduction stations, and special function camps have been documented in the counties..."

Tomak has conducted extensive archaeological studies on the prehistory of the Monroe County region. Should the reader wish to investigate the prehistoric cultural chronology of the region further, they are instructed to review Tomak (1983, 1984). Other studies conducted in the region have shown the presence of prominent Late Archaic Phases such as Mann in south-central and southwestern Indiana (Ruby 1993). Redmond and McCullough (1993) have also excavated a series of Late Woodland/Mississippian Period Oliver Phase village sites in southern and central Indiana. Additionally, recent excavations in Dubois County, Indiana, have revealed the presence of an Angel Phase Village (Pope 2003). This latter test excavation has served to extend the range of what was once thought to have been a limited Classical Mississippian phase occupation of southern Indiana.

Historically, Monroe County was named in honor of President James Monroe. It was created in 1818. However, the present county boundaries were not established until 1836. The first permanent settlement in the county is believed to have been that of David and Jonathan Riggs in the Bloomington area in 1816. Other early settlements included Detham's grist mill on Clear Creek in 1818, and Shirley's grist mill established below Shirley Springs a few years later. Also the Virginia Iron Works was established in 1839. Indiana University was founded in 1820 as a state seminary school (Barnhart and Riker 1971; Carmony 1966; Lockridge 1980; Rudolph 1980).

Historic sources such as the General Land Office survey notes for the township did not indicate any cultural resources present within the project area. Historic plat maps of Monroe County (Anonymous 1876) revealed the presence of four mills, a railroad, two schools, and a church within an approximate 1.0 mile radius of the project area. An examination of McGregor (1987) indicated that no early Indiana rural structures of the contact and/or exploration and pioneer settlement periods were located near the current project area.

A review of the Division of Historic Preservation cemetery records for the township indicated that no known graveyards would be impacted by the project. The same records showed the presence of Bunger, Duncan, Fullerton, Iseminger, Dodsan, and two unnamed cemeteries within an approximate 1.0 mile radius of the project.

Archaeological Survey Methods

The combined approximate 13.54 acre tract surveyed for the proposed development was currently situated within portions of grass covered ground and woods. Ground surface visibility within the project area was estimated to have been 0%. Due to the lack of available ground surface visibility within the limits of the proposed development, shovel testing was utilized within the project area. Shovel probe survey was implemented. Shovel probe survey consisted of small test holes, approximately 35-cm in diameter and 50-cm deep, that were excavated across the project area at intervals of 15-

meters along transects spaced 15-meters apart. Soil from the probes was screened through 6.4 mm mesh in an attempt to locate cultural materials. Soil conditions and the presence or absence of cultural materials were noted for each hole. In areas where shovel probes tested positive for cultural materials, additional probes were excavated at 5-meter intervals in the cardinal directions around the positive shovel test pit. Although the shovel probe technique will not find deeply buried sites, and may miss small or ephemeral sites, it is the most cost-effective, reliable form of archaeological survey in areas of low or zero surface visibility (Lightfoot 1986; Nance & Ball 1986).

If applicable, fire-cracked rock was noted but not collected during the survey. All cultural materials recovered during the course of the survey were taken to the ACO office for processing. All artifacts from the survey will be taken to Ball State University for curation.

Archaeological Reconnaissance Survey

On May 12, 2012, an archaeological reconnaissance level survey was initiated for a proposed development in Bloomington. The survey area was examined by Alan Miller, Arturo Fernandez, and Dustin Payne with the author serving as Principal Investigator. The project area consisted of several property lots that were to be utilized for a development. In all, the lots totaled approximately 13.54 acres (Figure 3).

The project area was located northeast of the intersection of Tapp Road and S.R. 37. The project area was bordered by Tapp Road to the south; and by woods to the north, east, and west (Figure 3). A portion of paved road infrastructure was present within the limits of the project. The roads included Tech Park Boulevard and West Schmaltz Boulevard. The roads were not technically part of the archaeological investigation and separated the lots that ACO personnel examined. Also present within the project area was an existing telecommunications facility compound located in the northern limits of the development (Figure 3).

Shovel testing of the wooded tracts contained within the project determined that the areas had been agriculturally disturbed. An agricultural plowzone was identified within the test pits that extended up to 9-inches in depth. The grass covered areas located adjacent to the existing road infrastructure improvements within the development had been disturbed by prior grading and filling activity.

During the course of the field reconnaissance, no archaeological sites were located. Archaeological survey of the project noted both agricultural and non-agricultural disturbance.

Stafford (et. al. 1988) suggests a probable prehistoric density within the region of one site per 12.08 acres surveyed. This density obviously fluctuates depending on the closeness of the survey area to major water resources (i.e. the White River) as demonstrated through numerous river valley surveys conducted within the state. The current survey located no archaeological sites within a combined approximate 13.54 acre

tract. While minor portions of the project had been disturbed by non-agricultural activity, the results of the field reconnaissance appear to fall within the margin of error for the anticipated prehistoric site density estimates put forth by Stafford (et. al. 1988) for the region.

Conclusions and Recommendations

An archaeological field reconnaissance of the proposed Mill Creek development in Bloomington, Monroe County, Indiana, discovered no archaeological sites. The project area had been both agriculturally and non-agriculturally disturbed. The results of the other CRM surveys conducted within the county suggest that sites contained within the region vary in size from small ephemeral lithic scatters to fairly significant prehistoric deposits. Because no archaeological resources were located during the survey, it is the opinion of the archaeologist that the proposed undertaking will not affect any archaeological properties eligible for listing on the National Register of Historic Places, and no further archaeological work is warranted. Project clearance is recommended. If human remains, features, or midden deposits are encountered during the construction of the proposed project, work must be halted and the archaeologists at the Indiana Department of Natural Resources-Division of Historic Preservation and Archaeology must be contacted for additional evaluation before work resumes.

References Cited

Anonymous
1876 *Illustrated Historical Atlas of the State of Indiana.* Baskin, Forster, and Company, Chicago.

Anslinger, Michael C.
1988 *"The Riverton Culture: Lithic Systems and Settlement Parameters."* M.A. Thesis, Washington State University, St. Louis.

Bailey, R. E.
1972 *Late and Post Glacial Environmental Changes in Northwestern Indiana.* Ph.D. dissertation, Department of Botany, Indiana University, Bloomington, IN.

Baltz, Christopher
1984 *An Archaeological Reconnaissance of Proposed Construction of Tie Lines in Greene, Owen, and Monroe Counties, Indiana.* Glenn Black Laboratory, Indiana University, Bloomington, IN.
1986 *An Archaeological Reconnaissance of Two Areas Along the Proposed Sare Road/Southeast Arterial Project in Bloomington, Monroe County, Indiana.* Glenn Black Laboratory, Indiana University, Bloomington, IN.

Barnhart, John D., & Riker, Dorothy L.
1971 *Indiana to 1816-The Colonial Period.* Indiana Historical Bureau & the Indiana Historical Society, Indianapolis, IN 1971.

Beard, Thomas
1979 *Archaeological Field Reconnaissance Project AHL-5353 (1) New Alignment Segments of S.R. 446 from S.R. 46 to Monroe Reservoir, Monroe County, Indiana.* Indiana Dept. of Highways, Indianapolis, IN.
1991 *Archaeological Field Reconnaissance Project BRZ-9953 ( ) Monroe County Bridge No. 625, Bridge Replacement on Kent Road over North Salt Creek, Monroe County, Indiana.* Landmark Archaeological and Environmental Services, Inc., Lebanon, IN.

Bennet, Stacy N.
1997 *Archaeological Field Reconnaissance: Proposed Dumpsite in the Northwest Quadrant of the Intersection of Curry Pike and S.R. 45, Monroe County, Indiana.* Landmark Archaeological and Environmental Services, Inc., Sheridan, IN.
2000 *Phase Ia Archaeological Field Reconnaissance: Proposed Borrow Areas for New S.R. 46 Interchange in Bloomington, Monroe County, Indiana.* Landmark Archaeological and Environmental Services, Inc., Sheridan, IN.

Berthrong, D. J.
1974 *Indians of Northern Indiana and Southwestern Michigan.* Garland Publishing, New York.

Bettarel, R. L. and H. G. Smith
1973 *The Moccasin Bluff Site and the Woodland Cultures of Southwestern Michigan.* Anthropological Papers 49. Museum of Anthropology, University of Michigan, Ann Arbor.

Binford, L. R.
1980 *Willow Smoke and Dog's Tails: Hunter-Gather Settlement Systems and Archaeological Site Formation.* American Antiquity 45: 4-28.

Black, Glen A.
1967 *Angel Site: An Archaeological, Historical, and Ethnological Study.* Indian Historical Society, Indianapolis, Indiana.

Brown, J. A.
1961 *The Zimmerman Site: A Report on Excavations at the Grand Village of the Kaskaskia.* Report of Investigations No. 9. Illinois State Museum, Springfield.

Brown, J. A. and O'Brien, Patricia J.
1990 *At the Edge of Prehistory: Huber Phase Archaeology in the Chicago Area.* Kompsville, IL: Center for American Archaeology Press.

Broyles, Bettye J.
1969 *Distribution of Southeastern Archaic Projectile Points in the Ohio Valley.* South Eastern Archaeological Conference Bulletin No. 11: 31-36.

Burkett, Frank
1990 *An Archaeological Reconnaissance for INDOT Project: ST-X465(B), Des. 24615, Road Reconstruction on S.R. 45 at the East Junction of the S.R. 46 Bloomington Bypass in Monroe County.* Indiana Dept. of Transportation, Indianapolis, IN.

Cantin, Mark
1991 *Archaeological Phase I Reconnaissance of Selected Areas in the United Mineral Corporation Lyons Surface Mine Permit, Permit # S-00261, Greene County, Indiana.* Anthropology Laboratory, Indiana State University, Terre Haute, IN.
1994 *Provenience, Description, and Archaeological Use of Selected Chert Types of Indiana.* Anthropology Laboratory, Indiana State University, Terre Haute, IN.

Carmony, D. F.
1966 *A Brief History of Indiana.* Indiana Historical Bureau, Indianapolis.

Cochran, Donald R.
1980 *An Archaeological Assessment of Fox Island County Park.* MA Thesis, Dept. of Anthropology, Ball State University, Muncie, IN.
1992 *Adena and Hopewell Cosmology: New Evidence from East Central Indiana.* In Native American Cultures in Indiana. Minnetrista Cultural Center & Ball State University, Muncie, Indiana.

Collins, Michael B.
1979 *Excavations at Four Archaic Sites in the Lower Ohio Valley, Jefferson County, Kentucky (Vol II).* Department of Anthropology, University of Kentucky, Lexington, KY.

Cunningham, W. M.
1948 *A Study of the Glacial Kame Culture in Michigan, Ohio, and Indiana.* Occasional Contributions No. 12. Museum of Anthropology, University of Michigan, Ann Arbor.

DeRegnaucourt, T.
1992 *A Field Guide to the Prehistoric Point Types of Indiana and Ohio.* Occasional Monographs No. 1. Upper Miami Valley Archaeological Research Museum, Ansonia, Ohio.

Dorwin, J. T.
1971 *The Bowen Site: An Archaeological Study of Culture Process in the Late Prehistory of Central Indiana.* In Indiana Research Series, vol. 4. Indiana Historical Society, Indianapolis, IN.
1984 *Fluted Points and Late-Pleistocene Geochronology in Indiana.* In Indiana Research Series, vol. 4. Indiana Historical Society, Indianapolis, IN.

Fagan, B. M.
1991 *Ancient North Americans.* Thames & Hudson, Ltd., London.

Faulkner, C. H.
1966 *The Morrow Site: A Red Ochre Workshop Site in the Kankakee Valley, Indiana.* Wisconsin Archaeologist 45: 151-156.
1972 *The Late Prehistoric Occupation of Northwestern Indiana: A Study of the Upper Mississippian Cultures of the Kankakee Valley.* Prehistory Research Series No. 5. Indiana Historical Society, Indianapolis.

Fitting, James E.
1979 *A Cultural Resource Overview of the Hoosier National Forest, Volume I.* Commonwealth Associates, Inc., Jackson, Michigan.

French, Shawn C.
1992 *An Archaeological Field Reconnaissance of the Proposed Location for the Development of Church Lane Subdivision, Clear Creek, Monroe County, Indiana.* Glenn Black Laboratory, Indiana University, Bloomington, IN.

French Shawn C. & Smith Edward
1990 *An Archaeological Reconnaissance of the Proposed Waterworks System Improvements for Eastern Heights Utilities, Inc. in Portions of Greene, Owen, and Monroe Counties, Indiana.* Glenn Black Laboratory, Indiana University, Bloomington, IN.

GLO
1820 *Notes of the General Land Office Survey. U.S. Lands in Indiana.* Indiana State Archives. Indianapolis.

Goddard. I.
1978 *Mascouten.* In Northeast. Handbook of North American Indians. 15. B. G. Trigger. ed., pp. 583-587. Smithsonian Institution. Washington. D.C.

Guendling, Randall L.
1976 *Archaeological Reconnaissance of the Winslow Road Park. Bloomington. Monroe County. Indiana.* Glenn Black Laboratory. Indiana University. Bloomington, IN.

Guernsey. E.Y.
1932 *Indiana: The Influence of the Indian Upon its History... (map). Indianapolis:* Department of Conservation. State of Indiana.

Gutschick, R. C.
1966 *Bedrock Geology.* In Natural Features of Indiana. edited by Alton A. Lindsey. pp. 40-56. Indiana Academy of Science. Indianapolis.

Hart. J. P. and R. J. Jeske
1988 *North American Origins of Middlewestern Frontier Populations.* Annals of the Association of American Geographers 78: 395-413.
1991 *Models of Prehistoric Site Location for the Upper Illinois River Valley.* Illinois Archaeology 2: 3-22.

Haynes. Vance C.
1983 *Fluted Points in the East and West.* Archaeology of Eastern North America 11: 24-26.

Hicks. Ronald
1992 *Native American Cultures in Indiana.* Minnetrista Cultural Center & Ball State University, Muncie. Indiana.

Higginbotham. Collin Dean
1983 *An Archaeological Survey of the Lower Wabash Valley in Gibson and Posey Counties in Indiana.* MS on file Purdue University. West Lafayette. Indiana.

Homoya. M. A.
1985 *Map Showing the Natural Regions of Indiana.* Indiana Academy of Science. Notre Dame.

Hudson. J. C.
1988 *North American Origins of Middlewestern Frontier Populations.* Annals of the Association of American Geographers 78(3): 395-413.

Jeske, Robert J.
1992 *The St. Joseph River Valley: A Systematic Archaeological Survey in Allen and DeKalb Counties, Indiana.* Northeast Indiana Archaeological Survey Report of Investigations No. 2. Indiana-Purdue University, Fort Wayne.
1996 *The Saint Mary's River Valley: A Systematic Archaeological Survey in Allen and Adams Counties, Indiana.* Northeast Indiana Archaeological Survey Report of Investigations No. 5. Indiana-Purdue University, Fort Wayne.

Justice, N. D.
1987 *Stone Age Spear and Arrow Points of the Midcontinental and Eastern United States.* Indiana University Press. Bloomington and Indianapolis.

Kearney, Janis and Amy Bailey
1993 *Archaeological Field Reconnaissance of a Proposed Borrow Area near Bloomington, Monroe County, Indiana.* Glenn Black Laboratory, Indiana University, Bloomington, IN.

Kellar, James H.
1993 *An Introduction to the Prehistory of Indiana.* 3rd Printing Indiana Historical Society, Indianapolis, IN.

Kinietz, W. V.
1995 *The Indians of the Western Great Lakes.* Ann Arbor Publications, Ann Arbor, MI.

Kolbe, Beth
1992 *An Archaeological Survey of the Brookville Reservoir, Franklin County, Indiana.* Archaeological Resources Management Service, Ball State University, Reports of Investigations 40.

Lightfoot, Kent G.
1986 *Regional Surveys in the Eastern United States: The Strengths and Weaknesses of Implementing Subsurface Testing Programs.* American Antiquity 51: 484-504.

Lilly, E.
1942 *A Cedar Point "Glacial Kame" Burial.* Proceedings of the Indiana Academy of Sciences 51: 31-34.

Lindsey, A. A., W. B. Crankshaw and S. A. Qadir
1965 Soil Relations and Distribution Map of the Vegetation of Presettlement Indiana. Botanical Gazetteer 126: 155-163.

Lockridge, R. E.
1980 *LaSalle's Visit to Indiana, 1679.* In The Hoosier State: Indian Prehistory to the Civil War, edited by R. Gray, pp. 28-34. Readings in Indiana History 1. William B. Eerdmans Publishing Co., Grand Rapids, MI.

Mason, Ronald J.
1981 *Great Lakes Archaeology.* New York: Academic Press, 1981.

McCord, Beth A. and Cochran, Donald R.
1994 *Excavation of a Albee Phase Habitation Site in Crawfordsville, Montgomery County, Indiana.* Archaeological Resources Management Service, Ball State University Reports of Investigation #38. Muncie, IN 47306.

McGregor, John R.
1987 *A Survey of West Central Indiana Rural Sites of the Contact/Exploration and Pioneer Settlement Periods.* Indiana State University, Terre Haute, IN.

Meadows, William C. and Charles Bair
1997 *An Archaeological Survey of High Priority Areas in Monroe County in South Central Indiana. Reports of Investigations 97-02.* Glenn Black Laboratory, Indiana University, Bloomington, IN.

Miller, Rex K.
1941 *The McCain Site, Dubois County, Indiana.* Indiana Historical Society, Indianapolis, IN.

Munson, Cheryl A.
1995 *An Archaeological Survey of Caborn-Welborn Phase Settlements in the Vicinity of the Caborn Site, Posey County, Indiana.* Indiana Dept. of Natural Resources-Division of Historic Preservation, Indianapolis, IN.

Munson, Patrick
1976 *Archaeological Study: An Assessment of the Impact of Monroe Reservoir on Prehistoric Cultural Resources.* Glenn Black Laboratory, Indiana University, Bloomington, IN.

Myers, Jeffrey
1986 *An Archaeological Reconnaissance of Proposed Site #2 Woodbridge Postal Station, Monroe County, Indiana.* Glenn Black Laboratory, Indiana University, Bloomington, IN.

Nance, Jack D. and Bruce F. Ball
1986 *No Surprises? The Reliability and Validity of Test Pit Sampling.* American Antiquity 51: 457-483.

Natt, Wendy L.
1999 *Archaeological Reconnaissance of the Proposed Leonard Springs Nature Park in Monroe County, Indiana.* Glenn A. Black Laboratory of Archaeology Report of Investigations No. 99-9, Indiana University, Bloomington.

Noel, James
1986 *An Archaeological Reconnaissance for Proposed Utility Pole and Line Construction Projects in of Greene, Monroe, and Lawrence Counties, Indiana.* Glenn Black Laboratory, Indiana University, Bloomington, IN.

Pace, Robert E.
1979 *Archaeological Reconnaissance, S.R. 37 and S.R. 48 Intersection Improvements, Monroe County, Indiana.* Anthropology Laboratory, Indiana State University, Terre Haute, IN.

Parmalee, Paul W., Patrick Munson, and John Guilday
1978 *The Pleistocene Mammalian Fauna of Harrodsburg Crevice, Monroe County, Indiana.* NSS Bulletin 40:64-75. National Speleological Society.

Petty, P. O. and M. T. Jackson
1966 *Plant Communities.* In Natural Features of Indiana, edited by Alton A. Lindsey, pp. 264-296. Indiana Academy of Science, Indianapolis.

Pope, Melody, et. al.
2003 *Archaeological Investigations as Site 12-Du-73, An Upland Mississippian Village in the White River Valley, East Fork.* Glenn A Black Laboratory of Archaeology, Indiana University, Bloomington, Indiana.

Purtill, Matthew P. and Marcia Vehling
2010 I-69 Corridor Tier 2 Studies Evansville to Indianapolis: Phase Ia Archaeological Investigations Section 4, US 231 to SR 37. Gray & Pape, Inc., Cincinnati, IN.

Quimby, G. I.
1941 *The Goodall Focus, An Analysis of Ten Hopewellian Components in Michigan and Indiana.* Prehistory Research Series 2 (2). Indiana Historical Society, Indianapolis, IN.

Redmond, Brian G.
1986 *Yankeetown Phase Settlement in the Lower Ohio Valley.* Glenn A Black Laboratory of Archaeology, Indiana University, Bloomington, Indiana.

Redmond, Brian G., and McCullough, Robert G.
1993 *Survey and Test Excavation of Late Prehistoric, Oliver Phase Components in Martin, Lawrence, and Orange Counties, Indiana.* Reports of Investigations 93-13. Glenn A Black Laboratory of Archaeology, Indiana University, Bloomington, Indiana.

Reid, K. C.
1984 *Fire and Ice: New Evidence for the Production and Preservation of Late Archaic Fiber-Tempered Pottery in the Middle-Latitude Lowlands.* American Antiquity 49: 55-76.

Ruby, Brett J.
1993 *An Archaeological Investigation of Mann Phase Settlement Patterns in Southwestern Indiana.* Reports of Investigations 94-15. Glenn A Black Laboratory of Archaeology, Indiana University, Bloomington, Indiana.

Rudolph, L. C.
1980 *The Settlers.* In The Hoosier State: Indian Prehistory to the Civil War, edited by R. Gray, pp. 28-34. Readings in Indiana History 1. William B. Eerdmans Publishing Co., Grand Rapids, MI.

Schaal, L. A.
1966 *Climate.* In Natural Features of Indiana, edited by Alton A. Lindsey, pp. 40-56. Indiana Academy of Science, Indianapolis.

Schneider, Allen F.
1966 *Physiography.* In Natural Features of Indiana, edited by Alton A. Lindsey, pp. 40-56. Indiana Academy of Science, Indianapolis.

Smith, Edward E.
1984 *Paleo-Indian/Early Archaic Settlement Patterns in Southcentral Indiana: Final Report.* Glenn A Black Laboratory of Archaeology, Indiana University, Bloomington, Indiana.

Springer, J. W.
1985 *Site Distribution, Environmental Adaptation and Environmental Change Along the Northern Edge of the Prairie Peninsula.* Wisconsin Archaeologist 66: 1-46.

Springer, J. W., C. C. Karch and W. F. Harrison
1978 *Early Archaic Hafted Stone Tools From Northern Illinois.* Wisconsin Archeologist 60: 277-309.

Stafford, C. Russell, C. Michael Anslinger, Mark Cantin, and Robert E. Pace
1988 *An Analysis of Data Center Site Surveys in Southwestern Indiana.* Anthropology Laboratory, Indiana State University, Terre Haute, IN.

Stillwell, Larry N.
1999 *An Archaeological Field Reconnaissance of a Proposed Cellular Phone Tower (Project # MW02505D) near Modesto, Monroe County, Indiana.* Archaeological Consultants of Ossian, Muncie, IN.
2000a *An Archaeological Field Reconnaissance of a Proposed Cellular Phone Tower (Project # IN-0532) near Bloomington, Monroe County, Indiana.* Archaeological Consultants of Ossian, Muncie, IN.
2000b *An Archaeological Field Reconnaissance of a Proposed Cellular Phone Tower (Project # 00-0141-47 in Bloomington, Monroe County, Indiana.* Archaeological Consultants of Ossian, Muncie, IN.

2001a *An Archaeological Field Reconnaissance of a Proposed Cellular Phone Tower (Site #91666) near Sanders, Monroe County, Indiana.* Archaeological Consultants of Ossian, Muncie, IN.

2001b *An Archaeological Field Reconnaissance of a Proposed Cellular Phone Tower (Site #91665) near Modesto, Monroe County, Indiana.* Archaeological Consultants of Ossian, Muncie, IN.

2003a *An Archaeological Field Reconnaissance of the Proposed S.R. 46 Road Rehabilitation (Des. 0014800) in Monroe and Brown Counties, Indiana.* Archaeological Consultants of Ossian, Muncie, IN.

2003b *An Archaeological Field Reconnaissance of a Proposed Cellular Phone Tower (Project # 017-3E041) in Bloomington, Monroe County, Indiana.* Archaeological Consultants of Ossian, Muncie, IN.

2004 *An Archaeological Field Reconnaissance of the Proposed Reconstruction of West Third Street from Wynnedale Drive to Landmark Avenue (Project #STP-9953(020)) in Bloomington, Monroe County, Indiana.* Archaeological Consultants of Ossian, Muncie, IN.

2005a *An Archaeological Field Reconnaissance of a Proposed Cellular Phone Tower (Project #IN-0612) near Lake Monroe, Monroe County, Indiana.* Archaeological Consultants of Ossian, Muncie, IN.

2005b *An Archaeological Field Reconnaissance of a Proposed Cellular Phone Tower (Project #IN-0622) in Bloomington, Monroe County, Indiana.* Archaeological Consultants of Ossian, Muncie, IN.

2005c *An Archaeological Field Reconnaissance of the Proposed S. R. 37 Improvements (Project #NH-095-6(014), Des. 0300511) in Monroe County, Indiana.* Archaeological Consultants of Ossian, Muncie, IN.

2008 *An Archaeological Field Reconnaissance of a Proposed Habitat for Humanity Development in Bloomington, Monroe County, Indiana.* Archaeological Consultants of Ossian, Muncie, IN.

2010a *An Archaeological Field Reconnaissance of a Proposed Seniors Community in Bloomington, Monroe County, Indiana.* Archaeological Consultants of Ossian, Muncie, IN.

2010b *An Archaeological Field Reconnaissance of a Proposed Disposal Area (Contract #IR-29982-A) in Bloomington, Monroe County, Indiana.* Archaeological Consultants of Ossian, Muncie, IN.

2010c *An Archaeological Field Reconnaissance of Two Proposed Borrow Areas (Contract #IR-29982-A) in Modesto, Monroe County, Indiana.* Archaeological Consultants of Ossian, Muncie, IN.

2011a *An Archaeological Field Reconnaissance of the Proposed Will Detmer Park in Bloomington, Monroe County, Indiana.* Archaeological Consultants of Ossian, Muncie, IN.

2011b *An Archaeological Field Reconnaissance of the Proposed Fullerton Pike Improvements (Des. No. 0801059) in Bloomington, Monroe County, Indiana.* Archaeological Consultants of Ossian, Muncie, IN.

2012a *An Archaeological Field Reconnaissance of the Hoosier Energy Campus in Bloomington, Monroe County, Indiana.* Archaeological Consultants of Ossian, Muncie, IN.

2012b *An Archaeological Field Reconnaissance of a Proposed Development near Bloomington, Monroe County, Indiana.* Archaeological Consultants of Ossian, Muncie, IN.

Struever, Stuart
1964 *The Hopewell Interaction Sphere in Riverine-Western Great Lakes Culture History.* In Hopewell Studies pp. 85-106. Scientific Papers 12. Illinois State Museum, Springfield, IL.

Tankersley, Kenneth B.
1987 *Patterns in Lithic Resource Procurement and Exploitation among Early Paleoindians of Indiana.* Reports of Investigations 87-60. Glenn A Black Laboratory of Archaeology, Indiana University, Bloomington, Indiana.

Tankersley, Kenneth B., Edward Smith & Donald Cochran.
1990 *Early Paleoindian Land Use, Mobility, and Lithic Exploitation Patterns: Updated distribution of Fluted Points in Indiana.* North American Archaeologist 11:301-19.

Thomas, Jerry A.
1981 *Soil Survey of Monroe County, Indiana.* United States Department of Agriculture Soil Conservation Service and Purdue Agricultural Experiment Station, West Lafayette.

Tomak, Curtis H.
1970 *Aboriginal Occupations in the Vicinity of Greene County, Indiana.* MA Thesis, Department of Anthropology, Indiana University, Bloomington, IN.
1981 *Cherts and Their Utilization in an Area of Southwestern Indiana.* Paper presented at the Annual Meeting of the Indiana Historical Society, Indianapolis, IN.
1983 *A Proposed Prehistoric Cultural Sequence for a Section of the Valley of the West Fork of the White River in Southwestern Indiana.* Tennessee Anthropologist 8(1):67-94.
1984 *Prehistoric Occupations of a Section of the Valley of the East Fork of White River in Southern Indiana.* Paper prepared for the archaeological session of the annual meeting of the Indiana Historical Society. Indianapolis.
1986 *Archaeological work for IDOH Project F-056-5( ), 45-53-6238, Monroe County, Indiana.* Indiana Dept. of Highways, Indianapolis, IN.
1993 *The Mount Vernon Site: A Hopewell Ceremonial Site in Posey County, Indiana.* Indiana Department of Transportation, Indianapolis, 1990. Report on file at IDNR, DHPA.
1995 *Archaeological Work for INDOT Project NH-062-5( ), Stephens Creek, SR 46, Monroe County.* Indiana Department of Transportation, Indianapolis, IN.

Ulrich, H.P.
1966 *Soils.* In Natural Features of Indiana, edited by Alton A. Lindsey, pp. 57-90. Indiana Academy of Science, Indianapolis.

Wayne, W. J.
1963 *Pleistocene Formations in Indiana.* Geological Survey Bulletin 25. Department of Natural Resources, Bloomington, IN.
1966 *Ice and Land: A Review of the Tertiary and Pleistocene History of Indiana.* In Natural Features of Indiana, edited by Alton A. Lindsey, pp. 21-39. Indiana Academy of Science, Indianapolis.

Will, Bryan and Melody Pope
2004 *Phase Ia Archaeological Reconnaissance Survey of Proposed Lake Monroe Access and Pumping Unit Areas, Monroe County, Indiana.* Glenn A Black Laboratory of Archaeology, Indiana University, Bloomington, Indiana.

Williams, Alice S.
1974 *Late-Glacial-Postglacial Vegetational History of the Pretty Lake Region, Northeastern Indiana.* Geological Survey Professional Paper 686-B. United States Department of the Interior, Washington, D.C.

Winters, Howard D.
1967 *The Riverton Culture-A Second Millennium Occupation in the Central Wabash Valley.* Illinois State Museum & The Illinois Archaeological Survey, Springfield, IL.

Wolforth, T.
1996 *An Analysis of the Distribution of Steuben Punctated Ceramics.* Wisconsin Archaeologist.

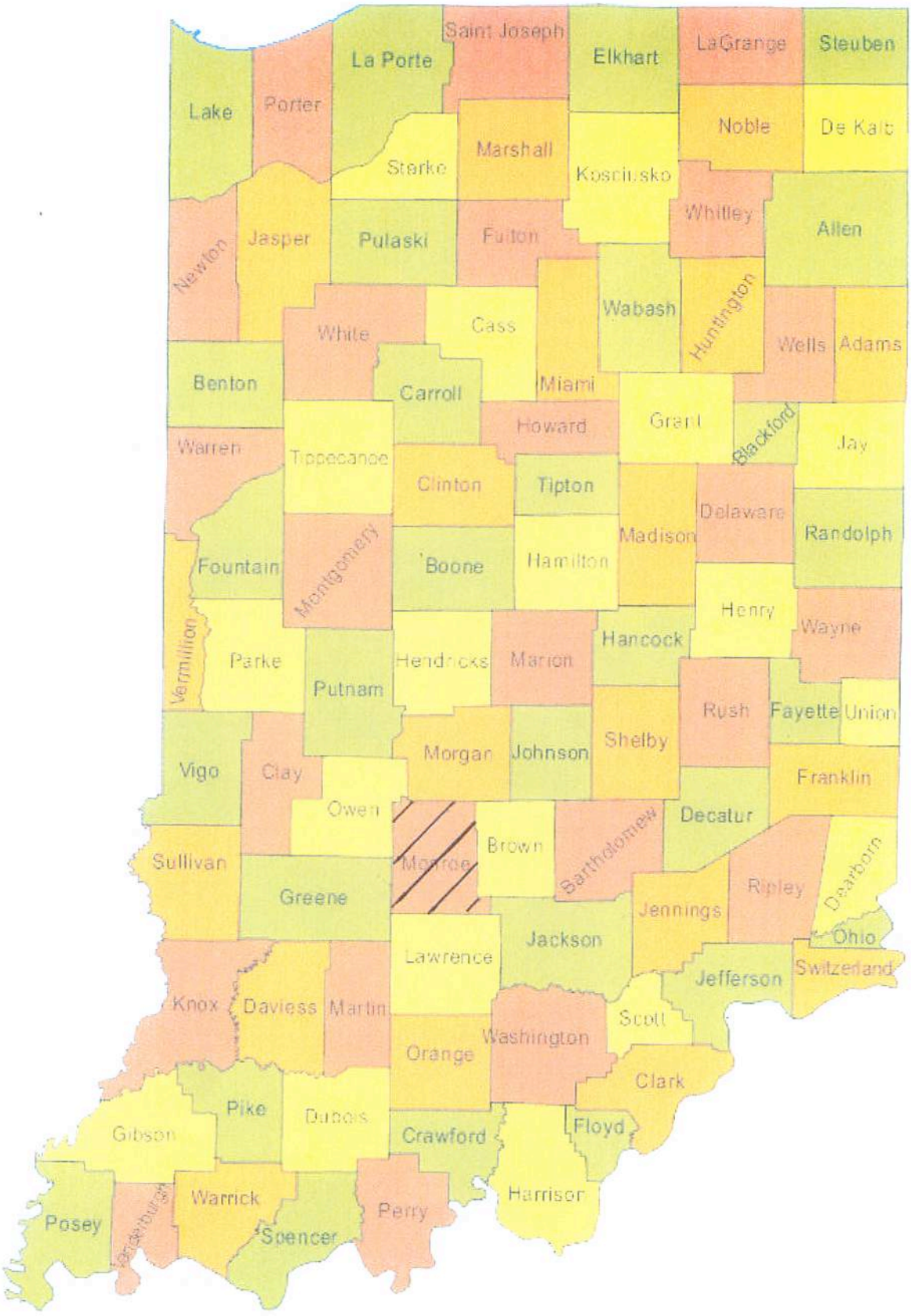


Figure 1. Location of Monroe County within the State.

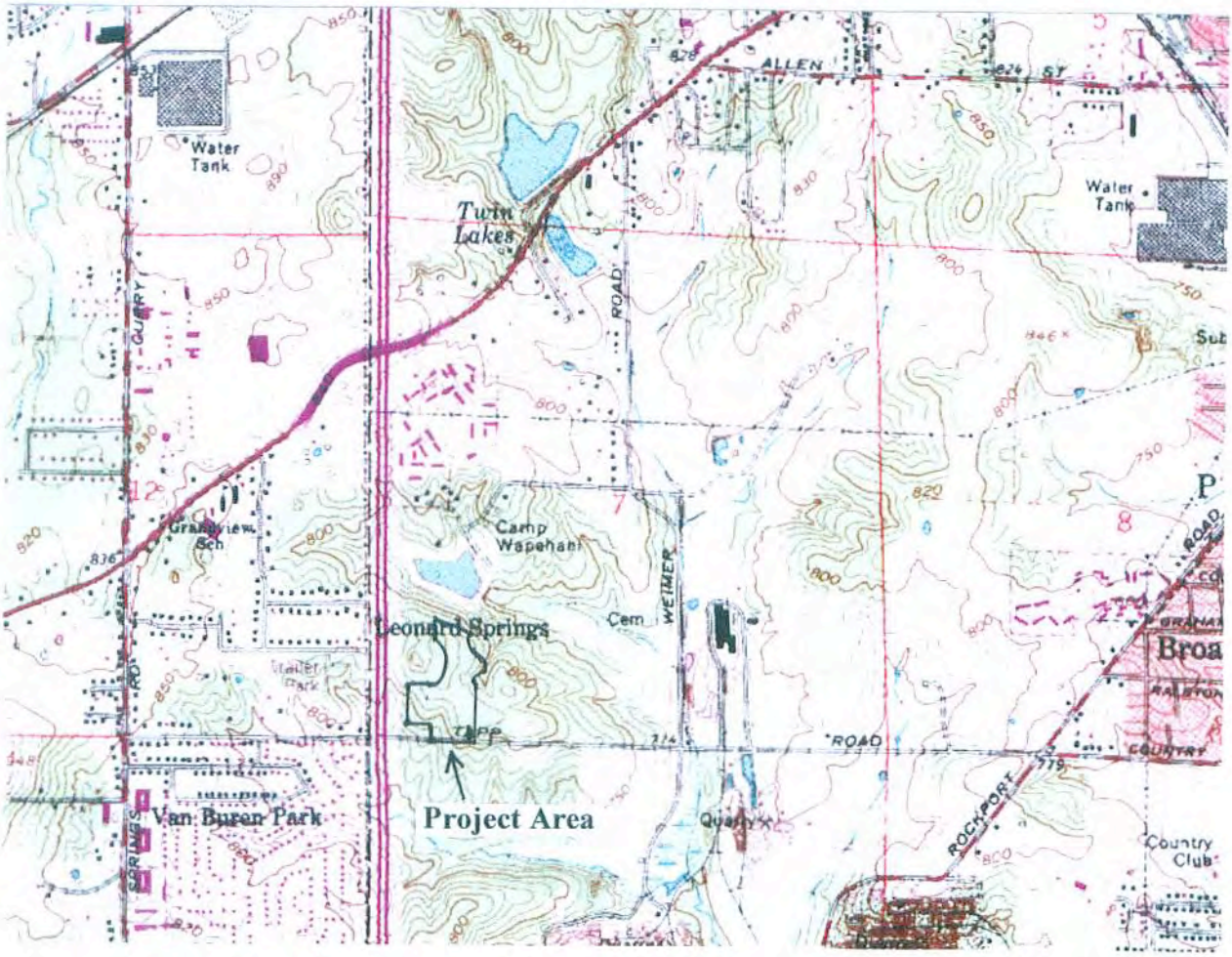


Figure 2. Portion of USGS 7.5' Bloomington, Indiana Quadrangle showing the project area.

Figure 3. Aerial Map of the Project.

APPENDIX D - KARST ASSESSMENT

Bledsoe Riggert Guerrettaz
LAND SURVEYING · CIVIL ENGINEERING

February 9, 2013

Matt Mabrey, Manager – Facilities Construction Project Manager
Management Services Division
Hoosier Energy REC, Inc.
7398 N. State Road 37
Bloomington, IN 47404 via email Mmabrey@HEPN.com

Re: Hoosier Energy Headquarters
Karst Assessment – Mill Creek Phase I

Dear Matt,

The following serves to address your request for a karst assessment of the Hoosier Energy site within the Mill Creek Phase I Subdivision. Mill Creek Phase I is located at the northeast corner of the intersection of State Road 37 and Tapp Road in Bloomington, Indiana.

We understand that Hoosier Energy is in the process of acquiring Lots 1, 6, 7, 8, 10, 11, 12, and 13 and possibly Lot 2 of the Mill Creek Phase I Subdivision for the site of their new headquarters facility.

I have reviewed the following documents in an effort to assess the potential that karst features may be encountered within the project site:

1. Mill Creek Phase I Boundary & Topographic Survey prepared by Bledsoe Riggert & Guerrettaz dated July 18, 2012. This Survey identifies the lots that are of interest to Hoosier Energy.

2. Mill Creek Village Environmental Analysis prepared by Smith Neubecker & Associates (SNA) dated February 24, 2003. This report provides a general overview of karst and other environmental features located within the area bounded by SR-37 on the west, Tapp Road on the south, Weimer Road on the east, and Wapehani Road and the City of Bloomington Wapehani Mountain Bike Park to the north. The area of this study reaches well beyond the Mill Creek Phase I Subdivision which resides in its southwest corner. The report makes reference to the investigations performed by John Bassett and James Keith of Earth Tech and provides inventory maps of their findings. It also includes a detailed site inventory map that lists SNA's observations from their site reconnaissance.

3. Karst Inventory of Tapp Road Property Memo prepared by John Bassett of Earth Tech dated December 2002 with Figure 1 and Drawing 'B'. Drawing 'A' was not in the file. John Bassett's memo provides a detailed description of the overall property bounded by SR-37 on the west, Tapp Road on the south, Weimer Road on the east, and Wapehani Road and the City of Bloomington Wapehani Mountain Bike Park to the north and its geology. The memo also provides a comprehensive account of his examination of the site and its features. John describes each of his findings and references them on Figure 1 and cross references them to Drawing 'B', the SNA site reconnaissance noted in Document 2 above.

4. City of Bloomington Unified Development Ordinance Section 20.05.042 – Environmental Standards; Karst Features. This reference defines the City of Bloomington's regulations regarding karst features.

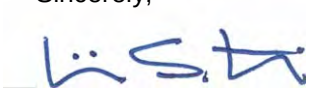
Copies of these documents are attached for your reference.

It is my opinion, based on John Bassett's work, that karst features should not be encountered within the portion of the Mill Creek Phase I Subdivision that Hoosier Energy is interested in developing. In the

unlikely event that karst features are encountered during construction of the anticipated Hoosier Energy Headquarters development I would recommend that a team of geotechnical and structural engineering experts be engaged to evaluate the condition and provide a suitable solution to address situation. It should be noted that the City of Bloomington's Unified Development Ordinance acknowledges karst geology and regulates land disturbing activities within karst features. It may be necessary to consult with the City of Bloomington Planning Department to discuss these regulations and seek a variance or related approvals to continue work.

Please contact me if you have any questions.

Sincerely,



William S. Riggert, PE
Principal

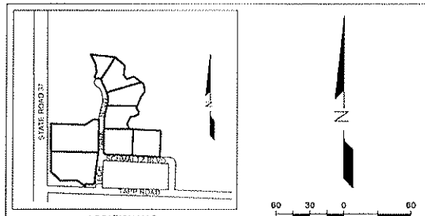
Attachments

xc: File – Project No. 7662

7662 – Mill Creek Karst Assessment_2013-02-09

BOUNDARY AND TOPOGRAPHIC SURVEY

A PART OF MILL CREEK PHASE I, BEING A PART OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 7, TOWNSHIP 8 NORTH, RANGE 1 WEST
MONROE COUNTY, INDIANA



LOCATION MAP
NOT TO SCALE

DATUM:

HORIZONTAL DATUM: STATE PLANE, NAD83, 1302-INDIANA WEST, US SURVEY FEET
VERTICAL DATUM: NAVD88, US SURVEY FEET

CONTROL POINTS				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
1	1416951.6280	3098151.6480	805.88	REBAR/ RED CAP
2	1417725.0558	3098097.3960	828.94	MAG NAIL
4	1416956.1292	3098417.7020	819.74	MAG NAIL
307	1417267.8868	3098130.9357	826.10	MAG NAIL

NOTES:

1. FIELD WORK COMPLETED JUNE 2012.
2. ALL REBAR SET ARE ½" WITH YELLOW PLASTIC CAP STAMPED "BRG PLS09290004" AND ARE 0.3' ABOVE GRADE UNLESS OTHERWISE NOTED.
3. BASIS OF BEARINGS: INDIANA STATE PLANE WEST ZONE 1302, NAD83, US SURVEY FEET.
4. VERTICAL CONTROL IS BASED ON "ON SITE" STATIC GPS OBSERVATIONS, NAVD88, US SURVEY FEET.

S:\global\7501-7600\7538 MILL CREEK (S.R. 37 & TAPP RD)\dgn\7538_SURVEY_C3D2012.dwg

REPORT OF SURVEY:

In accordance with **Title 865, 1-12-1 through 1-12-30** of the **Indiana Administrative Code**, the following observations and opinions are submitted regarding the various uncertainties in the locations of the lines and corners established on this survey as a result of:

a. Reference monuments of record
b. Title documents of record
c. Evidence of adverse lines of occupation
d. Relative Positional Accuracy "RPA"

The Relative Positional Accuracy "RPA" (due to random errors in measurement) of this survey is within that allowable for an urban survey (0.07 feet plus 50 ppm) as defined IAC, Title 865 ("Relative Positional Accuracy" means the value expressed in feet or meters that represents the uncertainty due to random errors in measurements in the location of any point on a survey relative to any other point on the same survey at the 95 percent confidence level").

In regard to **"ACTIVE LINES OF OCCUPATION"** - point (c) above. ACTIVE refers to lines which are marked by visible, obvious, well defined and maintained, man-made or placed objects, such as, but not limited to, fences, hedges and retaining walls. The uncertainty cited for a line of occupation is general in nature and is NOT intended to be specific for every point along the line. Therefore portions of the occupation line may vary from the surveyed line by a distance greater or less than uncertainty cited in this report.

This survey is a Retracement Boundary Survey.

This survey was performed at the request of Public Investment Corporation.

The property is currently in the name of Public Investment Corporation per the plats recorded as Instrument # 2009017173 and # 2005022765 in the Office of the Recorder of Monroe County, Indiana. The following Lots were surveyed: Lot 1 and Lots 6-8 of Mill Creek, Phase 1 Final Plat as recorded in Plat Cabinet D, Envelope 21 as Instrument # 2005022765 and Lots 10-13 of Mill Creek, Phase 1, Replat of Lot 10, Final Plat as recorded in Plat Book D, Envelope 83 as Instrument # 2009017173.

The field work was completed on June 25, 2012.

MONUMENTS FOUND:

1. Northeast corner of Lot 3; 5/8" rebar w/ SNA cap found flush, original subdivision corner.
2. Northwest corner of Lot 3; 5/8" rebar w/ SNA cap found flush, original subdivision corner.
3. Northwest corner of Lot 8; 5/8" rebar w/ SNA cap found 0.3' above grade, original subdivision corner.
4. Northwest corner of Lot 9; 5/8" rebar w/ SNA cap found 0.2' above grade, original subdivision corner.
5. Northeast corner of Lot 6; 5/8" rebar w/ SNA cap found flush, original subdivision corner.

PRIOR SURVEYS:

A. Mill Creek, Phase 1 Final Plat as recorded in Plat Cabinet D, Envelope 21 as Instrument # 2005022765 by James D. Smale of Smith Neubecker and Associates, dated November 1, 2005.
B. Mill Creek, Phase 1, Replat of Lot 10, Final Plat as recorded in Plat Book D, Envelope 83 as Instrument # 2009017173 by Stephen L. Smith of Smith Neubecker and Associates dated August 11, 2009.

DEED ANALYSIS:

There were significant mathematical errors found on the replat of Lot 10 ("Prior Surveys"- Plat B). Smith Neubecker and Associates was contacted and they provided coordinates for many of the corners so that the correct bearings and distances could be calculated. Very few of the corners within the subdivision were found.

ESTABLISHMENT OF LINES AND CORNERS:

Monuments 1 and 2 above in "Monuments Found" were held and used to reestablish the rest of the corners of the subdivision at record bearings and distances except where noted below. All monuments noted in the "Monuments Found" section were held as good.

There is a small triangle of land dedicated to conservation easement near the southeast corner of Lot 1 of Plat A (above in "Prior Surveys") that is dimensioned in an ambiguous way. It is not clear if this land is intended to be a part of Lot 1 or if it is supposed to be included in the land dedicated to Tapp Road. The platted acreage equals the calculated acreage if it is included in Lot 1 and it seems unlikely that the City of Bloomington would accept dedicated right-of-way that is also a dedicated conservation easement. For these reasons the triangular portion of land was included in Lot 1 for the purposes of this survey.

The acreage of Lot 8 is platted as 3.14 acres. The calculated acreage is 2.84 acres. The reason for the discrepancy could not be determined.

The south line of Lot 10 on Plat B does not agree with the same line as shown on Plat A. The dimension of 280.61 should read 244.29 because it should not include the 36.32 feet that are actually a part of Lot 5 (Plat A). The dimension of 244.29 was held for this survey. The east line of Lot 10 on Plat B that is platted as 11.55 feet is also in error. The distance of the line on the plat scales at ~26 feet. When the coordinate sheet from Smith Neubecker was consulted this distance was shown to be 24.76 feet. A similar problem was found with the east line of Lot 12 that is platted as 92.56 feet but is shown to be 74.60 feet per the coordinate sheet. All of these errors were corrected with this survey in order for the lots to close mathematically.

There were several discrepancies with the curve data table found on Plat B and the provided coordinate sheet. Two of the curves in the data table appear to have been annotated across multiple lots, resulting in distances that are drastically different from the calculated distances. Curve 5 from Plat B has a record curve length of 127.52 feet and a calculated curve length of 89.17 feet. Curve 7 from Plat B has a record curve length of 82.06 feet and a calculated curve length of 51.02 feet. Several other curves were adjusted in order to fit the north-south line of the lots to the east-west lines of the lots. Coordinates provided for the intersection of the east-west lines with the east right-of-way of the road were used for the beginning and end points of the curves.

As a result of the above observations, it is my opinion that the uncertainties in the location of the lines and corners established on this survey are as follows:

Due to *Availability and condition of reference monuments* ..0.2 foot.

Due to *Occupation or possession lines* , none noted.

Due to *Clarity or ambiguity of the record description used and of adjoiners' descriptions and the relationship of the lines of the subject tract with adjoiners' lines* ..as much as 38' due to plat inaccuracy.

RECORD LEGAL DESCRIPTION:

Lot 1 and Lots 6-8 of Mill Creek, Phase 1 Final Plat as recorded in Plat Cabinet D, Envelope 21 as Instrument # 2005022765 and Lots 10-13 of Mill Creek, Phase 1, Replat of Lot 10, Final Plat as recorded in Plat Book D, Envelope 83 as Instrument # 2009017173

Subject to any easements of record.

This survey was executed according to survey requirements contained in Sections 1 through 19 of 865 IAC 1-12.

This certification does not take into consideration additional facts that an accurate and correct title search and/or examination might disclose.

Evidence of easements have not been located in the field and are not shown on this survey drawing.

Subject to the above reservation, I hereby certify that the survey work performed on the project shown hereon was performed either by me or under my direct supervision and control and that all information shown is true and correct to the best of my knowledge and belief.

Certified this 18th day of July, 2012

Ben E. Bledsoe
Registered Land Surveyor No. S0559
State of Indiana
ben@bigcivil.com

LEGEND:

A YARD LIGHT	FENCE	FD AXEL
LIGHT POLE	GUARDRAIL	FD BRASS DISK
SIGNAL POLE	OVERHEAD WIRES	FD COT GIN SPOLE
UTILITY POLE	UNDER ELEC.	FD CHISELED X
GUY WIRE	GAS LINE	SET CHISELED X
CATCH BASIN	SAN. SEWER LINE	SET DRILL HOLE
CURB INLET	STORM SEWER LINE	FD HARRISON MON.
ELECTRIC MH	UNDER TELEPHONE	SET HARISON MON.
MANHOLE	EXISTING WATER LINE	SET HUB/TACK
PHONE MH	CHILLED WATER LINE	FD REBAR
SANITARY MH	SIGN	SET REBAR
SIGNAL MH	R.O.W. MON.	FD MAG NAIL
STEAM MH	MONITORING WELL	SET MAG NAIL
STORM MH	BOLLARD	FD NAIL
WATER MH	BORE HOLE	SET NAIL
ELEC. METER	DOWNSPOUT	FD PIPE
CLEANOUT	GATE POST	FD RR SPIKE
GAS METER	POLE	SET RR SPIKE
GAS VALVE	PARKING METER	FD STONE
WATER VALVE	SPIGOT	RECORDED B&D
FIRE HYDRANT	T-POST	MEASURED B&D
SPR. HOOKUP	WOOD POST	CALCULATED B&D
SPRINKLER	PARKING SPACES	PROPORTIONAL DIST.
	TRANSFORMER	ABOVE GROUND
	ELEC. VAULT	BELOW GROUND
	PHONE VAULT	CONIF. TREE
	STEAM VAULT	DECID. TREE
	VALVE VAULT	
	AC UNIT	SHRUB
	PHONE BOOTH	
	BIRD FEEDER	PHONE RISER--BOX
	MAILBOX	TV RISER--BOX
	PROP. TANK	ELEC. RISER--BOX
	PARKING BLOCK	GAS RISER--BOX

Revision	By	Date
REVISED CONTROL ON LOT 1 BASED ON ADDITIONAL SURVEY INFO	BEB	9/13/12
REVISED CONTROL INFORMATION	BEB	11/9/12

Bledsoe Riggert Guerrettaz
LAND SURVEYING · CIVIL ENGINEERING
1351 West Tapp Road
Bloomington, Indiana 47403
P: 812-336-8277
F: 812-336-0817
E: ben@bigcivil.com

MILL CREEK PHASE 1
TAPP ROAD
FOR
PUBLIC INVESTMENT CORPORATION

SURVEYED BY: A.BLEDSOE
DRAWN BY: R. OSER
CHECKED BY: B.BLEDSOE
DATE: JUN 2012

BOUNDARY & TOPOGRAPHIC SURVEY

SHEET 1 OF 1

PROJECT NO. 7538

Environmental Analysis

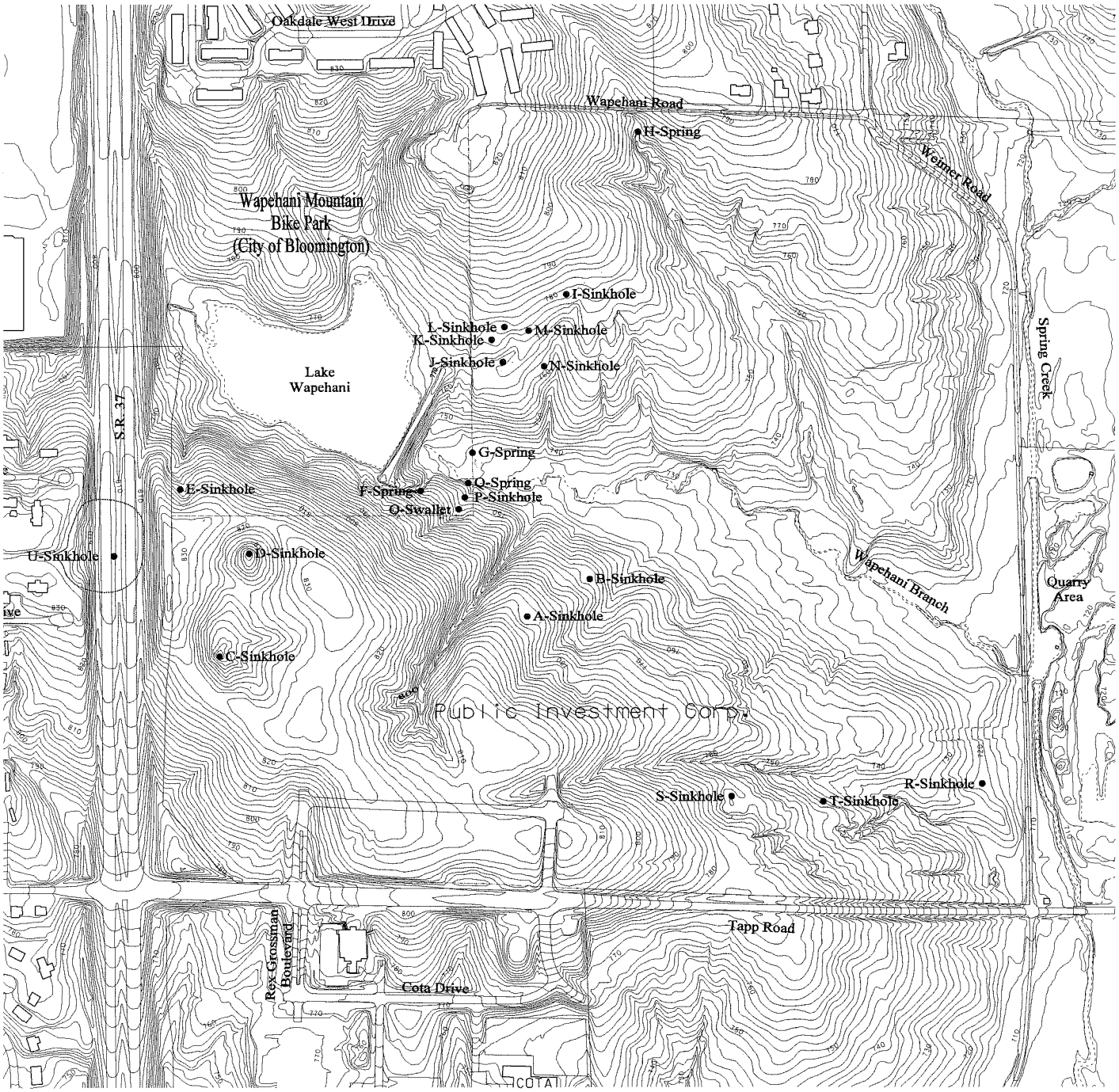
Karst Inventory

Earth Tech was retained to conduct a review of the karst features on the Mill Creek Village site. John Basset of Earth Tech has provided a report of his findings. Prior to his review two maps were provided for his use. One was prepared by City Planning Staff and was dated September 29, 2002 and called Wooded Areas, Floodplain, Wetlands, and Potential Karst Features. The other was prepared by Smith Neubecker & Associates showing 47 areas, including karst features, identified during an earlier site reconnaissance.

A number of suspected karst features were not found or were not considered karst features. Several additional karst features were found and mapped. Several karst features were found to be not accurately located.

The Mill Creek Village plan has subsequently been revised to reflect these findings. Where sinkholes were clustered; they were aggregated within larger open space buffers. Where single karst features were found, buffers of at least twenty-five feet from the last closed contour have been called for. In one case, a karst feature was found in the path of a proposed roadway. That roadway has been removed from the plan.

Illustration 9 is a map of the findings provided by John Bassett. His complete report is provided with our application.



EARTH TECH

Karst Inventory Map

Explanation

- Site Boundary
- Water Feature
- Topographic Contour 2 Foot Contour Interval
- Karst Feature
- Approximate Limit of Buried Sinkhole

Base Provided by City of Bloomington Utilities

Smith Neubecker & Associates, Inc.

453 S. Clarizz Blvd.
Bloomington, Indiana, 47401
Telephone: (812) 336-6536

Public Investment Corporation Presents

MILL CREEK VILLAGE

Wetlands Inventory

Earth Tech was retained to conduct a wetlands determination and delineation for the project. James H. Keith of Earth Tech has provided a report of his findings. Illustration 10 is a map of these findings. His executive summary reads as follows:

"Earth Tech evaluated the Tapp Road Site (Site) to determine if jurisdictional wetlands are present. This 143-acre parcel of land is located north and east of the intersection of Tapp Road and the State Road 37 Bypass on the southwest side of Bloomington, Indiana. The Site is presently underdeveloped, and consists of hilly land that is primarily wooded. It is bounded by the State Road 37 Bypass on the west, by Tapp Road on the south, by Weimer Road on the east, and by open and residential land on the north."

"There are some open grassed fields on the east side of the Site. A stream draining Lake Wapehani (formerly Lake Weimar) runs easterly across the Site and the discharges into Spring Creek immediately east of Weimar Road. Lake Wapehani is situated on a mountain bike park and is owned by the City of Bloomington. However, the entire Site contains mountain bike trails. There are a number of karst features on the Site. These consist of sinkholes, slumps, springs, and seeps. None of the karst features were found to contain wetlands."

"Based on this wetland determination and delineation, two jurisdictional wetlands were identified along the stream that drains Lake Wapehani. Wetland W-1 is located just downstream of the Lake Wapehani Dam. It is a saturated, broad-leaved deciduous palustrine scrub-shrub wetland (PSS1B) covering approximately 0.56 acres. The wetland is fed by a seep line in the north side toe of the stream valley. It is bounded by the toe of the Lake Wapehani Dam slope on the west, by the seep line on the north, by the north bank of the stream on the south, and by dry ground on the east, where the seep line ends."

"Wetland W-2 is located about 700 feet downstream from W-1. It is a permanently flooded, broad-leaved deciduous scrub-shrub/emergent wetland that is present as the result of a series of beaver dams across the stream (PSS1/EMHb). The wetland covers approximately 0.95 acres. It is bounded on the west (upstream end) by the point where the stream flow entering the uppermost pool becomes imperceptible. It is bounded on the north by the toe of the ridge slope, on the east by the last beaver dam across the stream, and on the south by the stream margin on the south bank."

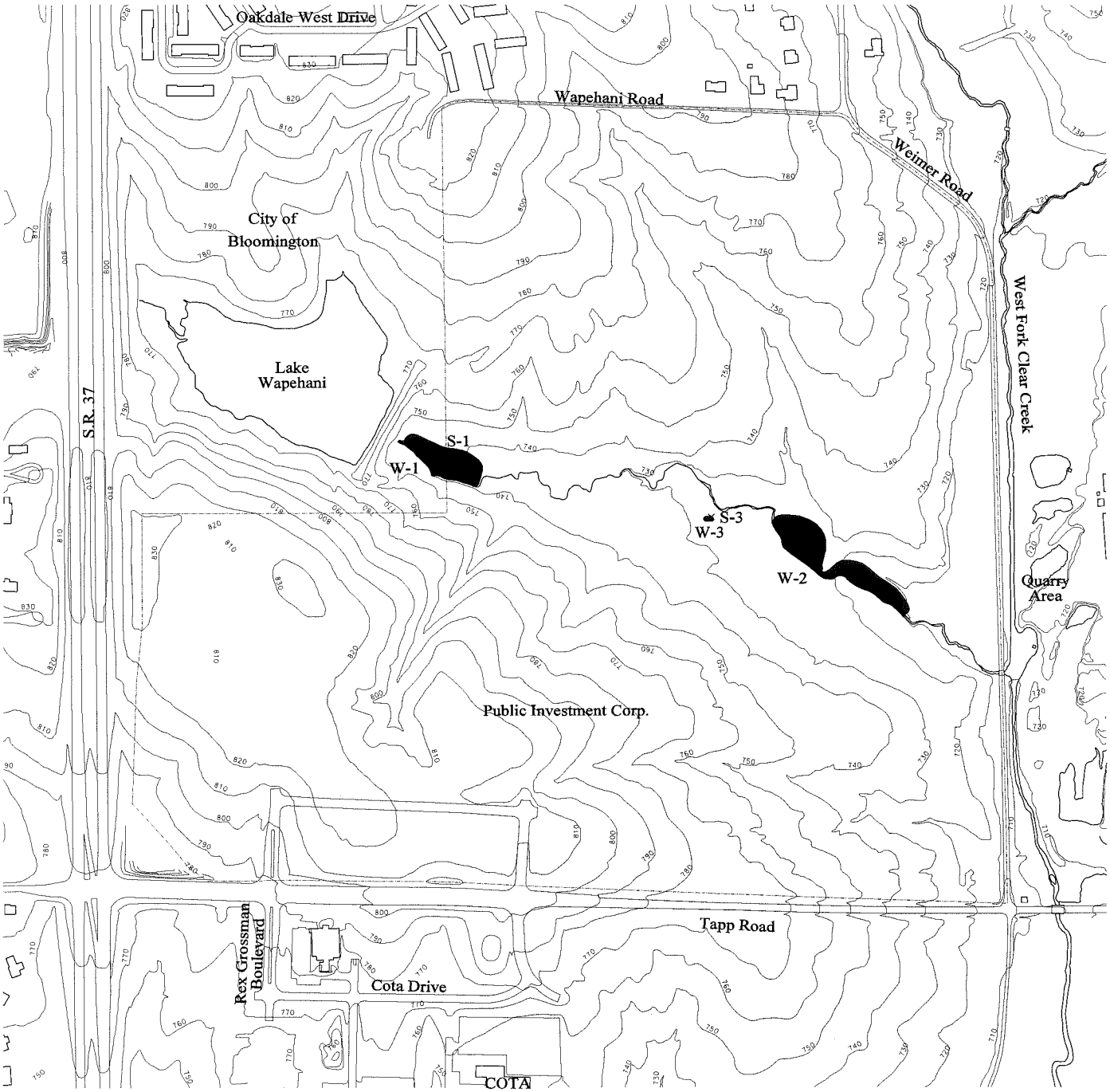
"An area designated W-3 was also evaluated. This area consists of a small excavated or eroded basin in a shallow swale on the grassed valley floor. The area was dominated by hydrophytic plants and had wetland hydrology. However, the soil, though presently inundated, is a subsoil with no hydric characteristics. The area did not appear on recent aerial photographs of the Site, and it appears to be recently formed, perhaps as part of one of the mountain bike trails. A number of other small basins were identified in upland areas that were created for that purpose."

"The boundaries of areas determined to be wetlands were flagged in the field for later survey."

"If encroachment or disturbance of either wetland is anticipated as a result of development or construction on the Site, it is recommended that proper notification be made to the following agencies, once the type and degree of encroachment is known:"

- U.S. Army corps of Engineers, Louisville District
- Indiana Department of Environmental Management
- Indiana Department of Natural Resources

The Mill Creek Village plan has subsequently been revised to reflect these findings. In one case a proposed roadway was planned to cross a mapped wetland along the creek that drains from Wapehani Lake. That roadway has been eliminated from the plan. The proposed development does not intend to encroach on either of the jurisdictional wetlands found.



EARTH TECH

Wetlands Inventory Map

Explanation

- Site Boundary
- Water Feature
- 750 Topographic Contour 10 Foot Contour Interval
- W-1 Wetland
- S-1 × Soil Sample Location

Base Provided by City of Bloomington Utilities

Smith Neubecker & Associates, Inc.
4625 Morningside Drive
Bloomington, Indiana, 47401
Telephone: (812) 336-6536

Public Investment Corporation Presents

STONEY CREEK VILLAGE

site inventory Map

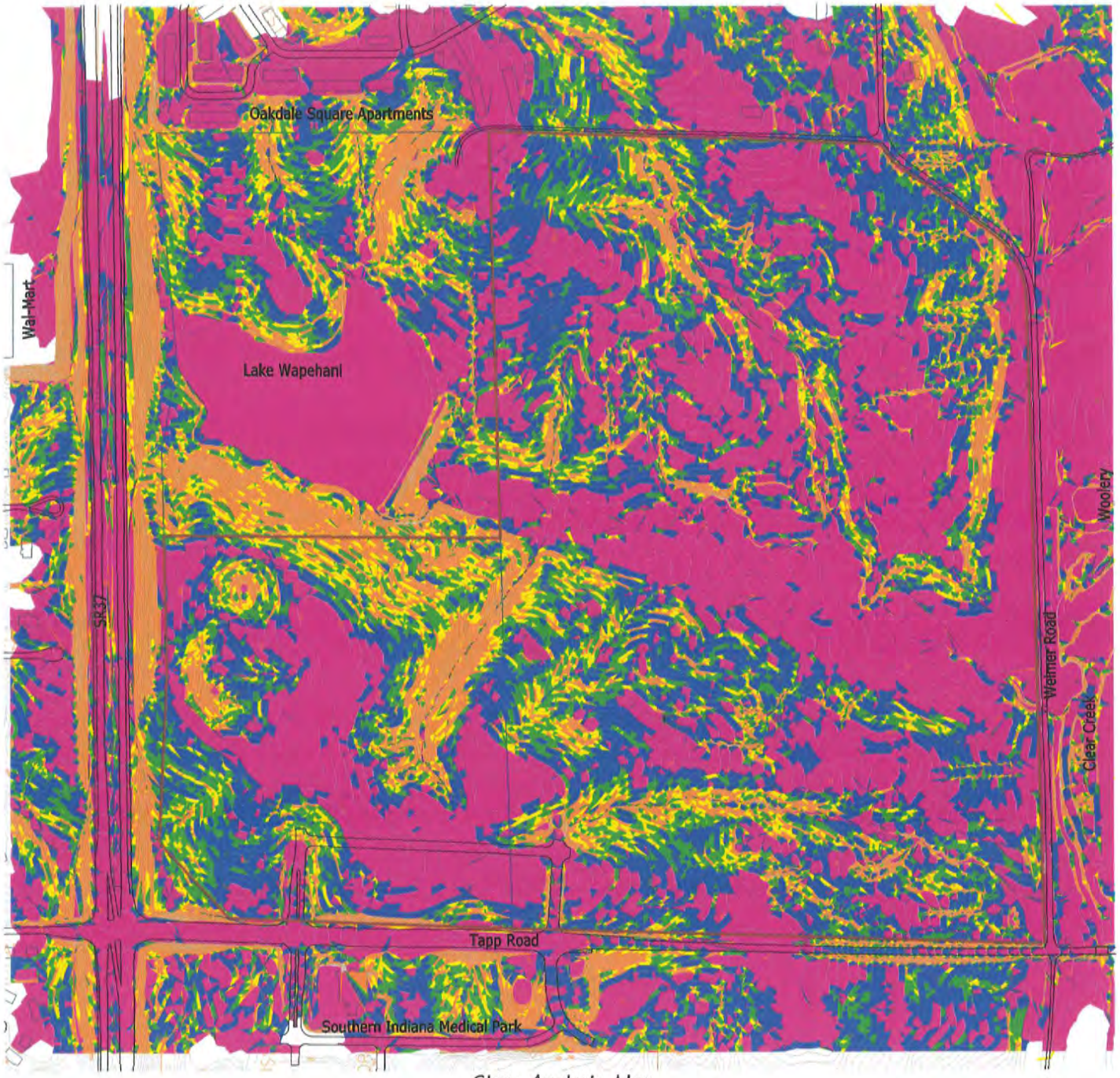
Tapp Road Site Reconnaissance: 11/28/01

1. Wooded hillside with slopes of around 10-12 percent. Trees are predominantly small diameter with Cherries, Maples, Beech and a few scattered 18"-24" Oaks. The Highway is quite visible and very noisy, especially this time of year.
2. Largest sinkhole in double bottom pair of sinkholes. Did not observe open crevice or water standing. Side slopes ranging from 10-20 percent. Most vegetation is 2"-12" in size with a few scattered larger dia. trees as in area 1. Species are predomi
nantly the same mix.
3. Wooded hillside with trees becoming larger in general. Slopes increasing to about 20 percent or more. Less understory vegetation and a more mature canopy with larger sizes ranging from 18"-30" dia. View to the lake is good this time of year.
4. Narrow ridge between double sink and hillside to lake. It would be a good path location. The vegetation is small here, as if a road or large trail existed at some time in past.
5. Small Sinkhole of the double. Did not observe crevice or standing water. Trees species same mix as larger sink.
6. Stand of Cottonwoods (?) 4"-12" dia. within the rest of the mix.
7. Wooded hillside with slopes in the range of 12-16 percent. Vegetation? Incomplete.
8. Flat wooded ridge top. Slope range from 2-8 percent. Tree cover is a bit less thick with some larger canopy trees than area 1. Quality trees include predominantly Oaks, Maples and Tulip trees in the 4"-24" range.
9. Deep wooded ravine with steep side slopes. Well defined channel with bedrock showing in places.
10. One of the flattest ridge top areas on site. It has the one of the most mature canopy on the site as well. Understory vegetation is relatively thin here. Vegetation mix similar to area 8.
11. Wooded hillside with mature canopy and thin understory. Slopes range from 10-12 percent. Minor ravine toward bottom of slope. Vegetation?
12. Small, but long wooded ravine. Side slopes are pretty gentle.
13. Possible small double karst feature.
14. Wooded hillside with slopes in the 6-12 percent. Canopy of mostly Tulip trees that fade into thin Pine trees as you go down the hillside.
15. Wooded hillside with an irregular terrain. It has predominantly pines for tree cover and looks as if it may have been open and eroded severely at some time in the past. Slopes are around 10-12 percent. There is Some Tulip large trees mixed in, esp
ecially at the base of the hillside.
16. Sparsely wooded hillside with little canopy. Vegetation of poor quality.
17. Fairly flat ridge top with mature canopy towards the center and increasing understory toward the edges. Mostly large Tulip trees in the canopy 12"-24" in diameter.
18. Somewhat shallow wooded ravine with moderate side slopes, but a well-defined channel at the bottom eroded often to bedrock.
19. Fairly open understory with some large canopy trees, predominantly Tulip trees? There appears to be a trail or farm roadbed to the north of the ravine describen in #18 and an existing farm-type road to the south of the ravine with vegetation removed
for about a 30' wide path.
20. Irregular terrain with predominantly scrubby pine and cedar re-growth and a few, scattered, large Tulip trees. Slopes range from 6-12 percent. May have been open and left to severely erode in the past.
21. Small, but well defined Karst feature. Open crevice is visible.
22. Open meadow with grass as a vegetative cover. Slopes are relatively low ranging from 3-12 percent
23. This ridge top works to visually separate one meadow area from another and screen Weimer form the western meadow area.
24. A pool of water and a small, attractive waterfall on this adjacent site.
25. Creek bed without a lot of mature vegetation along it. Mostly shrubbery exists along it in this location, especially along the south side. A few Sycamore trees here and there.
26. Another pool of water. It could be temporary due to recent rains.
27. Nice, more gently sloped wooded hillside. Slopes range from 5-10 percent. Trees include Beeches, Oaks Maples and Hickory's up to 24" dia.
28. Very nice view of the lake at this location.
29. A flat shelf, but didn't notice any Karst as it appears from the contours.
30. Same tree types here as in area 27, but add in tulip trees.
31. Limestone wall at base of levee with steel pipe sticking up about 3' at a 45° angle. Standpipe outlet?
32. Water bubbles up from under the ground here and looks to be the main source of water for the creek flow to the east.
33. Flat bottomland with meandering creek. Tree species is predominantly Tulip Trees, Maples and Sycamores.
34. Somewhat gently sloped ravine. Not very deep.
35. Shallow irregular ravines throughout most of this area. It looks as if it may have been open at one time and was eroded and then came back with a significant amount of pine re-growth. Also scattered maples and tulip trees. Poor vegetation quality.
Not too steep with slopes ranging from 4-8 percent.
36. Very irregular terrain with the same characteristics as above, but with mostly pines. It looks like it was even more eroded than the rest of the area around it. This is one of the poorest vegetation areas on the site. Also a number of junked auto'
s, etc. dumped in small ravines here. Slopes are a bit steeper here than in the surrounding area.
37. Very attractive wooded ravine with gentler side slopes and a small creek running down the bottom. Predominantly Maples Oaks and Tulip trees. Bedrock is showing along much of creek bottom.
38. Wooded hillside with much the same vegetation in area 37. There are some large trees along the field edge as large as 36" diameter.
39. A depressed area in the topography that doesn't seem to resemble a typical Karst faature. This will require further investigation.
40. Predominantly small Maples, 2"-8", a few as large as 12". Slopes are in the 12 percent range.
41. Mostly Pines and cedars on very irregular, deeply fissured terrain. The vegetation quality is poor.
42. Very similar to are 41, but add in a few more Maples and less evergreen material.
43. Tending toward larger trees with Oaks, Maples and Tulips up to around 24" diameter. Slopes range from 10 percent in the northern area to 25 percent to the south.
44. Grass covered open meadow. Slopes range from 3-8 percent.
45. Fairly flat bottom area with approximately 4 percent maximum slope. It is also narrow and is well separated from meadow to the west by steep wooded hillside.
46. Small pot-shaped Karst feature, perhaps 15'-20' in diameter.
47. It looks like a bunch of large slabs of limestone were dumped or pushed into the northern edge of the adjacent ravine.

Smith Neubecker & Associates, Inc.
453 S. Clarizz Blvd.
Bloomington, Indiana, 47401
Telephone: (812) 336-6536

Public Investment Corporation Presents

MILL CREEK VILLAGE



Slope Analysis Map

Slope Analysis Legend
RANGE [0.000 : 8.000]
RANGE [8.000 : 12.000]
RANGE [12.000 : 15.000]
RANGE [15.000 : 18.000]
RANGE [18.000 : 10000.000]

Smith Neubecker & Associates, Inc.
4625 Morningside Drive
Bloomington, Indiana, 47401
Telephone: (812) 336-6536

Public Investment Corporation Presents

STONEY CREEK VILLAGE

1939 Aerial Photo

Smith Neubecker & Associates, Inc.
453 S. Clarizz Blvd.
Bloomington, Indiana, 47401
Telephone: (812) 336-6536

Public Investment Corporation Presents

MILL CREEK VILLAGE

MEMO

Date: December 2, 2002

To: Steve Brehob cc:
Smith Neubecker and Associates

From: John Bassett

Subject: **Karst Inventory of Tapp Road Property**

INTRODUCTION

At the request of Smith Neubecker & Associates, Inc. Earth Tech conducted a review of karst features on an undeveloped parcel of land located at the northeast corner of the intersection of Tapp Road and the State Road 37 Bypass, Monroe County, Indiana. This review was undertaken in partial fulfillment of the requirements of the City of Bloomington Zoning Ordinance Chapter 20-06D, *Environmental Review Plan for Karst Terrain*. Locations of karst features are shown in Figure 1.

PROPERTY DESCRIPTION

The Site is located in part of the Southwest Quarter of Section 7, T8N, R1W. The Site is owned by Public Investment Corporation and is about 143 acres in size. The parcel is bounded by S.R. 37 on the west, Tapp Road on the south, Weimer Road on the east, and Wapehani Road and the 42-acre City of Bloomington Wapehani Mountain Bike Park to the north. The site is hilly, with open and wooded hill slopes along a stream valley. The stream, herein referred to as Wapehani Branch, drains the 12-acre Lake Wapehani on the City of Bloomington property, and drains eastward to Spring Creek, a tributary of Clear Creek. The ground elevation ranges from approximately 830 feet above sea level on a ridge top in the southwest portion of the property to about 710 feet above mean sea level where the stream crosses Weimer Road.

Lake Wapehani (formerly Lake Weimer) impounds the discharge from Weimer Spring and a small surface catchment area. The lake was constructed in 1909 and formerly served as a water supply for the City of Bloomington. Use as a water supply was later abandoned due, in part, to leakage of the lake through solution conduits in the underlying limestone bedrock. In 1954, the Bloomington Board of Public Works leased the 42-acre property containing the lake to the Boy Scouts of America for a camp. The Boy Scouts operated the camp on the property until 1980. In 1990, the Wapehani Mountain Bike Park was developed and continues to operate. Mountain bike trails also cover most of the site area.

The entire site is underlain by carbonate rocks (limestone and dolostone) assigned to the middle Mississippian Blue River and Sanders Groups. The St. Louis Limestone (Blue River Group) occurs on the upland area of the property and the underlying Salem limestone (Sanders Group) occurs along the lower valley slopes in the eastern part of the area. Karst features on the property include sinkholes (dolines and small soil cover collapses) and springs.

IDENTIFICATION OF KARST FEATURES

The site was examined for the presence of karst features during the week of September 30, 2002. The entire property was traversed, concentrating on areas where karst features were indicated by the available 2-foot interval City of Bloomington Utilities (CBU) GIS topographic mapping. Earth Tech was provided with two plan drawings of the property prior to the field reconnaissance. These included:

Drawing A - A 1"= 150' drawing dated Sepember 9, 2002 entitled *Wooded Areas, Floodplain, Wetlands, and Potential Karst Features.*

Drawing B – A 1" = 200' plan prepared by Smith-Neubecker & Associates showing the location of 47 areas, including karst features, identified during an earlier site reconnaissance.

Both of these drawings were reviewed prior to and during the field examination to make sure that all potential karst features were examined. Both drawing utilize the 2' contour interval CBU GIS basemap.

Karst features were located in the field using the 2' contour interval CBU GIS drawing. Information regarding each feature was placed on standard form. The completed forms, including relevant data regarding each karst feature, are provided in Attachment A. Approximate easting and northing coordinates (Indiana State Plain Coordinate System, NAD 83) of each karst feature were determined digitally from the CBU GIS base map drawing. Some of the property was difficult to traverse due to a thick vegetative under story. Some feature locations are approximate, as there is no indication of the feature on the contour map. Most features are flagged with an orange wire flag indicating the feature designation (e.g. "A"). A total of 21 karst features were located and plotted in Figure 1. Most of the features were identified on either Drawing A or B, but several were incorrectly located. Some potential karst features shown on Drawings A or B either could not be located at the location provided, or were not karst features.

The following features were located during the field inspection, but appear to be incorrectly located on Drawing A.

Feature A – This feature is a small doline located in a drainageway northwest of the location shown on Drawing A. It appears to be located on the Wapehani Mountain Bike property.

Feature H – This feature is categorized as a spring, although it is best described as a small natural bridge or stone arch. It is located in a drainageway near the north property boundary, and is located about 100 feet north of the location shown on Drawing A or B. The stream sinks into an open joint in massive limestone and flow vertically 4 feet and laterally 5 feet beneath a 20 foot long natural bride. The water emerges from beneath the bridge as a small spring.

Features J, K, L and M – These features are small doline sinkholes located on a topographic bench. This area has a dense vegetative under story. Feature J is the only feature evident from the CBU contour map. The other features in this area were evident only from a close field inspection, and were located by compass and pace measurements from Feature J. These features are generally located in the area shown in Drawing A, but are more accurately located as shown in Figure 1. The sinkholes are generally located in Area 28 and 29 of Drawing B.

Feature P – This feature consists of two small, adjacent, cover collapse sinkholes on the south side of Wapehani Branch. These are located between a small swallet (Feature O) and a small spring on the south bank of Wapehani Branch. They appear to be related to soil piping above a shallow conduit in the limestone between the swallet and the spring. On Drawing A, the feature appears to be located about 200 feet too far to the east. The feature is located adjacent to a drainage way, as shown in Drawing A, but the correct drainage way is located 200 feet to the west. All of these features appear to be located on the Wapehani Mountain Bike property.

Feature T – This feature is a small soil cover collapse sinkhole located in the southeast portion of the property. Drawing A shows a karst feature located in a gullied area southeast of this feature. No karst feature was identified in the gullied area, but the feature identified in Drawing A may be Feature T. This is Feature 46 of Drawing B.

Several other potential karst features are located on Drawing A or B, but could not located during the field inspection, or not karst features. The features in Drawing A are not numbered, so they are identified by their location west of Weimer Road and north of Tapp Road.

1. 180' west of Weimer, 1275' north of Tapp – No karst feature was identified. The ruins of an old cellar were found in this general area.

2. 525' west of Weimer, 1350' north of Tapp – This is a broad anthropogenic depression resulting from soil borrow activity. Soil was borrowed from this area at some time in the past resulting in a depression. This is Feature 239 of Drawing B.

3. 540' west of Weimer, 1035' north of Tapp – This small hole appears to be a ground hog burrow.

4. 675' west or Weimer, 150' north of Tapp – No karst feature was identified.

5. 1005' west of Weimer, 1500' north of Tapp – This feature is a massive limestone outcrop on the north side of Wapehani Branch that has been

undercut by the stream. This type of feature is associated with other massive non-carbonate rock types, and is not regarded as a karst feature.

6. 1425' west of Weimer, 1230' north of Tapp – No karst feature was identified at this location. This may be Feature B plotted in the incorrect location. Feature B is not evident in either Drawing A or B.

7. 1490' west of Weimer, 720 feet north of Tapp – This is feature 13 of Drawing B. The feature is a broad wide area in a small drainageway. Although it is roughly circular in form, it appears to have positive drainage on the downstream side and is not regarded as karst feature.

SPRINGS AND SUBTERRANEAN DRAINAGE

Features F, G and Q are springs. Feature F is located in the spillway of Wapehani Lake. The flow from the spring was observed to be about 100 gpm on September 27. The spring temperature on September 27 was 21.1 °C, and was considerably higher than normal ambient ground water temperature. This suggests that the spring flow is derived primarily from leakage of Lake Wapehani through karst conduits.

Feature G is located in the valley of Wapehani Branch The flow from the spring was observed to be about 150 gpm on September 27. The spring temperature was 20.7 °C, suggests that the spring flow is derived primarily from leakage of Lake Wapehani through karst conduits.

Feature Q is a very small spring located in the south bank or Wapehani Branch. This spring had a flow of only about 2 gpm on September 27. The feature probably receives storm flow from the small swallet (Feature O) located to the south. The spring temperature of 19.1°C measured on September 27 again suggest a possible connection to Lark Wapehani.

No tracer tests have been conducted from any of the karst features on the property. In March 1975, tracer dye injected into a small sinking stream located on the east side of Curry Pike 3,000 feet northwest of Wapehani Lake was traced to Weimer Spring, west of the site. In May 1986, tracer dye injected into a soil boring on the Park 37 industrial tract, located about 2,400 feet northwest of Wapehani Lake, appeared in a culvert discharging into the west end of the lake. The dye was visually detected in the discharge from the smaller of two culverts draining from beneath S.R. 37. The tracer dye probably discharged from Weimer Spring. Weimer Spring is now buried beneath the southbound lanes of S.R. 37 directly east of Wal Mart.

Attachment A

Karst Feature Forms

Karst Feature Form

Feature No.		A
Northing	(State Plane, ft, NAD 83)	1417619
Easting	(State Plane, ft, NAD 83)	3098894
Feature Type	(Sinkhole, Swallet, Blind Valley, Spring, Cave)	Sinkhole
Field Checked	(y/n)	y
Field Check Date		09/27/02
Subsurface Drainage Basin		

Sinkhole / Swallet

Length	(ft)	30
Width	(ft)	30
Depth	(ft)	1
Open Hole	(y/n)	n
Bedrock	(y/n)	n
Soil Slump or Eye	(y/n)	n
Evidence of Ponding	(y/n)	n
Altered - Data Source	(Plan, As Built, Field ET, Field CBU)	
Altered - Buried	(y/n)	n
Altered - Rock Fill	(y/n)	n
Altered - French Drain	(y/n)	n
Altered - Standpipe	(y/n)	n

Standpipe

Diameter	(ins.)	
Depth	(ft)	
Grate	(Type)	

Sinkhole

Sinkhole Type	(Doline, Cover Collapse, Bedrock Collapse)	Doline

Cover Collapse, Bedrock Collapse Sinkhole

Year Sink Formed	

Swallet

Swallet Type	(Terminal, Channel)	
Drainage Area	(acres)	

Blind Valley

Area at highest closed contour	(acres)	
Associated swallets	(Feature Nos.)	

Spring

Spring Name		
Spring Type	(Perennial, Overflow)	
Estimated Flow	(gpm)	
Outflow Channel Width	(ft)	
Outflow Channel Depth	(ft)	

Notes

Very shallow depression.

Karst Feature Form

Feature No.		B
Northing	(State Plane, ft, NAD 83)	1417748
Easting	(State Plane, ft, NAD 83)	3099112
Feature Type	(Sinkhole, Swallet, Blind Valley, Spring, Cave)	Sinkhole
Field Checked	(y/n)	y
Field Check Date		09/27/02
Subsurface Drainage Basin		

Sinkhole / Swallet

Length	(ft)	20
Width	(ft)	20
Depth	(ft)	1
Open Hole	(y/n)	n
Bedrock	(y/n)	n
Soil Slump or Eye	(y/n)	y
Evidence of Ponding	(y/n)	n
Altered - Data Source	(Plan, As Built, Field ET, Field CBU)	
Altered - Buried	(y/n)	n
Altered - Rock Fill	(y/n)	n
Altered - French Drain	(y/n)	n
Altered - Standpipe	(y/n)	n

Standpipe

Diameter	(ins.)	
Depth	(ft)	
Grate	(Type)	

Sinkhole

Sinkhole Type	(Doline, Cover Collapse, Bedrock Collapse)	Doline

Cover Collapse, Bedrock Collapse Sinkhole

Year Sink Formed	

Swallet

Swallet Type	(Terminal, Channel)	
Drainage Area	(acres)	

Blind Valley

Area at highest closed contour	(acres)	
Associated swallets	(Feature Nos.)	

Spring

Spring Name		
Spring Type	(Perennial, Overflow)	
Estimated Flow	(gpm)	
Outflow Channel Width	(ft)	
Outflow Channel Depth	(ft)	

Notes

Soil slump 2' diameter x 10" deep in center.

Karst Feature Form

Feature No.		C
Northing	(State Plane, ft, NAD 83)	1417482
Easting	(State Plane, ft, NAD 83)	3097828
Feature Type	(Sinkhole, Swallet, Blind Valley, Spring, Cave)	Sinkhole
Field Checked	(y/n)	y
Field Check Date		09/27/02
Subsurface Drainage Basin		

Sinkhole / Swallet

Length	(ft)	350
Width	(ft)	350
Depth	(ft)	16
Open Hole	(y/n)	n
Bedrock	(y/n)	n
Soil Slump or Eye	(y/n)	y
Evidence of Ponding	(y/n)	n
Altered - Data Source	(Plan, As Built, Field ET, Field CBU)	
Altered - Buried	(y/n)	n
Altered - Rock Fill	(y/n)	n
Altered - French Drain	(y/n)	n
Altered - Standpipe	(y/n)	n

Standpipe

Diameter	(ins.)	
Depth	(ft)	
Grate	(Type)	

Sinkhole

Sinkhole Type	(Doline, Cover Collapse, Bedrock Collapse)	Doline

Cover Collapse, Bedrock Collapse Sinkhole

Year Sink Formed	

Swallet

Swallet Type	(Terminal, Channel)	
Drainage Area	(acres)	

Blind Valley

Area at highest closed contour	(acres)	
Associated swallets	(Feature Nos.)	

Spring

Spring Name		
Spring Type	(Perennial, Overflow)	
Estimated Flow	(gpm)	
Outflow Channel Width	(ft)	
Outflow Channel Depth	(ft)	

Notes

3' x 2' x 1' d soil slump in bottom

Karst Feature Form

Feature No.		D
Northing	(State Plane, ft, NAD 83)	1417839
Easting	(State Plane, ft, NAD 83)	3097930
Feature Type	(Sinkhole, Swallet, Blind Valley, Spring, Cave)	Sinkhole
Field Checked	(y/n)	y
Field Check Date		09/27/02
Subsurface Drainage Basin		

Sinkhole / Swallet

Length	(ft)	250
Width	(ft)	230
Depth	(ft)	14
Open Hole	(y/n)	n
Bedrock	(y/n)	n
Soil Slump or Eye	(y/n)	n
Evidence of Ponding	(y/n)	n
Altered - Data Source	(Plan, As Built, Field ET, Field CBU)	
Altered - Buried	(y/n)	n
Altered - Rock Fill	(y/n)	n
Altered - French Drain	(y/n)	n
Altered - Standpipe	(y/n)	n

Standpipe

Diameter	(ins.)	
Depth	(ft)	
Grate	(Type)	

Sinkhole

Sinkhole Type	(Doline, Cover Collapse, Bedrock Collapse)	Doline

Cover Collapse, Bedrock Collapse Sinkhole

Year Sink Formed	

Swallet

Swallet Type	(Terminal, Channel)	
Drainage Area	(acres)	

Blind Valley

Area at highest closed contour	(acres)	
Associated swallets	(Feature Nos.)	

Spring

Spring Name		
Spring Type	(Perennial, Overflow)	
Estimated Flow	(gpm)	
Outflow Channel Width	(ft)	
Outflow Channel Depth	(ft)	

Notes

Bike trail on north side.

Karst Feature Form

Feature No.		E
Northing	(State Plane, ft, NAD 83)	1418062
Easting	(State Plane, ft, NAD 83)	3097693
Feature Type	(Sinkhole, Swallet, Blind Valley, Spring, Cave)	Sinkhole
Field Checked	(y/n)	y
Field Check Date		09/27/02
Subsurface Drainage Basin		

Sinkhole / Swallet

Length	(ft)	25
Width	(ft)	20
Depth	(ft)	6
Open Hole	(y/n)	n
Bedrock	(y/n)	n
Soil Slump or Eye	(y/n)	n
Evidence of Ponding	(y/n)	n
Altered - Data Source	(Plan, As Built, Field ET, Field CBU)	
Altered - Buried	(y/n)	n
Altered - Rock Fill	(y/n)	n
Altered - French Drain	(y/n)	n
Altered - Standpipe	(y/n)	n

Standpipe

Diameter	(ins.)	
Depth	(ft)	
Grate	(Type)	

Sinkhole

Sinkhole Type	(Doline, Cover Collapse, Bedrock Collapse)	Doline

Cover Collapse, Bedrock Collapse Sinkhole

Year Sink Formed	

Swallet

Swallet Type	(Terminal, Channel)	
Drainage Area	(acres)	

Blind Valley

Area at highest closed contour	(acres)	
Associated swallets	(Feature Nos.)	

Spring

Spring Name		
Spring Type	(Perennial, Overflow)	
Estimated Flow	(gpm)	
Outflow Channel Width	(ft)	
Outflow Channel Depth	(ft)	

Notes

Bike trail immediately to west at head of ravine.

Karst Feature Form

Feature No.		F
Northing	(State Plane, ft, NAD 83)	1418056
Easting	(State Plane, ft, NAD 83)	3098528
Feature Type	(Sinkhole, Swallet, Blind Valley, Spring, Cave)	Spring
Field Checked	(y/n)	y
Field Check Date		09/27/02
Subsurface Drainage Basin		

Sinkhole / Swallet

Length	(ft)	
Width	(ft)	
Depth	(ft)	
Open Hole	(y/n)	
Bedrock	(y/n)	
Soil Slump or Eye	(y/n)	
Evidence of Ponding	(y/n)	
Altered - Data Source	(Plan, As Built, Field ET, Field CBU)	
Altered - Buried	(y/n)	
Altered - Rock Fill	(y/n)	
Altered - French Drain	(y/n)	
Altered - Standpipe	(y/n)	

Standpipe

Diameter	(ins.)	
Depth	(ft)	
Grate	(Type)	

Sinkhole

Sinkhole Type	(Doline, Cover Collapse, Bedrock Collapse)	

Cover Collapse, Bedrock Collapse Sinkhole

Year Sink Formed	

Swallet

Swallet Type	(Terminal, Channel)	
Drainage Area	(acres)	

Blind Valley

Area at highest closed contour	(acres)	
Associated swallets	(Feature Nos.)	

Spring

Spring Name		unnamed
Spring Type	(Perennial, Overflow)	Perennial
Estimated Flow	(gpm)	100
Outflow Channel Width	(ft)	1
Outflow Channel Depth	(ft)	1

Notes

Emerges from hole 5' above Wapehani Lake spillway on shaley limestone. Open hole in side of spillway at stream level 20 feet downstream. SpC = 280 umhos, T = 21.1oC on 9/30/02. Spring is probably lake water based on comparison of SpC and T.

Karst Feature Form

Feature No.		G
Northing	(State Plane, ft, NAD 83)	1418188
Easting	(State Plane, ft, NAD 83)	3098707
Feature Type	(Sinkhole, Swallet, Blind Valley, Spring, Cave)	Spring
Field Checked	(y/n)	y
Field Check Date		09/27/02
Subsurface Drainage Basin		

Sinkhole / Swallet

Length	(ft)	
Width	(ft)	
Depth	(ft)	
Open Hole	(y/n)	
Bedrock	(y/n)	
Soil Slump or Eye	(y/n)	
Evidence of Ponding	(y/n)	
Altered - Data Source	(Plan, As Built, Field ET, Field CBU)	
Altered - Buried	(y/n)	
Altered - Rock Fill	(y/n)	
Altered - French Drain	(y/n)	
Altered - Standpipe	(y/n)	

Standpipe

Diameter	(ins.)	
Depth	(ft)	
Grate	(Type)	

Sinkhole

Sinkhole Type	(Doline, Cover Collapse, Bedrock Collapse)	

Cover Collapse, Bedrock Collapse Sinkhole

Year Sink Formed	

Swallet

Swallet Type	(Terminal, Channel)	
Drainage Area	(acres)	

Blind Valley

Area at highest closed contour	(acres)	
Associated swallets	(Feature Nos.)	

Spring

Spring Name		unnamed
Spring Type	(Perennial, Overflow)	Perennial
Estimated Flow	(gpm)	150
Outflow Channel Width	(ft)	5
Outflow Channel Depth	(ft)	1

Notes

Spring boils up from gravel at base of Wapehani Lake dam. SpC = 286 umhos, T = 20.7oC on 9/30/02. Spring is probably lake water based on comparison to conductivity and temperature of spillway water.

Karst Feature Form

Feature No.		H
Northing	(State Plane, ft, NAD 83)	1419286
Easting	(State Plane, ft, NAD 83)	3099278
Feature Type	(Sinkhole, Swallet, Blind Valley, Spring, Cave)	Spring
Field Checked	(y/n)	y
Field Check Date		09/30/02
Subsurface Drainage Basin		

Sinkhole / Swallet

Length	(ft)	
Width	(ft)	
Depth	(ft)	
Open Hole	(y/n)	
Bedrock	(y/n)	
Soil Slump or Eye	(y/n)	
Evidence of Ponding	(y/n)	
Altered - Data Source	(Plan, As Built, Field ET, Field CBU)	
Altered - Buried	(y/n)	
Altered - Rock Fill	(y/n)	
Altered - French Drain	(y/n)	
Altered - Standpipe	(y/n)	

Standpipe

Diameter	(ins.)	
Depth	(ft)	
Grate	(Type)	

Sinkhole

Sinkhole Type	(Doline, Cover Collapse, Bedrock Collapse)	

Cover Collapse, Bedrock Collapse Sinkhole

Year Sink Formed	

Swallet

Swallet Type	(Terminal, Channel)	
Drainage Area	(acres)	

Blind Valley

Area at highest closed contour	(acres)	
Associated swallets	(Feature Nos.)	

Spring

Spring Name		unnamed
Spring Type	(Perennial, Overflow)	Ephemeral
Estimated Flow	(gpm)	2
Outflow Channel Width	(ft)	8
Outflow Channel Depth	(ft)	1

Notes

Feature is best described as a natural bridge or stone arch. A small stream sinks as a waterfall in an open joint in a massive bed of limestone, and flows vertically 4' and laterally 5' beneath the 20' long natural bridge.

Karst Feature Form

Feature No.		1
Northing	(State Plane, ft, NAD 83)	1418730
Easting	(State Plane, ft, NAD 83)	3099030
Feature Type	(Sinkhole, Swallet, Blind Valley, Spring, Cave)	Sinkhole
Field Checked	(y/n)	y
Field Check Date		09/30/02
Subsurface Drainage Basin		

Sinkhole / Swallet

Length	(ft)	8
Width	(ft)	5
Depth	(ft)	2
Open Hole	(y/n)	y
Bedrock	(y/n)	n
Soil Slump or Eye	(y/n)	y
Evidence of Ponding	(y/n)	n
Altered - Data Source	(Plan, As Built, Field ET, Field CBU)	
Altered - Buried	(y/n)	n
Altered - Rock Fill	(y/n)	n
Altered - French Drain	(y/n)	n
Altered - Standpipe	(y/n)	n

Standpipe

Diameter	(ins.)	
Depth	(ft)	
Grate	(Type)	

Sinkhole

Sinkhole Type	(Doline, Cover Collapse, Bedrock Collapse)	Cover Collapse

Cover Collapse, Bedrock Collapse Sinkhole

Year Sink Formed		

Swallet

Swallet Type	(Terminal, Channel)	
Drainage Area	(acres)	

Blind Valley

Area at highest closed contour	(acres)	
Associated swallets	(Feature Nos.)	

Spring

Spring Name		
Spring Type	(Perennial, Overflow)	
Estimated Flow	(gpm)	
Outflow Channel Width	(ft)	
Outflow Channel Depth	(ft)	

Notes

Located 50' north of bike trail.

Karst Feature Form

Feature No.		J
Northing	(State Plane, ft, NAD 83)	1418498
Easting	(State Plane, ft, NAD 83)	3098810
Feature Type	(Sinkhole, Swallet, Blind Valley, Spring, Cave)	Sinkhole
Field Checked	(y/n)	y
Field Check Date		09/30/02
Subsurface Drainage Basin		

Sinkhole / Swallet

Length	(ft)	30
Width	(ft)	15
Depth	(ft)	3
Open Hole	(y/n)	n
Bedrock	(y/n)	n
Soil Slump or Eye	(y/n)	n
Evidence of Ponding	(y/n)	n
Altered - Data Source	(Plan, As Built, Field ET, Field CBU)	
Altered - Buried	(y/n)	n
Altered - Rock Fill	(y/n)	n
Altered - French Drain	(y/n)	n
Altered - Standpipe	(y/n)	n

Standpipe

Diameter	(ins.)	
Depth	(ft)	
Grate	(Type)	

Sinkhole

Sinkhole Type	(Doline, Cover Collapse, Bedrock Collapse)	Doline

Cover Collapse, Bedrock Collapse Sinkhole

Year Sink Formed		

Swallet

Swallet Type	(Terminal, Channel)	
Drainage Area	(acres)	

Blind Valley

Area at highest closed contour	(acres)	
Associated swallets	(Feature Nos.)	

Spring

Spring Name		
Spring Type	(Perennial, Overflow)	
Estimated Flow	(gpm)	
Outflow Channel Width	(ft)	
Outflow Channel Depth	(ft)	

Notes

Small composite doline oriented NE-SW. Feature is evident of CBU topographic contour map.

Karst Feature Form

Feature No.		K
Northing	(State Plane, ft, NAD 83)	1418574
Easting	(State Plane, ft, NAD 83)	3098772
Feature Type	(Sinkhole, Swallet, Blind Valley, Spring, Cave)	Sinkhole
Field Checked	(y/n)	y
Field Check Date		09/30/02
Subsurface Drainage Basin		

Sinkhole / Swallet

Length	(ft)	15
Width	(ft)	15
Depth	(ft)	2
Open Hole	(y/n)	n
Bedrock	(y/n)	n
Soil Slump or Eye	(y/n)	n
Evidence of Ponding	(y/n)	n
Altered - Data Source	(Plan, As Built, Field ET, Field CBU)	
Altered - Buried	(y/n)	n
Altered - Rock Fill	(y/n)	n
Altered - French Drain	(y/n)	n
Altered - Standpipe	(y/n)	n

Standpipe

Diameter	(ins.)	
Depth	(ft)	
Grate	(Type)	

Sinkhole

Sinkhole Type	(Doline, Cover Collapse, Bedrock Collapse)	Doline

Cover Collapse, Bedrock Collapse Sinkhole

Year Sink Formed	

Swallet

Swallet Type	(Terminal, Channel)	
Drainage Area	(acres)	

Blind Valley

Area at highest closed contour	(acres)	
Associated swallets	(Feature Nos.)	

Spring

Spring Name		
Spring Type	(Perennial, Overflow)	
Estimated Flow	(gpm)	
Outflow Channel Width	(ft)	
Outflow Channel Depth	(ft)	

Notes

Center is 10' east of quarter section line marked by hub stake and lath.

Karst Feature Form

Feature No.		L
Northing	(State Plane, ft, NAD 83)	1418618
Easting	(State Plane, ft, NAD 83)	3098816
Feature Type	(Sinkhole, Swallet, Blind Valley, Spring, Cave)	Sinkhole
Field Checked	(y/n)	y
Field Check Date		09/30/02
Subsurface Drainage Basin		

Sinkhole / Swallet

Length	(ft)	25
Width	(ft)	25
Depth	(ft)	3
Open Hole	(y/n)	n
Bedrock	(y/n)	n
Soil Slump or Eye	(y/n)	n
Evidence of Ponding	(y/n)	n
Altered - Data Source	(Plan, As Built, Field ET, Field CBU)	
Altered - Buried	(y/n)	n
Altered - Rock Fill	(y/n)	n
Altered - French Drain	(y/n)	n
Altered - Standpipe	(y/n)	n

Standpipe

Diameter	(ins.)	
Depth	(ft)	
Grate	(Type)	

Sinkhole

Sinkhole Type	(Doline, Cover Collapse, Bedrock Collapse)	Doline

Cover Collapse, Bedrock Collapse Sinkhole

Year Sink Formed	

Swallet

Swallet Type	(Terminal, Channel)	
Drainage Area	(acres)	

Blind Valley

Area at highest closed contour	(acres)	
Associated swallets	(Feature Nos.)	

Spring

Spring Name		
Spring Type	(Perennial, Overflow)	
Estimated Flow	(gpm)	
Outflow Channel Width	(ft)	
Outflow Channel Depth	(ft)	

Notes

Located about 50' N60E of Feature K.

Karst Feature Form

Feature No.		M
Northing	(State Plane, ft, NAD 83)	1418606
Easting	(State Plane, ft, NAD 83)	3098900
Feature Type	(Sinkhole, Swallet, Blind Valley, Spring, Cave)	Sinkhole
Field Checked	(y/n)	y
Field Check Date		09/30/02
Subsurface Drainage Basin		

Sinkhole / Swallet

Length	(ft)	20
Width	(ft)	20
Depth	(ft)	2
Open Hole	(y/n)	n
Bedrock	(y/n)	n
Soil Slump or Eye	(y/n)	n
Evidence of Ponding	(y/n)	n
Altered - Data Source	(Plan, As Built, Field ET, Field CBU)	
Altered - Buried	(y/n)	n
Altered - Rock Fill	(y/n)	n
Altered - French Drain	(y/n)	n
Altered - Standpipe	(y/n)	n

Standpipe

Diameter	(ins.)	
Depth	(ft)	
Grate	(Type)	

Sinkhole

Sinkhole Type	(Doline, Cover Collapse, Bedrock Collapse)	Doline

Cover Collapse, Bedrock Collapse Sinkhole

Year Sink Formed	

Swallet

Swallet Type	(Terminal, Channel)	
Drainage Area	(acres)	

Blind Valley

Area at highest closed contour	(acres)	
Associated swallets	(Feature Nos.)	

Spring

Spring Name		
Spring Type	(Perennial, Overflow)	
Estimated Flow	(gpm)	
Outflow Channel Width	(ft)	
Outflow Channel Depth	(ft)	

Notes

Located about 50' S50E of Feature L.

Karst Feature Form

Feature No.		N
Northing	(State Plane, ft, NAD 83)	1418484
Easting	(State Plane, ft, NAD 83)	3098953
Feature Type	(Sinkhole, Swallet, Blind Valley, Spring, Cave)	Sinkhole
Field Checked	(y/n)	y
Field Check Date		09/30/02
Subsurface Drainage Basin		

Sinkhole / Swallet

Length	(ft)	20
Width	(ft)	10
Depth	(ft)	2
Open Hole	(y/n)	n
Bedrock	(y/n)	n
Soil Slump or Eye	(y/n)	n
Evidence of Ponding	(y/n)	n
Altered - Data Source	(Plan, As Built, Field ET, Field CBU)	
Altered - Buried	(y/n)	n
Altered - Rock Fill	(y/n)	n
Altered - French Drain	(y/n)	n
Altered - Standpipe	(y/n)	n

Standpipe

Diameter	(ins.)	
Depth	(ft)	
Grate	(Type)	

Sinkhole

Sinkhole Type	(Doline, Cover Collapse, Bedrock Collapse)	Doline

Cover Collapse, Bedrock Collapse Sinkhole

Year Sink Formed	

Swallet

Swallet Type	(Terminal, Channel)	
Drainage Area	(acres)	

Blind Valley

Area at highest closed contour	(acres)	
Associated swallets	(Feature Nos.)	

Spring

Spring Name		
Spring Type	(Perennial, Overflow)	
Estimated Flow	(gpm)	
Outflow Channel Width	(ft)	
Outflow Channel Depth	(ft)	

Notes

Located about 70' west of small drainageway and about N90W of Feature J.

Karst Feature Form

Feature No.		O
Northing	(State Plane, ft, NAD 83)	1417991
Easting	(State Plane, ft, NAD 83)	3098660
Feature Type	(Sinkhole, Swallet, Blind Valley, Spring, Cave)	Swallet
Field Checked	(y/n)	y
Field Check Date		09/30/02
Subsurface Drainage Basin		

Sinkhole / Swallet

Length	(ft)	10
Width	(ft)	10
Depth	(ft)	1
Open Hole	(y/n)	n
Bedrock	(y/n)	n
Soil Slump or Eye	(y/n)	n
Evidence of Ponding	(y/n)	n
Altered - Data Source	(Plan, As Built, Field ET, Field CBU)	
Altered - Buried	(y/n)	n
Altered - Rock Fill	(y/n)	n
Altered - French Drain	(y/n)	n
Altered - Standpipe	(y/n)	n

Standpipe

Diameter	(ins.)	
Depth	(ft)	
Grate	(Type)	

Sinkhole

Sinkhole Type	(Doline, Cover Collapse, Bedrock Collapse)	

Cover Collapse, Bedrock Collapse Sinkhole

Year Sink Formed	

Swallet

Swallet Type	(Terminal, Channel)	Channel
Drainage Area	(acres)	2

Blind Valley

Area at highest closed contour	(acres)	
Associated swallets	(Feature Nos.)	

Spring

Spring Name		
Spring Type	(Perennial, Overflow)	
Estimated Flow	(gpm)	
Outflow Channel Width	(ft)	
Outflow Channel Depth	(ft)	

Notes

Minor swallet located just upstream of bike trail. Channel extending north of trail to creek takes swallet overflow.

Karst Feature Form

Feature No.		P
Northing	(State Plane, ft, NAD 83)	1418032
Easting	(State Plane, ft, NAD 83)	3098681
Feature Type	(Sinkhole, Swallet, Blind Valley, Spring, Cave)	Sinkhole
Field Checked	(y/n)	y
Field Check Date		09/30/02
Subsurface Drainage Basin		

Sinkhole / Swallet

Length	(ft)	8
Width	(ft)	6
Depth	(ft)	6
Open Hole	(y/n)	n
Bedrock	(y/n)	y
Soil Slump or Eye	(y/n)	y
Evidence of Ponding	(y/n)	n
Altered - Data Source	(Plan, As Built, Field ET, Field CBU)	
Altered - Buried	(y/n)	n
Altered - Rock Fill	(y/n)	n
Altered - French Drain	(y/n)	n
Altered - Standpipe	(y/n)	n

Standpipe

Diameter	(ins.)	
Depth	(ft)	
Grate	(Type)	

Sinkhole

Sinkhole Type	(Doline, Cover Collapse, Bedrock Collapse)	Cover Collapse

Cover Collapse, Bedrock Collapse Sinkhole

Year Sink Formed	

Swallet

Swallet Type	(Terminal, Channel)	
Drainage Area	(acres)	

Blind Valley

Area at highest closed contour	(acres)	
Associated swallets	(Feature Nos.)	

Spring

Spring Name		
Spring Type	(Perennial, Overflow)	
Estimated Flow	(gpm)	
Outflow Channel Width	(ft)	
Outflow Channel Depth	(ft)	

Notes

Two small cover collapse sinkholes located 20' apart, and 60' downslope from Feature O on a line with Feature Q. Dimensions are of the largest feature. These features appear to be related to piping along a conduct between Features O and Q.

Karst Feature Form

Feature No.		Q
Northing	(State Plane, ft, NAD 83)	1418082
Easting	(State Plane, ft, NAD 83)	3098692
Feature Type	(Sinkhole, Swallet, Blind Valley, Spring, Cave)	Spring
Field Checked	(y/n)	y
Field Check Date		09/30/02
Subsurface Drainage Basin		

Sinkhole / Swallet

Length	(ft)	
Width	(ft)	
Depth	(ft)	
Open Hole	(y/n)	
Bedrock	(y/n)	
Soil Slump or Eye	(y/n)	
Evidence of Ponding	(y/n)	
Altered - Data Source	(Plan, As Built, Field ET, Field CBU)	
Altered - Buried	(y/n)	
Altered - Rock Fill	(y/n)	
Altered - French Drain	(y/n)	
Altered - Standpipe	(y/n)	

Standpipe

Diameter	(ins.)	
Depth	(ft)	
Grate	(Type)	

Sinkhole

Sinkhole Type	(Doline, Cover Collapse, Bedrock Collapse)	

Cover Collapse, Bedrock Collapse Sinkhole

Year Sink Formed	

Swallet

Swallet Type	(Terminal, Channel)	
Drainage Area	(acres)	

Blind Valley

Area at highest closed contour	(acres)	
Associated swallets	(Feature Nos.)	

Spring

Spring Name		unnamed
Spring Type	(Perennial, Overflow)	Ephemeral
Estimated Flow	(gpm)	2
Outflow Channel Width	(ft)	
Outflow Channel Depth	(ft)	

Notes

Located in right bank of stream at mouth of small drainageway. Probably drains swallet located upstream. SpC = 301 umhos, T=19.1oC on 9/30/02.

Karst Feature Form

Feature No.		R
Northing	(State Plane, ft, NAD 83)	1417042
Easting	(State Plane, ft, NAD 83)	3100464
Feature Type	(Sinkhole, Swallet, Blind Valley, Spring, Cave)	Sinkhole
Field Checked	(y/n)	y
Field Check Date		10/01/02
Subsurface Drainage Basin		

Sinkhole / Swallet

Length	(ft)	8
Width	(ft)	8
Depth	(ft)	1
Open Hole	(y/n)	n
Bedrock	(y/n)	n
Soil Slump or Eye	(y/n)	y
Evidence of Ponding	(y/n)	n
Altered - Data Source	(Plan, As Built, Field ET, Field CBU)	
Altered - Buried	(y/n)	n
Altered - Rock Fill	(y/n)	n
Altered - French Drain	(y/n)	n
Altered - Standpipe	(y/n)	n

Standpipe

Diameter	(ins.)	
Depth	(ft)	
Grate	(Type)	

Sinkhole

Sinkhole Type	(Doline, Cover Collapse, Bedrock Collapse)	Doline

Cover Collapse, Bedrock Collapse Sinkhole

Year Sink Formed	

Swallet

Swallet Type	(Terminal, Channel)	
Drainage Area	(acres)	

Blind Valley

Area at highest closed contour	(acres)	
Associated swallets	(Feature Nos.)	

Spring

Spring Name		
Spring Type	(Perennial, Overflow)	
Estimated Flow	(gpm)	
Outflow Channel Width	(ft)	
Outflow Channel Depth	(ft)	

Notes

Small soil slump in minor drainageway.

Karst Feature Form

Feature No.		S
Northing	(State Plane, ft, NAD 83)	1416999
Easting	(State Plane, ft, NAD 83)	3099603
Feature Type	(Sinkhole, Swallet, Blind Valley, Spring, Cave)	Sinkhole
Field Checked	(y/n)	y
Field Check Date		10/01/02
Subsurface Drainage Basin		

Sinkhole / Swallet

Length	(ft)	50
Width	(ft)	40
Depth	(ft)	6
Open Hole	(y/n)	y
Bedrock	(y/n)	y
Soil Slump or Eye	(y/n)	y
Evidence of Ponding	(y/n)	y
Altered - Data Source	(Plan, As Built, Field ET, Field CBU)	
Altered - Buried	(y/n)	n
Altered - Rock Fill	(y/n)	n
Altered - French Drain	(y/n)	n
Altered - Standpipe	(y/n)	n

Standpipe

Diameter	(ins.)	
Depth	(ft)	
Grate	(Type)	

Sinkhole

Sinkhole Type	(Doline, Cover Collapse, Bedrock Collapse)	Doline

Cover Collapse, Bedrock Collapse Sinkhole

Year Sink Formed	

Swallet

Swallet Type	(Terminal, Channel)	
Drainage Area	(acres)	

Blind Valley

Area at highest closed contour	(acres)	
Associated swallets	(Feature Nos.)	

Spring

Spring Name		
Spring Type	(Perennial, Overflow)	
Estimated Flow	(gpm)	
Outflow Channel Width	(ft)	
Outflow Channel Depth	(ft)	

Notes

Feature contains two soil slumps. The largest is evident on the CBU topographic map and is 6' deep with an open hole.

Karst Feature Form

Feature No.		T
Northing	(State Plane, ft, NAD 83)	1416980
Easting	(State Plane, ft, NAD 83)	3099921
Feature Type	(Sinkhole, Swallet, Blind Valley, Spring, Cave)	Sinkhole
Field Checked	(y/n)	y
Field Check Date		10/01/02
Subsurface Drainage Basin		

Sinkhole / Swallet

Length	(ft)	10
Width	(ft)	10
Depth	(ft)	3
Open Hole	(y/n)	n
Bedrock	(y/n)	n
Soil Slump or Eye	(y/n)	n
Evidence of Ponding	(y/n)	n
Altered - Data Source	(Plan, As Built, Field ET, Field CBU)	
Altered - Buried	(y/n)	n
Altered - Rock Fill	(y/n)	n
Altered - French Drain	(y/n)	n
Altered - Standpipe	(y/n)	n

Standpipe

Diameter	(ins.)	
Depth	(ft)	
Grate	(Type)	

Sinkhole

Sinkhole Type	(Doline, Cover Collapse, Bedrock Collapse)	Cover Collapse

Cover Collapse, Bedrock Collapse Sinkhole

Year Sink Formed	

Swallet

Swallet Type	(Terminal, Channel)	
Drainage Area	(acres)	

Blind Valley

Area at highest closed contour	(acres)	
Associated swallets	(Feature Nos.)	

Spring

Spring Name		
Spring Type	(Perennial, Overflow)	
Estimated Flow	(gpm)	
Outflow Channel Width	(ft)	
Outflow Channel Depth	(ft)	

Notes

Feature is a small well-defined steep-sided soil cover collapse sinkhole.

Karst Feature Form

Feature No.		U
Northing	(State Plane, ft, NAD 83)	1417830
Easting	(State Plane, ft, NAD 83)	3097465
Feature Type	(Sinkhole, Swallet, Blind Valley, Spring, Cave)	Sinkhole
Field Checked	(y/n)	y
Field Check Date		10/01/02
Subsurface Drainage Basin		

Sinkhole / Swallet

Length	(ft)	300
Width	(ft)	200
Depth	(ft)	20
Open Hole	(y/n)	
Bedrock	(y/n)	
Soil Slump or Eye	(y/n)	
Evidence of Ponding	(y/n)	y
Altered - Data Source	(Plan, As Built, Field ET, Field CBU)	Field ET
Altered - Buried	(y/n)	y
Altered - Rock Fill	(y/n)	n
Altered - French Drain	(y/n)	n
Altered - Standpipe	(y/n)	n

Standpipe

Diameter	(ins.)	
Depth	(ft)	
Grate	(Type)	

Sinkhole

Sinkhole Type	(Doline, Cover Collapse, Bedrock Collapse)	Doline

Cover Collapse, Bedrock Collapse Sinkhole

Year Sink Formed	

Swallet

Swallet Type	(Terminal, Channel)	
Drainage Area	(acres)	

Blind Valley

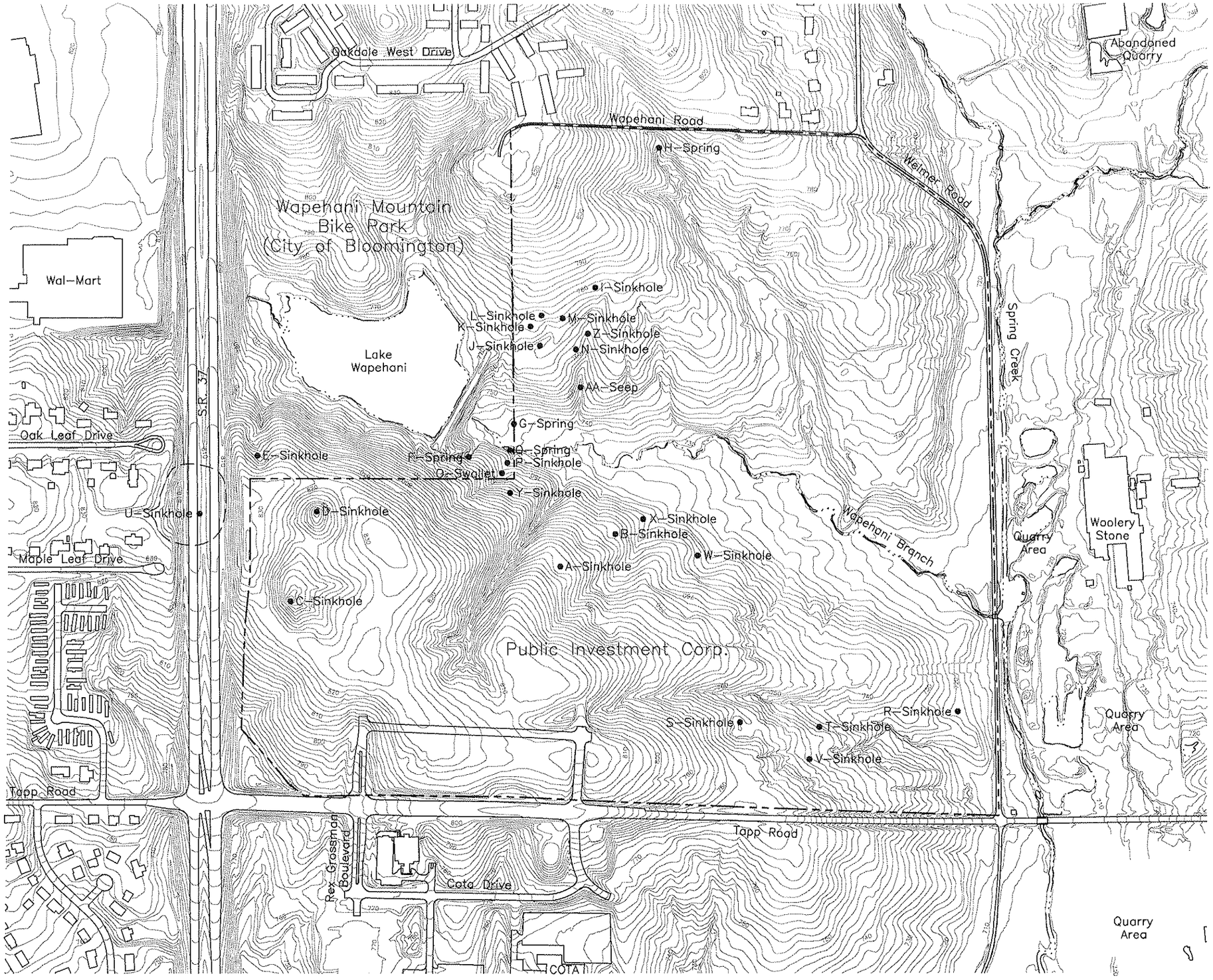
Area at highest closed contour	(acres)	
Associated swallets	(Feature Nos.)	

Spring

Spring Name		
Spring Type	(Perennial, Overflow)	
Estimated Flow	(gpm)	
Outflow Channel Width	(ft)	
Outflow Channel Depth	(ft)	

Notes

Large doline apparent on 1966 U.S.G.S topographic map. Sinkhole was directly in S.R.37 Bypass alignment, and was buried / removed by grading. A small segment of the west sinkhole rim remains. Sinkhole treatment unknown.



Explanation

- Site Boundary
- Water Feature
- Topographic Contour 2 Foot Contour Interval
- Karst Feature
- Approximate Limit of Buried Sinkhole

Base Provided by City of Bloomington Utilities

NORTH

0 400

Feet

1: 400
NW042503
L:\WORK\61032.01\DWG\61032F1-K

FIGURE 1

LOCATION OF KARST FEATURES

TAPP ROAD PROPERTY ASSESSMENT
BLOOMINGTON, INDIANA

EARTH TECH

Tapp Road Site Reconnaissance: 11/28/01

1. Wooded hillside with slopes of around 10-12 percent. Trees are predominantly small diameter with Cherries, Maples, Beech and a few scattered 18"-24" Oaks. The Highway is quite visible and very noisy, especially this time of year.
2. Largest sinkhole in double bottom pair of sinkholes. Did not observe open crevice or water standing. Side slopes ranging from 10-20 percent. Most vegetation is 2"-12" in size with a few scattered larger dia. trees as in area 1. Species are predominantly the same mix.
3. Wooded hillside with trees becoming larger in general. Slopes increasing to about 20 percent or more. Less understory vegetation and a more mature canopy with larger sizes ranging from 18"-30" dia. View to the lake is good this time of year.
4. Narrow ridge between double sink and hillside to lake. It would be a good path location. The vegetation is small here, as if a road or large trail existed at some time in past.
5. Small Sinkhole of the double. Did not observe crevice or standing water. Trees species same mix as larger sink.
6. Stand of Cottonwoods (?) 4"-12" dia. within the rest of the mix.
7. Wooded hillside with slopes in the range of 12-16 percent. Vegetation? Incomplete.
8. Flat wooded ridge top. Slope range from 2-8 percent. Tree cover is a bit less thick with some larger canopy trees than area 1. Quality trees include predominantly Oaks, Maples and Tulip trees in the 4"-24" range.
9. Deep wooded ravine with steep side slopes. Well defined channel with bedrock showing in places.
10. One of the flattest ridge top areas on site. It has the one of the most mature canopy on the site as well. Understory vegetation is relatively thin here. Vegetation mix similar to area 8.
11. Wooded hillside with mature canopy and thin understory. Slopes range from 10-12 percent. Minor ravine toward bottom of slope. Vegetation?
12. Small, but long wooded ravine. Side slopes are pretty gentle.
13. Possible small double karst feature.
14. Wooded hillside with slopes in the 6-12 percent. Canopy of mostly Tulip trees that fade into thin Pine trees as you go down the hillside.
15. Wooded hillside with an irregular terrain. It has predominantly pines for tree cover and looks as if it may have been open and eroded severely at some time in the past. Slopes are around 10-12 percent. There is Some Tulip large trees mixed in, esp
ecially at the base of the hillside.
16. Sparsely wooded hillside with little canopy. Vegetation of poor quality.
17. Fairly flat ridge top with mature canopy towards the center and increasing understory toward the edges. Mostly large Tulip trees in the canopy 12"-24" in diameter.
18. Somewhat shallow wooded ravine with moderate side slopes, but a well-defined channel at the bottom eroded often to bedrock.
19. Fairly open understory with some large canopy trees, predominantly Tulip trees? There appears to be a trail or farm roadbed to the north of the ravine described in #18 and an existing farm-type road to the south of the ravine with vegetation removed
for about a 30' wide path.
20. Irregular terrain with predominantly scrubby pine and cedar re-growth and a few, scattered, large Tulip trees. Slopes range from 6-12 percent. May have been open and left to severely erode in the past.
21. Small, but well defined Karst feature. Open crevice is visible.
22. Open meadow with grass as a vegetative cover. Slopes are relatively low ranging from 3-12 percent
23. This ridge top works to visually separate one meadow area from another and screen Weimer form the western meadow area.
24. A pool of water and a small, attractive waterfall on this adjacent site.
25. Creek bed without a lot of mature vegetation along it. Mostly shrubbery exists along it in this location, especially along the south side. A few Sycamore trees here and there.
26. Another pool of water. It could be temporary due to recent rains.
27. Nice, more gently sloped wooded hillside. Slopes range from 5-10 percent. Trees include Beeches, Oaks Maples and Hickory's up to 24" dia.
28. Very nice view of the lake at this location.
29. A flat shelf, but didn't notice any Karst as it appears from the contours.
30. Same tree types here as in area 27, but add in tulip trees.
31. Limestone wall at base of levee with steel pipe sticking up about 3' at a 45° angle. Standpipe outlet?
32. Water bubbles up from under the ground here and looks to be the main source of water for the creek flow to the east.
33. Flat bottomland with meandering creek. Tree species is predominantly Tulip Trees, Maples and Sycamores.
34. Somewhat gently sloped ravine. Not very deep.
35. Shallow irregular ravines throughout most of this area. It looks as if it may have been open at one time and was eroded and then came back with a significant amount of pine re-growth. Also scattered maples and tulip trees. Poor vegetation quality.
Not too steep with slopes ranging from 4-8 percent.
36. Very irregular terrain with the same characteristics as above, but with mostly pines. It looks like it was even more eroded than the rest of the area around it. This is one of the poorest vegetation areas on the site. Also a number of junked auto's, etc. dumped in small ravines here. Slopes are a bit steeper here than in the surrounding area.
37. Very attractive wooded ravine with gentler side slopes and a small creek running down the bottom. Predominantly Maples Oaks and Tulip trees. Bedrock is showing along much of creek bottom.
38. Wooded hillside with much the same vegetation in area 37. There are some large trees along the field edge as large as 36" diameter.
39. A depressed area in the topography that doesn't seem to resemble a typical Karst feature. This will require further investigation.
40. Predominantly small Maples, 2"-8", a few as large as 12". Slopes are in the 12 percent range.
41. Mostly Pines and cedars on very irregular, deeply fissured terrain. The vegetation quality is poor.
42. Very similar to are 41, but add in a few more Maples and less evergreen material.
43. Tending toward larger trees with Oaks, Maples and Tulips up to around 24" diameter. Slopes range from 10 percent in the northern area to 25 percent to the south.
44. Grass covered open meadow. Slopes range from 3-8 percent.
45. Fairly flat bottom area with approximately 4 percent maximum slope. It is also narrow and is well separated from meadow to the west by steep wooded hillside.
46. Small pot-shaped Karst feature, perhaps 15'-20' in diameter.
47. It looks like a bunch of large slabs of limestone were dumped or pushed into the northern edge of the adjacent ravine.

N

200 400
0 40
SCALE: 1"=200'

Smith Neubecker & Associates, Inc.
451 S. Clarizz Boulevard
Bloomington, Indiana, 47401-5365
Telephone (812) 336-6536
Fax (812) 336-0513
www.snaarch.com

JOB TITLE

REVISIONS | BY | DATE

DESIGNED
DRAWN
CHECKED
DATE

JOB NUMBER

SHEET 1 OF 1

DATE 12/04/01

20.05.042 EN-05 [Environmental Standards; Karst Geology]

This Environmental Standards section applies to the following zoning districts:

RE RS RC RM RH MH CL CG CA CD IG BP IN MD QY

(a) Karst Geology:

(1) *Applicability*: This section shall apply to all land-disturbing activities on properties that contain surface and subsurface karst features.

(2) *Adjacent Properties*: Where surface or subsurface karst features are present on adjacent properties, and where required conservation areas for such karst features would extend onto the subject property, such conservation areas shall be established according to the provisions of *Section 20.05.042*.

(3) *Compound Karst Features*: For the purposes of *Subsection 20.05.042(a)*, compound karst features shall be defined as any two (2) or more karst features where the last closed contour of the features are located within one hundred (100) feet of each other. The outer boundary of the compound karst feature shall be drawn by connecting the last closed contour of each individual karst feature with a tangential line.

(4) *Karst Conservancy Easement (KCE)*: All karst features shall be protected by Karst Conservancy Easements. Such easements shall be established in accordance with the following standards:

(A) No land-disturbing activity, permanent or temporary structures, or the placement of any fill material shall be allowed within a KCE.

(B) The outer perimeter of the KCE shall be protected with silt fencing and/or tree protection fencing during the entire period of construction.

(C) For all individual karst features, the KCE shall encompass the entire feature and all of the area within twenty-five (25) feet horizontally from the last closed contour line of the feature. The last closed contour line shall be as shown on the City's geographic information system (GIS) using a contour interval of two (2) feet. When the City has reason to doubt the accuracy of the GIS data, the City shall use field verification to determine the location of the last closed contour.

(D) For all compound karst features, the KCE shall encompass the entire outer boundary of the compound karst feature as defined in *Division 20.05.042(a)(3): Compound Karst Features* above and all of the area within twenty-five (25) feet horizontally from the outer boundary of the compound karst feature.

(5) *Setback*: No structures shall be located within ten (10) feet of a Karst Conservancy Easement.

(6) *Storm Water Discharge*: Storm water discharge into a karst feature shall not be increased over its pre-development rate. In addition, such discharge into a karst feature shall not be substantially reduced from pre-development conditions.

(7) *Storm Water Detention:* Karst Conservancy Easements shall not be utilized for storm water detention. Drainage shall be designed to route runoff through vegetative filters or other filtration measures before entering a karst feature.

(8) *Spring or Cave Entrances*: Spring or cave entrances shall not be modified except for the placement of a gate to prevent human access.

Burns & McDonnell World Headquarters
9400 Ward Parkway
Kansas City, MO 64114
Phone: 816-333-9400
Fax: 816-333-3690
www.burnsmcd.com

Burns & McDonnell: Making our clients successful for more than 100 years