

U.S. Department of the Interior
National Park Service

Vincennes Levee & Wastewater Infrastructure
Rehabilitation Project- Environmental Assessment
George Rogers Clark National Historical Park
Vincennes, Indiana



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Public Review Draft Environmental Assessment, November 2014
Vincennes Levee & Wastewater Infrastructure Rehabilitation project

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EXECUTIVE SUMMARY

The National Park Service (NPS) has cooperated with the City of Vincennes, Indiana, to prepare this Environmental Assessment (EA) to evaluate the potential environmental, social, cultural, and historical impacts of alternatives associated with the Vincennes Levee and Wastewater Infrastructure Rehabilitation project located within George Rogers Clark National Historical Park (referred throughout this report as GERO). This EA provided information on the potential environmental, social, and cultural impacts to allow the NPS to make an informed decision on the appropriateness of an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI).

The overall project has three separate construction activities for which the potential impacts of each are discussed within this EA:

- Levee modifications
- Wastewater infrastructure rehabilitation
- Rehabilitation of the B&O railroad corridor within GERO boundaries

Modifications to the Vincennes-Brevoort levee system, which serves as the primary Wabash River flood protection mechanism for the City of Vincennes and surrounding areas, are necessary for the City of Vincennes to achieve levee certification and accreditation from the Federal Emergency Management Agency (FEMA). According to FEMA Flood Insurance Rate Map (FIRM; dated December 18, 1984), the majority of the City of Vincennes, including GERO, is currently located in flood designation zone B; areas in Zone B are not required to obtain federal flood insurance in accordance with the National Flood Insurance Program (NFIP). Past and ongoing communications with FEMA have indicated that the levee system as it currently exists is not adequate for FEMA certification. Because the Vincennes-Brevoort levee system is not certified or accredited by FEMA, amendments to the FIRM map for the City and outlying areas considered protected by the Vincennes-Brevoort levee system would result in changes in the current flood zone designations and subsequent federal flood insurance requirements in the future.

The City-owned aging wastewater infrastructure line traverses the southeastern boundary of GERO and turns north and west near the GERO Mall, travelling under the flagpole terraces and steps on the north and south sides of SR 441/Vigo Street. This infrastructure likely dates to the 1930's. A sinkhole formed in 2008 in the visitor's parking lot of GERO due to a leak from this infrastructure. The City of Vincennes is seeking proactive measures to rehabilitate this wastewater infrastructure before its deteriorating conditions result in more leaks and sinkholes in the future.

The Baltimore and Ohio (B&O) railroad corridor traverses GERO, generally following the Wabash River. The corridor existed in this location prior to the construction of GERO, but it is no longer actively used for rail transportation. The metal rails and wooden railroad ties have been removed; however, the corridor still maintains an elevation approximately five feet lower than the surrounding grade elevation of the Park. This

abrupt change in elevation presents safety issues for Park visitors walking to the retaining wall and walkway along the Wabash River, and is not consistent with the surrounding cultural landscape of the Park.

Alternatives for each of the three construction activities were examined:

Levee Modifications

- A. The “No Action” alternative
- B. Levee modification and construction of permanent closures at Willow and Main Streets in place of temporary closures at these locations (preferred alternative)
- C. Convert the Willow and Main Street temporary flood closures to permanent closures only

Wastewater Infrastructure Rehabilitation

- A. The “No Action” alternative
- B. Wastewater infrastructure rehabilitation using synthetic liners (preferred alternative)
- C. Pipe bursting technique to rehabilitate the wastewater infrastructure
- D. Rehabilitation via excavation

Rehabilitation of the B&O railroad corridor within GERO boundaries

- A. The “No Action” alternative
- B. Rehabilitate the railroad corridor to match the existing cultural landscape of GERO (preferred alternative)

Impact areas that were researched for each of the construction activities above were:

1. Cultural resources
2. Aesthetics and visual resources
3. Hydrology and water resources
4. Floodplains and flood protection systems
5. Soils
6. Terrestrial habitat and wildlife
7. Socioeconomic environment and environmental justice
8. Visitor use and experience
9. Park operations
10. Public and private utilities
11. Former Manufactured Gas Plant (MGP) site

The preferred alternative for levee modifications involves construction of a permanent high ground area using earthen fill in the open grassy area south of the George Rogers Clark memorial building, as well as converting the temporary flood closures at Willow

and Main Streets to permanent flood closures. Construction of this alternative would provide the City of Vincennes with the necessary modifications to maintain the current flood designation of Zone B (or the equivalent based on the most current FEMA designations at the time of FIRM amendments) and to achieve FEMA levee certification, resulting in substantial and significant positive impacts that would be felt by all residents and businesses located in the current FEMA flood zone B.

The high ground portion of the preferred alternative for levee modification would increase the current elevation by 2.4 feet at the highest point, tapering to the north and south toes of slope. The high ground would have only minor negative impacts to the historic designed landscape of the south side of the Park because this area is already elevated as part of the Brevoort levee. Construction of the high ground area would have medium-term negative impacts to the aesthetics and visual resources, terrestrial habitat, and visitor use and experience because trees would be removed. Other minor positive and negative impacts would result from this preferred alternative; this EA found these minor impacts not to be significant in the long-term.

The City of Vincennes is aware of the aging and deteriorating conditions of its underground wastewater infrastructure and has been proactively assessing and repairing sections of infrastructure throughout the City. The preferred alternative to line the existing infrastructure with synthetic materials would extend the life of the infrastructure and would prevent future leaks and failures. Research for this EA found that the preferred alternative provides for the least amount of environmental, social, and cultural impacts to GERO for wastewater infrastructure rehabilitation.

Because the condition of the underground wastewater infrastructure line in GERO is unknown, the alternative to rehabilitate the infrastructure via excavation may become the preferred alternative if lining the infrastructure with synthetic materials (the preferred alternative presented in this EA) cannot be achieved. Negative impacts to the historic designed landscape and historic features would result from rehabilitation via excavation in the form of sidewalk, tree, and memorial building terrace removal to gain access to the wastewater infrastructure. However, these impacts would occur in the short- and medium-term; sidewalks and the memorial building terrace would be replaced after construction is complete. Many of the trees were not part of the Park's original historic designed landscape, and trees would be replaced. Therefore, negative impacts in the form of tree removal would be medium-term and would diminish as the replacement trees grow.

The Park's flagpole terrace, inscribed stone slabs, street lamps, and stone seat walls adjacent to SR 441/Vigo Street are located above the underground wastewater infrastructure. Should excavation of the underground wastewater infrastructure be required at this location, these historic resources original to the historic designed landscape would be removed and preserved during construction, and would be reinstalled to their original location after construction is complete. Aggregate walkways would be replaced in-kind in a similar manner as other past sidewalk repair and replacement projects in GERO. Therefore, impacts to the flagpole terrace and other historic features

located along SR 441/Vigo Street above the wastewater infrastructure alignment would be negative but short-term, and not significant in the long-term.

Rehabilitation of the B&O railroad corridor through GERO may have minor positive and negative impacts as a result of this preferred alternative; this EA found these minor impacts not to be significant in the long-term.

There is a former Manufactured Gas Plant (MGP) site located within GERO boundaries where the visitor's parking lot currently exists. Previous investigations of the site have found elevated concentrations of MGP-related contaminants in surface and subsurface soils in the vicinity of the former MGP site. NPS has initiated a response action under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) to address the releases of hazardous substances due to the former MGP operations. Disturbance of soils as a result of construction associated with any of the preferred alternatives may expose surface and subsurface soils in the vicinity of the former MGP site, if present. Therefore, soil intrusive work would need to be conducted in accordance with the NPS *Public Information Sheet for Soil Disturbing Activities* ("Guidelines for Health and Safety During Soil Disturbing Construction/Maintenance Activities" section; refer to Appendix E-6 to E-7).

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ACRONYMS

AC	Affected Community
ADA	Americans with Disabilities Act
BFE	Base Flood Elevation
BLCD	Brevoort Levee Conservation District
B&O	Baltimore and Ohio (railroad)
BTEX	Benzene, Toluene, Ethylbenzene, and Xylene
DBH	Diameter at Breast Height
EA	Environmental Assessment
EIS	Environmental Impact Statement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
COC	Community of Comparison
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FONSI	Finding of No Significant Impact
GERO	George Rogers Clark National Historical Park
GHG	Greenhouse Gas
GIS	Geographic Information System
IC	Indiana Code
IDEM	Indiana Department of Environmental Management
IDNR	Indiana Department of Natural Resources
IGS	Indiana Geological Survey
LED	Light Emitting Diode
LSE	Levee System Evaluation
MGP	Manufactured Gas Plant
NEPA	National Environmental Protection Act
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NPS	National Park Service
NRCS	Natural Resources Conservation Service
PAL	Provisionally Accredited Levee
PAH	Polycyclic Aromatic Hydrocarbons
PEPC	Planning, Environment, and Public Comment (system)
PVC	Polyvinyl Chloride
SFHA	Special Flood Hazard Area
SHPO	State Historic Preservation Office
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
UST	Underground Storage Tank

Chapter 1 Introduction

Sec. 1.1, Project Background & Scope

The NPS has prepared this EA to evaluate the potential impacts associated with the modification of the Brevoort and Vincennes levees and the repair of sanitary sewer infrastructure in the City of Vincennes. The project is located in George Rogers Clark National Historical Park (GERO) in the City of Vincennes, Knox County, Indiana. This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969; the Council of Environmental Quality (40 CFR 1500-1508); the Department of Interior's 43 CFR Part 46 Implementation of NEPA; the Federal Register, Vol. 73, No. 200, dated October 15, 2008 (pp. 61292-61323); and the NPS DO-12 Handbook. This EA provides information on the potential environmental, social, and cultural impacts to allow the NPS to make an informed decision on the appropriateness of an EIS or a FONSI.

GERO is located directly adjacent to the Wabash River in the City of Vincennes in Knox County, Indiana. The Park and its memorial building were constructed in the early 1930s, removing numerous streets and buildings but leaving in place many facets of the city's infrastructure including water, sewer, levee, and other features. GERO was operated by the city of Vincennes until 1939 when it was taken over by the State of Indiana as the George Rogers Clark State Memorial. It was adopted by the NPS in 1966 and became the George Rogers Clark National Historical Park; it was later listed on the National Register of Historic Places. GERO is generally bound by Main Street to the northeast, Second Street to the southeast, the Wabash River to the northwest, and Willow Street to the southwest.



Photo #1: Facing south to George Rogers Clark memorial building. 8/28/2014

The Park is approximately 26 acres and consists of the memorial building, both a cultural and recreational landscape, wide sidewalks with benches (referred to as the Mall), parking, a decorative retaining wall and walking path along the Wabash, and commemorative statues of Francis Vigo and Pierre Gibault. The St. Francis Xavier (Old Cathedral) “French and Indian” Cemetery is located along the southeastern park boundary, between the Park and Second Street.

The Brevoort Levee system begins within GERO, near the south boundary of the Park, while the Vincennes levee system begins at the north side of the Lincoln Memorial Bridge approach and runs along the Wabash River north of GERO. The first levee systems along the Wabash River in Vincennes date back to the 1880’s. The city experienced major floods in 1875 and 1898; the historic 1913 flood, which claimed lives and caused vast flood damage throughout the Ohio Valley and Midwest, overtopped levees in Vincennes. During this flood event, the Wabash River grew to seven miles in width in the Vincennes area.

The Brevoort Levee system extended into the GERO boundaries before the Park was built, but the levee was modified in 1939 after construction of the GERO memorial building and grounds. In 1956 city and levee managers discussed extending the levee system along the B&O railroad tracks; however, the idea was abandoned because it would hinder the views of the George Rogers Clark Memorial building and views of the Wabash River from the Park. The Wabash River has flooded several times, most recently in 2008, 2011, and 2013, threatening businesses, property, and public safety. The flood in 2013 set the record river height on the modern levee system.

The existing Brevoort Levee structure extends south of GERO, parallel to the Wabash River, for a total length of approximately 37 miles. Currently, during a flood event the City of Vincennes must operate a temporary levee closure on the B& O railroad corridor near Willow Street, located at the southern end of GERO. The temporary closure consists of an earth fill/sandbag structure constructed on the ground in the opening between both sides of earthen levee on either side of the opening. This temporary closure must be put in place manually to block water flow from the Wabash River during a flood event.

When the Wabash River reaches extremely high levels during a flood event, there is also a temporary low fill closure that is constructed across the open grassy area south of the Park memorial building and extends from the closure near Willow Street to a point just south of the Park Memorial building. This closure is placed on top of those portions of the Brevoort Levee that were built at a lower elevation within GERO property boundaries.

The length of the existing Vincennes levee structure is approximately 2.54 miles, and extends from a point adjacent to the north side of the Lincoln Memorial Bridge approach, within GERO property boundaries, to a point near the intersection of Main and Culbertson Boulevard. From that point the existing Vincennes Levee structure extends northeasterly along the Wabash River, turning southeast along Niblack Boulevard and Kelso Creek to the railroad tracks at Gregg Park. A temporary levee closure exists at

Main Street, approximately 230 feet northeast of the Lincoln Memorial Bridge over the Wabash River and on the B&O railroad corridor (now out of use). This closure consists of a temporary metal wall structure, constructed between permanent concrete floodwalls located on both sides of the railroad corridor; this temporary structure, which must be constructed manually, blocks water flow from the Wabash River during a flood event.

Vincennes has many miles of aging waste and storm water infrastructure that threatens the integrity of roads, sidewalks, and buildings. The wastewater line that runs along the southeast side of the Mall, memorial building, parking lot, and open space is a clay pipe that is 18 inches in diameter in northern sections of the infrastructure alignment and increases to 36 inches near Willow Street. The length of infrastructure to be addressed in this project is approximately 1,710 feet and traverses roughly from Willow Street to Main Street.

The B&O railroad corridor traverses through GERO for a total length of approximately 1,400 feet. The corridor section to be addressed in this project includes all portions located within the GERO property boundaries, from a point south of the intersection of Willow Street and River Road (also referred to as Frisz Boulevard and Henderson Road) to about the Main Street temporary flood closure. The corridor is generally located along the Wabash River, between the Park Memorial building and the river's east bank.

The primary area of effect for the proposed action to be discussed in this EA extends generally from the intersection of Culbertson Boulevard and Main Street to a point approximately 1,660 linear feet southwest, to a point near the intersection of River Road and Willow Street. The study area includes all areas from the Wabash River to Second Street (approximately 700 feet in width). For the purposes of the EA, the study area encompasses all of GERO, including those portions on the northeast side of SR 441/Vigo Street. Refer to Figure 1 for an aerial map of the project area and key sites and structures within GERO.

Figure 1. Project area key sites and structures.



Map Source: Indiana Geological Survey, www.maps.indiana.edu

- - - - - Brevoort Levee
- Willow Street temporary closure location
- Vincennes Levee
- Main Street temporary closure location
- - - - - Wastewater Infrastructure Alignment
- George Rogers Clark National Historical Park boundaries
- M George Rogers Clark Memorial Building
- C Old Cathedral "French and Indian" Cemetery
- - - - - B&O Railroad corridor alignment

**Aerial Map of Key Sites & Structures
Vincennes Levee Modification & Wastewater Infrastructure Project
George Rogers Clark National Historical Park
City of Vincennes, Indiana**

1.2 Purpose & Need for the Proposed Action

The purpose of the Vincennes Levee and Wastewater Infrastructure Rehabilitation project in GERO is to address deficiencies and desired modifications in flood protection along the Wabash River and within GERO property boundaries. Currently the Brevoort Levee has a temporary closure near Willow Street at the southern end of GERO, and a temporary earthen closure that is constructed during flood events on top of the low section of the Brevoort Levee that extends into the open grassy area on the south side of the GERO memorial building. Both of these temporary closures are inconsistent with current US Army Corps of Engineers (USACE) standard operating procedures; both are operated by the City of Vincennes. There is also a temporary closure at Main Street, near Culbertson Boulevard and the Wabash River, which is part of the Vincennes levee system. These closures are located at the B&O railroad corridor (currently owned and controlled by CSX) that generally parallels the Wabash River and are shut during flood events.

Also proposed in this project is the rehabilitation of the out-of-use B&O railroad corridor located between the Wabash River and the Park memorial building. The metal rails and wooden ties have been removed and the stone ballast remains in place. The purpose of this part of the overall project is to rehabilitate the area to the standards of the existing cultural landscape and to complete the area, as close as practical, to the original intent of the George Rogers Clark Memorial and landscape designers. This will allow for sidewalk access from the existing stone patio around the memorial building to the Francis Vigo memorial statue and to the walking path along the Wabash River. This portion of the project will also address the safety deficiencies associated with the uneven terrain caused by the railroad corridor; the base of the corridor is currently approximately four to five feet below the surrounding grade of the Park. The railroad right-of-way is being reviewed by CSX for abandonment, at which point the property would revert to the owner of property on either side of the easement; in this case that would be the NPS.

This project also will address the aging condition of wastewater infrastructure currently located along the southeastern edge of the Park property, generally following the sidewalk located there. The infrastructure likely dates to the early 20th century and carries approximately 30 percent of the city's wastewater, including all wastewater from Vincennes University and historic downtown Vincennes. During 2008 a sinkhole from a leak in this wastewater line formed in the parking lot of the Park, near the base of a low section of the Brevoort Levee, and was promptly addressed by Vincennes Water Utilities (H. Pinnell, personal communications). There is a need to address the condition of this wastewater infrastructure in order to prevent future damage to surrounding roadways and to GERO, and to prevent adverse impacts to the local environment in the event of contamination due to infrastructure failure.

The existing condition of the levee system does not meet the flood protection needs of the City of Vincennes as identified by the USACE. The three temporary closures (at Main and Willow Streets and within GERO) that are utilized during flood events must be operated manually and require extensive manpower and maintenance to set in place and

remove. The aging sanitary sewer line has needed repairs in recent years and is in need of considerable maintenance or replacement in order to prevent future leaks and potential damage to the Park, the Brevoort Levee, nearby roadway infrastructure, and the local environment. Also, the ballast of the now out-of-use B&O railroad corridor sits below the surrounding grade and reduces the overall visual aesthetics and cultural landscape of GERO. Rehabilitating the corridor by removing the ballast and bringing the corridor up to existing surrounding grade level will provide park users with a consistent visual experience with the landscape of the park.

1.3 Prior NEPA Reports & other Environmental Documentation

The following NEPA and National Historic Preservation Act (NHPA) documents have been compiled for the GERO site:

- *An Archaeological Overview and Assessment of George Rogers Clark National Historical Park*, October 2002. This assessment was compiled to: report known and potential archaeological resources; to identify archaeological research and projects needed by the Park; map the depth of fill soils throughout the Park; determine the boundaries of the Old Cathedral cemetery (southeast of the Park); and to evaluate the possibility that remains of Fort Sackville can be located.
- *George Rogers Clark National Historical Park Cultural Landscape Report/Environmental Assessment*, January 2008. The purpose of this report was to provide guidance for treatment of the cultural landscape features in GERO (landscape and hardscape replacement, modification, removal, etc).
- *George Rogers Clark National Historical Park Phase I and II Archaeological Investigations, Knox County, Indiana (GERO 157423)*; April 2012. This report was compiled in response to the desire of NPS to install a geothermal heating and cooling system in the lawn on the southwest side of the George Rogers Clark Memorial building and concrete patio that surrounds the building.

1.4 Issues & Objectives

The Brevoort and Vincennes levee systems have temporary closures at Willow Street and Main Street, where the B&O railroad corridor transects GERO near the banks of the Wabash River. These flood prevention structures must be closed manually by city personnel during a flood event and remain open when river levels are normal. The objective of this portion of the project is to eliminate the need for these temporary closures to reduce the potential for flooding in the community and the manual labor and expense involved in constructing the temporary structures during flood events. Construction will occur primarily within previously disturbed soils, as the temporary

closures are located on the B&O railroad corridor. Access to River Road, which turns south off of Willow Street and parallels the Brevoort Levee on its west side, will be maintained after the temporary closure is removed and the permanent levee structure is constructed.

The wooden ties and metal rails have been removed from the out-of-use B&O railroad corridor, leaving the ballast of the railroad line below grade. It is anticipated that the current owners of the railroad corridor, CSX Railroad, will abandon the corridor; this would result in the corridor property reverting back to the adjacent property owner, the NPS. By removing the railroad ballast, filling the corridor, and matching the conditions of existing surrounding grade, the historic designed landscape of the Park will be improved and a new sidewalk from the Park memorial building to the walkway along the Wabash River banks could be constructed, improving visitor experience.

In order to provide adequate flood protection for GERO and portions of the city, the proposed action involves construction of a high ground area on the southwest side of the Park memorial building to eliminate the need to construct a temporary earthen closure during flood events. This work would involve raising the existing grade elevation approximately 2.4 feet; the proposed high ground would encompass approximately 2.7 acres of GERO property.

The City of Vincennes will benefit from rehabilitation of the wastewater infrastructure line that generally follows the existing sidewalks on the south side of GERO from Willow Street to Vigo Street/SR 441. There are multiple methods that may be used to rehabilitate this sewer line; trenchless repairs would provide the most efficient method with the least damage to surrounding infrastructure and the environment.

1.5 Impact Topics Selected for Detailed Analysis

The following topics were determined to be appropriate for a detailed analysis of impacts:

- Cultural resources
- Aesthetics and Visual Resources
- Hydrology and water resources
- Floodplains and Flood Protection Systems
- Soils
- Terrestrial habitat and wildlife
- Socioeconomic environment and environmental justice
- Visitor use and experience
- Park operations
- Public and private utilities
- Former MGP site (solid and hazardous waste)

1.6 Impact Topics Dismissed for Detailed Analysis

Seven topics areas were determined to be unaffected by the proposed project and were therefore dismissed from further analysis:

- *Noise Quality*: This project would not result in permanent impacts to noise quality because it would not introduce any new traffic patterns or mechanical equipment. Noise quality would be affected temporarily during construction only due to the use of fuel-powered earth moving equipment and related machinery and equipment.
- *Air Quality*: No new air pollutants, including the six criteria pollutants as defined by the Clean Air Act, would be introduced as a result of this project. This project would not involve the construction of new roadways that increase traffic patterns, nor would it involve the installation of new mechanical equipment that would produce air pollutants. Air quality in and near the project area may be temporarily affected by the use of fuel-powered earth moving equipment and related machinery.
- *Public Safety*: The project would not result in the interruption of police, fire, ambulance, or other emergency services; roadways and entrances into GERO would remain open throughout construction to provide public safety and emergency personnel access.
- *Farmland Impacts*: The project is located in an urban setting. The United States Department of Agriculture Natural Resources Conservation Service (NRCS) was consulted on this project; this agency, in a letter dated October 23, 2013, stated that the project would not result in the conversion of prime farmland (refer to Appendix B for environmental review agency response letters and comments).
- *Climate*: Air temperature, precipitation, wind, and other weather conditions of Vincennes would not be temporarily or permanently altered or impacted by the construction involved in this project. The Council on Environmental Quality (CEQ), in draft NEPA guidance to federal agencies regarding the documentation of climate change effects (dated February 18, 2010), directed agencies to conduct quantitative analysis of greenhouse gas (GHG) emissions for any project with an estimated GHG emission level over 25,000 metric tons. It is not anticipated that the total GHG emissions produced during construction of this project would exceed the 25,000 metric ton threshold.
- *Geology*: Disturbance of geologic features as a result of this project is not anticipated because excavation of disturbed and undisturbed soils is not involved. According to the Indiana Geological Survey (IGS), Knox County is located in Indiana's Seismic Zone 2A, a location where "soils are prone to seismic-wave amplification during earthquake shaking;" however, IGS stated in the agency's

letter dated November 5, 2013 that “with proper precautions, the proposed activities...should not affect or be affected by the geology of the area” (Appendix B).

- *Threatened & Endangered Species*: In a letter dated October 23, 2013, the US Fish and Wildlife Service (USFWS) stated the project was within range of two federally endangered mussel species and one mammal species as well as within range of on species proposed as endangered, but there are no known occurrences of these species or their habitat within the project area. The USFWS concluded that the project is not likely to adversely affect these listed species. Similarly, in their letter dated October 25, 2013, the Indiana Department of Natural Resources (IDNR) Division of Fish and Wildlife identified two state and federally endangered mussel species, one mussel species that is a candidate for state and federal listing, and one species of state special concern that have been recorded in the Wabash River within ½ mile of the project area. However, this agency stated that these mussel species are no longer found in the Wabash River near this project, and concluded that this agency did not foresee any impacts to these species as a result of this project. Therefore, it was concluded that threatened and endangered species would not be impacted by this project (refer to Appendix B for USFWS and IDNR Division of Fish and Wildlife letters and comments).

1.7 Public Concerns

Public concerns exist regarding the ability of the Brevoort and Vincennes levee systems to contain floodwaters during a flood event. The record flood level for the Wabash River was set in 1943, when the river reached 29.33 feet; this record was challenged in the spring of 2013, heightening public concerns.

1.8 Federal, State, and Local Regulations

The following regulations and policies are applicable to this project:

- **National Environmental Policy Act (NEPA), 1969-** requires that all federal projects, programs, and actions be assessed for short term, long term, cumulative, direct, and indirect impacts to surrounding environmental, social, and cultural resources.
- **National Historic Preservation Act (NHPA), 1966-** Section 106 of NHPA requires that federal agencies identify and assess the effects of federal projects, programs, and actions on historic resources

- **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 1980-** provides broad Federal authority to respond to releases or threatened releases of hazardous substances that may endanger public health or the environment
- **Organic Act, 1916-** established the National Park Service as an agency under the Secretary of Interior, with a mission to conserve park resources and provide for their use and enjoyment while also leaving the parks unimpaired for future generations
- **Title 44 of Code of Federal Regulations (44 CFR), Section 65.10-** provides minimum design, operation, and maintenance standards levee systems must meet in order to be recognized as providing protections from the base flood on a Federal Emergency Management Agency Flood Insurance Rate Map (FIRM).
- **Indiana Code 14-21-1-26.5, Burial Ground Development Plans-** a Development Plan is required for a government entity to disturb ground within 100 feet of a burial ground (including cemeteries). The Plan must be submitted to and approved by the Indiana Department of Natural Resources (IDNR) Division of Historic Preservation and Archaeology.
- **City of Vincennes Code of Ordinances, Title XV, Chapter 160, Flood Damage Prevention-** guides development in the flood hazard areas.

Chapter 2 Alternatives

There were several alternatives considered for levee modifications, wastewater infrastructure rehabilitation/repair, and for treatment of the out-of-use B&O railroad corridor through GERO.

Sec. 2.1, “No Action” Alternatives

2.1.1 No Action (“Do Nothing”) Alternative for Levee Modifications

This alternative represents future conditions and potential flood impacts if the project were not to take place. Although this alternative would cost nothing, it would not address the need to provide basic flood protection for the City or reduce the cost of manual labor hours involved in the placement and removal of temporary closures at Willow Street and Main Streets before and after flood events. This alternative would result in the flood protection system for Vincennes not being certified by FEMA in the future. FEMA has established procedures for determining the accreditation and certification of levees; this determination is used for the administration of floodplain management, flood insurance, and mandatory purchase requirements as part of the NFIP.

2.1.2 No Action (“Do Nothing”) Alternative for Wastewater Infrastructure Rehabilitation/Repair

The No Action Alternative would leave the sanitary sewer infrastructure inside GERO property boundaries untouched. Although this alternative would cost nothing, it does not address the need to rehabilitate the aging and deteriorating conditions of the wastewater infrastructure through GERO.

2.1.3 No Action (“Do Nothing”) Alternative for Rehabilitation of B&O Railroad Corridor

The No Action Alternative would leave the railroad corridor inside the Park boundaries in its current condition. This alternative would cost nothing but would not address the need to rehabilitate the area to the cultural landscape standards and intent of GERO landscape designers.

Sec. 2.2, Preferred Alternatives

2.2.1 Levee Modification and Construction of Permanent Closures at Willow and Main Streets

This alternative involves constructing permanent levee structures to replace two temporary closures as well as modifying the existing Brevoort Levee section inside

GERO boundaries in the open grassy area south of the GERO memorial building; this section was lowered in the 1930's when the Park was constructed.

The temporary closure at Willow Street is currently located at the junction of Willow Street and the out-of-use B&O railroad corridor, near the southern boundary of GERO. The temporary closure will be removed and replaced with a permanent earth fill levee section that will connect to the existing Brevoort Levee, thus becoming an extension of the existing levee. Construction of the permanent earth fill levee will involve removal of the old B&O railroad ballast and excavation of a six-foot deep key trench, which will then be filled with impervious excavated fill. The levee will be constructed of cohesive fill material and compacted backfill on the key trench; upon completion the levee, slopes will be covered with erosion blankets and re-seeded with perennial grass seed. This proposed levee section will be approximately 230 feet wide at the toe of slope and will have a base flood elevation (BFE) of 428.4 feet.

The existing asphalt of Willow Street will be removed and disposed of offsite at an approved location. An 18-foot wide asphalt or stone ramp will be constructed over the new levee section to maintain access to the structures located just south of Willow Street, in between the Wabash River and the existing Brevoort Levee.

The project also involves construction of a high ground area on top of that portion of the Brevoort Levee that was lowered when GERO was constructed in the 1930's. This high ground area will connect to the proposed earth fill levee section at Willow Street discussed above to create continuous flood protection. The high ground area will cover approximately 2.7 acres and will involve removal of the turf grass only (no soil excavation) and will be constructed using compacted backfill. Erosion control blankets and seeding will be installed after construction.



Photo #2: Proposed high ground area, facing north. 11/26/2013.

The toe of slope of the high ground area to the west (nearest to the Wabash River) will generally follow the out-of-use B&O railroad corridor alignment, turning easterly toward the open grassy area for approximately 40 feet before continuing generally northwest toward the GERO memorial building, tapering northeast and ending at the concrete patio that surrounds the memorial building. The eastern toe of slope will generally follow the five-foot sidewalk located along the eastern side of the open grassy area, tapering toward Willow Street and the proposed earth levee discussed above at the southern end and toward the memorial building on its northern end. The BFE of the proposed high ground area is 428 feet. Trees located in the footprint of the high ground area will be removed as well as the five-foot sidewalk located approximately 55 feet south of the GERO memorial building.

The Main Street temporary closure is currently located on the out-of-use B&O railroad corridor alignment, approximately 75 feet south and west of Main Street, near Culbertson Road. The temporary closure will be replaced with a permanent concrete floodwall between two existing concrete monolith walls on either side of the railroad corridor. The proposed concrete floodwall will be 18 inches thick and 33.83 feet wide, with a BFE of 429.3 feet (the current elevation of the existing grade is 420.5 feet).

Preliminary plans for the proposed permanent closures for Willow and Main Streets and the proposed high ground area can be found in Appendix A.

2.2.2 Wastewater Infrastructure Rehabilitation using Synthetic Liners

This alternative would involve no physical disturbance above ground. Synthetic sealant liners would be installed using mechanical equipment inside the existing piping using existing manholes for access.

2.2.3 Rehabilitate Railroad Corridor to Match Existing Cultural Landscape of GERO

This alternative would involve filling in the B&O railroad corridor to bring it up to the level of the surrounding grade. This alternative would rehabilitate the area to the standards of the existing historic designed landscape as close as practical to the original intent of the George Rogers Clark Memorial landscape designers. Construction activities involve excavation of the existing railroad ballast; installation of compacted backfill in the corridor to match the surrounding grade; and installation of grass seed over the entire area upon completion.

2.3 Other Alternatives Considered

2.3.1 Convert Temporary Closures to Permanent Closures Only

This alternative involves constructing permanent concrete closure walls only in place of the current temporary closures at Willow Street and Main Street and does not involve construction of the high ground area on the south side of the GERO memorial building.

This alternative would cost less because it would not include construction of the high ground area but would not address the need to provide flood protection for GERO and surrounding commercial and residential areas of the City that would be certified by FEMA in the future.

2.3.2 Pipe Bursting Technique to Repair Wastewater Infrastructure

This alternative would involve no physical disturbance above ground. The technique involves the insertion of a conically shaped tool (bursting head) into the old pipe, using existing manholes for access, forcing fragments of the old pipe into the surrounding soil. At the same time, a new pipe is pulled or pushed in behind the bursting head. The rear of the bursting head is connected to the new pipe, while its front end is connected to a cable or pulling rod. The bursting head and the new pipe are launched from the insertion pit, and the cable or pulling rod is pulled from the reception pit. The cable/rod pull together with the shape of the bursting head keeps the head following the existing pipe. While the process of pipe bursting would not result in visible disturbance to the surrounding landscape above grade, vibrations from the mechanical equipment used and the bursting of the pipes could result in impacts to nearby structures and infrastructure.

2.3.3 Wastewater Infrastructure Rehabilitation via Excavation

The physical condition of the existing wastewater infrastructure inside and outside of Park boundaries is currently unknown. In the event that the preferred alternative to line the infrastructure with synthetic materials is not possible due to advanced physical deterioration of the existing infrastructure, or if the pipe bursting method is not a viable option due to infrastructure deterioration, excavation of some or all areas surrounding the existing infrastructure would be required.

This alternative would address the aging conditions of the wastewater infrastructure but would most likely require the removal of several trees and the concrete sidewalk that extends the full length of the Park. This alternative would result in negative impacts to the historic designed landscape of GERO and minor impacts to local habitat. In addition, because the Old Cathedral “French and Indian” Cemetery lies directly adjacent to the sanitary sewer line, a Cemetery Development Plan would be required to delineate the boundaries of this cemetery in accordance with Indiana Department of Natural Resources Division of Historic Preservation and Archeology regulations regarding cemeteries.

Chapter 3 Affected Environment

The George Rogers Clark National Historical Park (GERO) encompasses 26 acres adjacent to the Wabash River in the City of Vincennes, located in southwestern Indiana. The proposed project area includes the open grassy area on the southwest side of the George Rogers Clark memorial building and the location of the existing wastewater infrastructure that traverses through the Park from Willow Street to about Culbertson Boulevard, generally located on the southeast side of the open grassy area, memorial building, the Mall, and grassy area on the northeast side of SR 441/Vigo Street. The project would also involve modification of the existing and out-of-use B&O railroad corridor right-of-way (currently owned by CSX Railroad) that traverses through the Park adjacent to the Wabash River, between the GERO memorial building and the riverbanks and the two temporary flood closure walls located at this railroad corridor (known as the Willow Street and Main Street closures).



Photo 3: Facing south along Wabash River at Lincoln Memorial Bridge. 8/28/2014

The high ground portion of the project will be located in the open grassy area to the southeast of the Park memorial building, which is relatively flat terrain from the building to the Park property line. Within this open grassy area is a portion of the Brevoort Levee that was built to lower elevation standards than the rest of the levee due to the existence of the George Rogers Clark State Memorial. At that point, the Brevoort Levee rises above the surrounding terrain to the south of GERO. The proposed high ground area is approximately 2.7 acres in area.

The existing site conditions of the location of the wastewater infrastructure line to be rehabilitated as part of this project is flat from Willow Street SR 441/Vigo Street and consists of concrete sidewalk and lawn, with trees lining the sidewalk; the length of the work zone in this portion is approximately 1,120 lineal feet. At Church Street, located on

the northeast side of the Old Cathedral Catholic Church, the infrastructure line turns and travels north at an angle for approximately 320 lineal feet to and under the flagpole terrace and steps on both sides of the roadway, and then under SR 441/Vigo Street. The flagpole terrace consists of concrete aggregate sidewalks, granite benches, and decorative stone with stairs that travel from the sidewalk along the roadway into GERO property on both sides of the roadway. From the flagpole terrace, the wastewater infrastructure line then travels northeast under the concrete approach for the terrace and under First Street for approximately 260 feet, where the wastewater line continues northeast and out of GERO park boundaries.

The out-of-use B&O railroad corridor right-of-way traverses through GERO and currently consists of the railroad ballast and gravel base; the metal rails and wooden ties have been removed. The corridor is surrounded by flat terrain on the southeast side (the open grassy area discussed above) and by a concrete retaining wall and the Wabash River on the northwest side; however, the terrain slopes down to the railroad ballast and gravel base, which sits approximately four to five feet below the surrounding grade.

Sec. 3.1, Cultural Resources

The George Rogers Clark National Historical Park and memorial building represent a significant and pivotal period of the history of the United States that begins with the British occupation of the area and culminates in the Siege of Fort Sackville, a critical battle of the American Revolution leading to American ownership of the area and the eventual opening of the Northwest Territory. Though the French had established Vincennes and had been settled there for some time, the placement of Lieutenant Governor Edward Abbott in Vincennes by the British on April 18, 1777 is when the conflict leading to the site's significance began (NPS, 2013). Upon his arrival, Abbott organized the villagers into three companies of militia. Soon, he would send for pieces of artillery and order a stockade built, naming it in honor of Lord George Germain, who had been known as Lord Sackville from 1720 until 1770 (NPS, 2013). After the foundation was built in 1778, Abbott left Vincennes, with Fort Sackville still under construction. Today, the Park's boundaries encompass the former site of Fort Sackville, a strategically placed stockade built around the two-story British headquarters building in 1777 (NPS, 1976).

According to the NPS (2013), "On December 17, 1778, Lieutenant Governor Henry Hamilton, Abbott's successor, arrived with companies of British soldiers, French militia from Detroit, and Indian allies." Upon his arrival, Hamilton wished to rebuild the fort to increase security; instead, he followed the more efficient plan set by his second-in-command Major Jehu Hay, which was to leave the stockade as it was and build two blockhouses, one at the northeast angle and the other at the southwest (NPS, 2013). As the fort was built, all the King's gunpowder was stored in a powder magazine, and additional gunpowder was collected from the inhabitants of Vincennes and stored in the fort; without Hamilton's knowledge, some inhabitants had hidden gunpowder, which

would later assist Clark's invading army. Continued labor on the fort through February 22nd would add a gate guardhouse, two new barracks, two cannons, ironwork, and parade grounds (NPS, 2013).

On February 23, 1779 George Rogers Clark attacked Fort Sackville, forcing Hamilton to surrender on February 25, 1779 (Nickel, 2002). According to Hamilton, weaknesses related to the quality of construction of the fort were significant reasons he considered for surrender (NPS, 2013). Another factor impacting the results of the siege was the fact that the French had allied themselves with Clark (NPS, 2008). The significance of the victory in Vincennes was the eventual gain of the Northwest Territory in the 1783 Treaty of Paris, nearly doubling the size of the original Thirteen Colonies, and the victory's implicit connection to the end of the Revolutionary War and the preservation of American values and culture (NPS, 1976).

After the surrender, the Americans renamed the fort in honor of the Virginia Governor Patrick Henry, and at the end of the American Revolution, the fort was abandoned (NPS, 2013). Eventually, the deteriorated condition of the fort required that a new fortification be built, and this new fort was built north of the original site and named Fort Knox (NPS, 2013).

During the 1800's, the exact location of Fort Sackville became lost as Vincennes grew. The site became home to businesses including mills, warehouses, auto dealerships, grain silos, and private homes. City roads traversed through the area including First Street, Lower First Street, Upper Second Street, Church Street, Barnett Street, Dubois Street, Nicholas Street, and Willow Street. Utilities were installed under these streets to service the businesses and homes that existed here; these included water sewer, storm drains, and natural gas. All of these streets were eventually abandoned where the utilities traversed GERO; however, right-of-ways exist for the infrastructure that was in place prior to construction of GERO and the memorial building.

By the 1920s, a major effort was made to remember the 150th anniversary of Clark's campaign (NPS, 1976). On February 23, 1927, the Indiana General Assembly established the Indiana George Rogers Clark Sesquicentennial Commission, which had as its mandate the acquisition of "suitable land in Knox County to include the site of Fort Sackville on which to erect a structure or structures to appropriately, adequately, fittingly, and permanently commemorate the historic expedition of George Rogers Clark, culminating in the capture of Fort Sackville" (Indiana Historical Society, 2004). On May 23, 1928 President Calvin Coolidge signed a resolution starting the George Rogers Clark Commission to create a monument to celebrate Clark. In the 1930s, the momentum toward Clark's memorial culminated in a series of appropriations from the State of Indiana, Knox County, the City of Vincennes, and the Federal government to support a total expenditure of \$2,500,000 (NPS, 1976). Construction of the memorial began in September 1931 and was finished by 1936 (Indiana Historical Society, 2004).

According to the NPS (1976), "The memorial as a whole is largely the conception of the noted landscape architect William E. Parsons, of the firm of Bennett, Parsons and Frost in

Chicago.” Serving as the design consultant to the George Rogers Clark Sesquicentennial Commission, Parsons outlined a concept for the memorial in 1929 that began by insuring the redesign of the bridge about to be constructed over the Wabash River into what became the Lincoln Memorial Bridge, indicating that the breadth and inclusiveness of his memorial concepts would be symbolized with a formal bridge with a grand approach that would “offset the proposed Clark memorial, stand as a symbolic gateway between Indiana and Illinois and recall the passage of the family of Abraham Lincoln over the same route” (NPS, 1976).

Parsons was also instrumental in preparing the prospectus for the architectural competition for the building that would be the central feature of his carefully designed grounds, and he “favored a massive but compact structure that would evoke the military strength represented in the Clark story” (NPS, 1976). It would stand symbolically facing the carefully structured esplanade with the city and bridge approach beyond and turning its back to informally landscaped grounds that blended into natural woods along the river, representing the conquest of the frontier (NPS, 1976).

The thematic and physical connections among Vincennes’s major historic resources including the monument and the St. Francis Xavier Cathedral and burial grounds are integral to the significance of the Park (NPS, 1976). The architectural firm of Hiron and Mellor of New York City won the architectural competition in 1930 and designed the structure to incorporate the Classical styles favored at the time, relying on the implied strength and masculinity of the Doric order and its massiveness to symbolize the perceived strength of Clark and his cause (NPS, 1976). According to Sesquicentennial Commission records, the jury was impressed with the design due to the fact that it could be clearly seen from the many points of view, taking advantage of the contrasting backdrops provided by the Cathedral, the river, a massive stone wall, and the Lincoln Memorial Bridge, and representing a strong point between the town and the woods near the river (NPS, 1976). Inside the memorial is Hermon MacNeil’s bronze statue of Clark and the murals by Ezra Winter depicting stages of the Clark campaign and its aftermath, and all memorial materials were carefully selected for their aesthetic qualities (NPS, 1976).

On the grounds designed by Parsons and his firm, the GERO memorial building divides the formal landscaping to the northeast from the informal landscaping of the park like area to the southwest, providing a transition to the Cathedral and the town from the surrounding countryside to the south (NPS, 1976). According to the NPS (1976), “The River is formalized with a massive seawall, which has as a centerpiece the statue of Francis Vigo. The Gibault Statue in front of the Cathedral similarly memorializes the French contribution to history. The landscaping emphasizes transitions from the memorial to the views in all directions.” New York architect Frederic Charles Hiron designed the memorial, and President Franklin Roosevelt dedicated it on June 14, 1936 (NPS, 1976). The elements of the GERO memorial building are described below in the following paragraphs. With the thematic and symbolic elements of the site described, details of the historic structures and site layout follow.

The memorial building is a circular granite building surrounded by sixteen granite Greek Doric columns in a peripteral colonnade under a saucer dome of glass panels (NPS, 1976). The ceiling of the colonnade gallery is composed of stone coffers, and the exterior wall of the building has a polished green granite wainscot with polished red granite band carved in a running dog motif, main wall of rusticated granite blocks, and parapet wall above the colonnade with a Greek key motif band (NPS, 1976). At the northeast side is a monumental doorway in granite surmounted by a carved eagle. The doorway has three glass and bronze doors, two lights, a tea-light transom, and elaborate bronze grills; inside the doors is a glass and bronze vestibule with two more doors opening inside (National Park Service, 1976). The building is raised on a stylobate, and visitors enter the memorial by climbing thirty granite steps in the northwest corner (NPS, 1976). The GERO memorial building is among the last major Beaux-Arts style public works in the United States, completed in 1933 (NPS, 1976).



Photo #4: George Rogers Clark Memorial building entrance. 1126/2013

The principal architect of the memorial building, Frederick Charles Hiron, was an active member of the American Society of Beaux Arts, the architect of the Society's New York headquarters in 1928 and the author of a number of other award-winning designs (NPS, 1976). He was also chiefly responsible for the selection of Ezra Winter as muralist and Hermon MacNeil as sculptor (NPS, 1976).

Inside the memorial building are seven murals painted by Ezra Winter depicting George Rogers Clark, his journey to the Ohio Valley, and the capture of Fort Sackville. The last two murals focus on the significance of the previous events highlighting the acquisition

of the Old Northwest Territory and eventually the Louisiana Territory. Winter was chosen by the Sesquicentennial Commission in consultation with Hirons and was instructed to emphasize the “winning of the Old Northwest” in his paintings (Indiana Historical Society, 2004). Before being hired for this job, he studied at the Chicago Academy of Fine Arts in 1908 and 1909 and had works hung in Radio City Music Hall (New York) and the reading rooms in the Library of Congress in addition to other locations (Indiana Historical Society, 2004). Winter hung his work in the George Rogers Clark Memorial in December 1934 (Indiana Historical Society, 2004).

In addition to the Winter murals, the inside of the GERO memorial building is focused on a bronze sculpture of Clark by Hermon Atkins, which “stands over seven feet tall and is centered in the space on a pedestal of Formosa marble with thirteen flutes” (NPS, 1976). According to the NPS (1976), “Around the base is a quotation in raised brass letters. Additional quotations and dates are placed on the walls of the building and discuss the life and death and accomplishments of Clark.” Flooring is of marble slabs radiating from the center with a raised step and “base for a smoothly molded circular bench and wainscot, all of a dark marble” (NPS, 1976). In the base of the bench, there are bronze heating grilles in a dragon design, and restrooms at the north and east corners feature plastered walls and ceilings, marble wainscoting, and terrazzo flooring; however, the basement of the building is unfinished (NPS, 1976).

Between the murals are limestone pilasters, and above is a limestone frieze with inscription (NPS, 1976). The ceiling is composed of limestone blocks corbelled up to a large circular skylight composed of multiple panes of etched glass, originally colored, and above the flat skylight is a set of light emitting diode (LED) lights (installed in 2013) covered by a steel and wire-glass conical exterior skylight (NPS, 1976). The roof of the building is constructed of terneplate and the roof of the colonnade gallery is constructed of tar and gravel with the terrace being surfaced with exposed aggregate concrete (NPS, 1976).

Outside of and in addition to the memorial building, GERO has a significant cultural landscape. The park space consists of formally landscaped grounds planted with evergreen shrubs and deciduous trees including flowering apple trees (NPS, 2008). The park is a unified whole in terms of landscaping and architecture and is visually defined by the Wabash River and its retaining wall, the Lincoln Memorial Bridge, which was designed to be an integral element of the entire Park design, statue of Pierre Gibault, and St. Francis Xavier Catholic Church (also known as the Old Cathedral), its burying ground, and its Library (NPS, 2008). The formal landscaping of the grounds complements the perpendicular axes of the boundaries, and the central feature of a scheme consists of a void formed by a large rectangular grass esplanade between the memorial and the bridge approach (NPS, 2008). As an expression of Classical Revival planning, GERO is an example not often seen outside of Washington, D.C. (NPS, 2008).

In addition to the memorial and the park space itself, there are several other historic sites and structures on the GERO site.

The Vigo Statue is a granite statue roughly nine feet by eleven feet and depicting a fur trader seated with his arm resting on a bale of furs. The statue was executed by John Angel and was built in 1934 to honor the Italian-American merchant who assisted George Rogers Clark (NPS, 1976).

The Gibault Statue is a copper statue located on the plaza in front of the Old Cathedral (NPS, 1976). It is 3 feet by 8 feet and is set on a high base of polished dark green granite (NPS, 1976). This statue was executed by Albin Polasek and was also added in 1934 to honor Father Pierre Gibault, a Jesuit missionary and priest in the Northwest Territory who “gained the allegiance to the United States of the French Population of Vincennes” according to the inscription on the statue base (NPS, 2008).



Photo 5: Pierre Gibault Statue and St Francis Xavier Cathedral beyond. 11/26/2013

The Lincoln Memorial Bridge approach and Esplanade contains numerous walks of exposed aggregate concrete, copper light standards and 12 granite benches (NPS, 1976). An 80' cast iron flagpole on a dark polished granite base is located on the northeast side of Vigo Street; around the flagpole is a series of monumental steps, terraces, walls, and planters. Opposite the flagpole across SR 441/Vigo Street is a series of monumental steps, terraces, walls, and planters focused on three large wall plaques inscribed with appropriate quotations. The material used on both sides of Vigo Street is gray granite, and also in gray granite are two pylons flanking the approach to the Lincoln Memorial Bridge and carved by Raoul Jossel into bas-relief Indians. A monument by Nellie Walker on the Illinois side of the bridge and owned by the State of Illinois celebrates the migration of Abraham Lincoln (NPS, 1976).

A poured concrete retaining wall separates GERO from the riverbank. The retaining wall somewhat protects the memorial building and Vincennes from Wabash River flooding and was designed to complement the memorial (NPS, 1976). Its design is Classical with rusticated buttresses.



Photo 6: Facing north along retaining wall and walk, inside GERO. 11/26/2013

A limestone war memorial to the soldiers from Knox County who served in World War I sits on a concrete base and has two bronze plaques on either side; it is located northeast of Vigo Street (NPS, 1976).

A headquarters site marker erected by the Daughters of the American Revolution in 1959 locates the probable site of the Clark headquarters; it consists of a bronze plaque on a gray granite wedge set in a concrete base (NPS, 1976).

The Fort Sackville Site Memorial stone marker is located in the north corner of the memorial building area and was erected in 1905, moved in 1931, and re-moved in 1971; it is a limestone block two feet by three feet and has an incised inscription (NPS, 1976).

The Charles Gratiot Monument was installed on November 18, 1905 and replaced in 1936 (NPS, 2008). This monument consists of a “bronze tablet mounted on an angled granite base” (NPS, 2008). The tablet and base are mounted on a concrete footing, which is mounted flush with existing grade (NPS, 2008). The monument was dedicated by the Huguenot Societies of the Old Northwest Territory as part of Bicentennial celebrations at the site (NPS, 2008). The monument honors Charles Gratiot, who furnished material aid to George Rogers Clark, helping him to capture Fort Sackville (NPS, 2008).

The Ferry Landing Plaque was installed in 1930 to commemorate Lincoln’s crossing of the Wabash. The plaque is bronze (NPS, 2008).

The USS Vincennes Memorial was installed in 1989 and is situated on a spur off of the diagonal sidewalk running from the southeast corner of the green up to the bridge approach area (NPS, 2008). The memorial was “erected to commemorate the four U.S. Naval ships commissioned the USS Vincennes” (NPS, 2008). The construction of the memorial consists of a circular grey granite base with a rough edge and eight compass points on top (NPS, 2008). The memorial is polished black marble, which is square at

the base with a pyramidal top half, and there is a bronze plaque on each side of the memorial and a common plaque on the north side of the base of the memorial (NPS, 2008).

The Vincennes in the American Revolution Marker was installed in 1976 (NPS, 2008). The plaque was erected by the Illinois Bicentennial Commission, Illinois State Historical Society and the Indiana Historical Society and is navy blue with raised white letters (NPS, 2008). The plaque is secured to a pole with brackets at the middle and top of a silver painted aluminum pole (NPS, 2008).

The Name of Vincennes Marker was installed by Delta Theta Tau Sorority, Epsilon Psi Chapter and Alumni Association in 1976 (NPS, 2008). This rectangular plaque is a traditional historical marker with the symbol of the American Revolution Bicentennial Commission above the text (NPS, 2008). The plaque is black with raised white letters and is posted on a concrete and metal post, which is mounted into the ground (NPS, 2008).

For the purposes of analysis in this EA, the types of “cultural resources” that may or may not be affected by the proposed alternatives include:

- The historic designed landscape of the Park, which includes physical attributes of the Park such as plaques, statues, memorials, buildings, walkways, and landscaping, as well as the design intent to commemorate George Rogers Clark and Fort Sackville
- Known and unknown belowground archaeological resources

Sec. 3.2, Aesthetics & Visual Resources

Besides views of the formal historic features, structures, and landscaping visitors access at the site, GERO offers extensive views of the Wabash River. To the south, riparian forest lines both banks of the Wabash for the length of the viewshed. Approximately one half mile south of the Park memorial building, the River bends to the west and views of the waterway diminish. The view to the south also includes the Park’s maintenance building and the Brevoort Levee at the Park’s south boundary.

The Old Cathedral “French and Indian” Cemetery is visible from many areas of GERO, including the memorial building. The cemetery contains about 4,000 residents of early Vincennes, including soldiers and patriots of the American Revolution. A log church at the cemetery, now gone, was the site where Colonel George Rogers Clark and British commander Lieutenant Governor Henry Hamilton negotiated the terms of British surrender of Fort Sackville on February 24, 1779.

The Lincoln Memorial Bridge, which carries SR 441/Vigo Street over the Wabash, is an integral part of the historic landscape of GERO and dominates the overall view of the

River to the north. Riparian forest also lines the banks of the River to the north beyond the Lincoln Memorial Bridge. SR 441/Vigo Street is elevated above the surrounding Park property, which diminishes views of the River and northern park areas for visitors while on the south side of this roadway. From park areas north of SR 441/Vigo Street, the viewshed includes portions of the River, the Lincoln Memorial Bridge, and the downtown commercial establishments along Main Street.

Sec. 3.3, Hydrology & Water Resources

The Wabash River is the western boundary of GERO. The 475 mile long river is Indiana's official State River, and is listed as a state Outstanding River for its scenery, recreational value, and cultural history (IDNR, n.d.). Its watershed drains approximately two thirds of the state; its course begins in the northeastern part of the state and empties into the Ohio River in the southwest corner of the state at the Illinois border. The River served as an important transportation route for Native Americans and early settlers; the Wabash Erie Canal was built in the mid- 1800's beside the River to serve as a more reliable transportation route, but the arrival of the railroad era doomed the canal (IDNR, n.d.).

According to Indiana Geological Survey GIS mapping (www.maps.indiana.edu) there is one water well located within the GERO boundaries. Coordination with Indiana Department of Environmental Management (IDEM) revealed that the project area also contains a wellhead protection area. This well is situated approximately 50 feet south of the B&O railroad corridor and approximately 150 feet northeast of SR 441/Vigo Street, in the open grassy area near the Main Street temporary levee closure. Another water well is located on the southwest side of Willow Street, approximately 230 feet south of River Road (Frisz Boulevard) and outside of the Park boundaries (refer to Appendix A for water well location map). There is also an irrigation well located in the open grassy area on the south side of the memorial building that provides water for GERO's irrigation system.

Sec. 3.4, Floodplains & Flood Protection Systems

The Park is situated directly adjacent to the Wabash River and, according to the December 18, 1984 FEMA FIRM map, the Park is located in designated Flood Zone B. Zone B is a designation used for areas of moderate flood hazard that are typically areas between the limits of 100-year and 500-year floods. According to FEMA, Zone B designations are also used to designate base floodplains of lesser hazards such as areas protected by levees (refer to Appendix A for 1984 FEMA's FIRM map).

The area between the Wabash River banks and the retaining wall and Vincennes Levee in GERO is designated Zone A10; this zone designation refers to areas that are subject to inundation by the one percent annual chance flood event. Mandatory flood insurance purchase requirements and floodplain management standards apply.

The natural floodplain of the Wabash River has been altered significantly by development since colonial settlement in the 1700's. Much of the land adjacent to the River north and south of the City of Vincennes and on the opposite side of River consists of farmland. The natural floodplain today is further altered by the existence of the Vincennes and Brevoort Levee systems, which protect Vincennes and surrounding areas from flooding, and other levee systems along the River's course to the north and south of the project site.

Sec. 3.5, Soils

Knox County is situated in the Southern Bottomlands Natural Region and Southern Bottomlands Section, characterized by bottomland forest, silt loam soils, and seasonal inundation from floods. Lower bottomland forest stands are dominated by Pecan, Shellbark Hickory, Silver Maple, Sycamore, Green Ash, and Sugarberry. Better drained forest sites consist of Swamp White and Chestnut Oaks, Shumard Red Oak, Shellbark Hickory, and Hackberry. Other natives to the Southern Bottomlands Natural Region include the Spider Lily, Mistletoe, and Woolly Pipe Vine. Giant Cane, a woody plant of the bamboo family, once formed canebrakes that occupied hundreds of acres of bottomland but is now restricted to small tracts (Abrell, 1997).

According to the Natural Resource Conservation Service (NRCS) online soil survey map tool, two soil types dominate GERO and the immediately areas surrounding the Park:

Landes loamy sand (La; rarely flooded): The La series is characterized by well-drained soils on broad flood plains. The parent material of the La soils in the Park is loamy alluvium with a depth to the water table being more than 80 inches. This soil type supports prime farmland areas.

Stockland sandy loam (SdA, 0-2% slopes): This series is also characterized by well-drained soils and found on broad outwash terraces. The typical profile is black sandy loam about ten inches in thickness with a subsurface layer of dark brown sandy loam about seven inches thick. This soil has a low available water capacity and moderately rapid permeability. The surface layer is friable and easily tilled, supporting prime farmland. However, due to its low available water capacity, crops are subject to damage from drought. An NRCS Soil Survey Map can be found in Appendix F.

Vincennes is located in the Wabash Valley Seismic Zone, which includes southeastern Illinois and southwestern Indiana. This Zone has the ability to produce "New Madrid" size earthquake events, referring to larger and historically destructive New Madrid

Seismic Zone that extends across portions of Missouri, Arkansas, Mississippi, Tennessee, Kentucky, and Illinois. On April 18, 2008 the Wabash Valley Seismic Zone produced a 5.2 magnitude earthquake near Mt. Carmel, Illinois, approximately 22 miles south and west of Vincennes, and was felt across 16 states (Central United States Earthquake Consortium).

Sec. 3.6, Terrestrial Habitat & Wildlife

The Park site has been disturbed by commercial and industrial development for over 100 years. Site development for the establishment of the Park began in the 1930’s; since then, the site has comprised mainly of maintained lawn and tree species including Little Leaf Linden, Red Oak, Sweet Gum, and ornamental Crabapples. Many of the trees from the original cultural landscape plan by Parsons have been replaced as necessary. The remaining trees support various bird species, insects, and small mammals.

Sec. 3.7, Socioeconomic Environment & Environmental Justice

According to the U.S. Census American Fact Finder data for 2010, there are 18,369 residents and 8,259 housing units in the City of Vincennes. Land area within the City’s boundaries includes 7.41 square miles, with an estimated 2,485 persons per square mile.

There are three U.S. Census Tracts that are contingent to GERO according to the Census data for 2010 (refer to Census Tract map in Appendix D). Total populations for these Tracts are as follows:

Table 1. Populations in 2010 Census Tracts contingent to GERO

Census Tracts	Total Population
9555, Knox County	3,407
9554, Knox County	1,855
9553, Knox County	3,542
Total of all three Census Tracts	8,804

Table 2 below demonstrates the total minority and low-income populations in these three Tracts.

Table 2. Populations in 2010 Census Tracts contingent to GERO

Census Tracts	Total- Minority Populations	Total- Low-Income Populations
9555, Knox County	159	548
9554, Knox County	202	440
9553, Knox County	735	535

The City is home to Vincennes University; according to the university’s website, there are currently 8,495 students enrolled. The university is located within Census Tract 9553.

Sec. 3.8, Visitor Use & Experience

GERO is located in historic downtown Vincennes. The Wabash River to the west of the city and Park delineates the Illinois-Indiana state line. The Park attracts thousands of visitors every year and offers tours of the facilities and memorial building for individuals, families, and student groups.

Visitor parking is located at the southeastern end of the GERO property, adjacent to the Park Visitor’s Center, with access from Second Street. The wastewater infrastructure to be rehabilitated in this project is located on the northwestern edge of the visitor parking area. School groups and families use the open grassy area for picnics and play where the proposed high ground portion of the project would be constructed. This portion of the Park would be closed off to visitors during construction of the high ground area and during wastewater infrastructure repair.

Sec. 3.9, Park Operations

There is no fee to enter and use GERO, although the memorial building, Visitor’s Center, and parking lot have established hours of operation. The outdoor areas of the Park maintain the general hours of dawn until dusk. There are no fences or barriers surrounding the Park, which allows visitors to enter from various locations besides the visitor center and parking areas. There is angle parking along the northern border of the Park near the intersection of Main Street and Second Street where visitors can access the USS Vincennes Memorial, the flagpole terrace on the northern side of SR 441/Vigo Street, and the sidewalk system that leads pedestrians across Vigo Street to the Mall located on the north side of the George Rogers Clark Memorial building.

Sec. 3.10, Public & Private Utilities

Underground storm water and wastewater (sanitary) infrastructure lines exist along the southeastern boundary of the open grassy area, the GERO memorial building, and the Mall. The wastewater infrastructure angles north near the sidewalk terrace on the south side of SR 441/Vigo Street and traverses under the roadway and flagpole terrace on the north side of Vigo Street, and then travels north and out of Park boundaries. Several manholes are located along the underground storm water and wastewater infrastructure for access. The power utility line servicing the traffic lights and lighting on the Lincoln Memorial Bridge represents the only aboveground utility within GERO boundaries. This line runs overhead from a transformer behind the Beauty College to a pole located at the northeast corner of the intersection of Vigo and Second Streets. The section of wastewater infrastructure within Park boundaries is the infrastructure to be rehabilitated as part of this proposed project.

Sec. 3.11, Former MGP Site

Research of solid and hazardous waste sites using Indiana Geological Survey online GIS mapping tools (www.maps.indiana.edu) revealed one potential hazardous site within GERO property boundaries. This former MGP site is also listed as a Voluntary Remediation Program site; both are located in the same area as the asphalt visitor parking lot at the southern end of GERO. This site is adjacent to the wastewater infrastructure line to be rehabilitated as part of this proposed project. Soil intrusive work would need to be conducted in accordance with the Park's *Guidelines for Health and Safety During Soil Disturbing Construction/Maintenance Activities* (Appendix E-6 to E-7). Procedures to be implemented to minimize risks associated with soil contamination include:

- Coordination with the GERO MGP Project Manager to identify project work scope and schedule, and to identify any previous observations of MGP residues or contaminated soils in the construction areas
- Coordination of an on-site meeting with NPS and all parties participating in construction activities to discuss potential exposure of contaminated soils, use of protective equipment, and decontamination of equipment
- Stop work and notification procedures to follow in the event of unanticipated discovery of contamination

The IGS online mapping tool also revealed an Underground Storage Tank (UST) located at the intersection of Second Street and SR 441/Vigo Street, also within GERO boundaries. This site is located outside of the project work area, and may have been removed during construction of that portion of GERO. There are no other solid or hazardous waste sites within or adjacent to the project area. Refer to Appendix E for an aerial map of hazardous site locations in and around GERO and public information about the former MGP site.

Chapter 4 Environmental Consequences

This Chapter contains an analysis of the potential impacts to resources in GERO from the Vincennes Levee and Wastewater Infrastructure Rehabilitation project and the project's alternatives. This project proposes three distinct construction activities that would occur in the Park:

- 1) Levee modifications
- 2) Wastewater infrastructure rehabilitation
- 3) Rehabilitation of the B&O railroad corridor

Impacts to resources and the context and intensity of impacts are described and assessed in accordance with CEQ regulations.

40 CFR 1502.16, Environmental Consequences, refers to the scientific and analytic basis for which alternatives are compared. Discussion of direct and indirect effects and the significance of such impacts should be included in each impact area below for each of the three distinct construction activities involved in this project. Effects to the environment, energy conservation, natural or depletable resources, urban quality, historic and cultural resources, and the design of the built environment should all be explored. In accordance with this regulation, possible conflicts between the proposed actions and federal, state, and local objectives, land use plans, and policies must be addressed.

According to 40 CFR 1508.7 *cumulative impacts* are those that “result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions...cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.”

Per 40 CFR 1508. 8, *direct* effects are caused by the action and occur at the same time and place. *Indirect* effects are caused by the action and are later in time or farther removed, but are still reasonably foreseeable. These may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems. The terms “impact” and “effect” are used interchangeably, and include impacts to ecological, aesthetic, historic, cultural, economic, social, and/or health.

CEQ regulation 40 CFR 1508.27 addresses the context and intensity of impacts. The significance of an action is analyzed in several contexts such as society as a whole, the affected region surrounding the project, and the locality of the project. The intensity of impacts can be positive, negative, or adverse, and may impact the unique characteristics of the geographic area and the quality of the human environment. The intensity, or significance, of impacts to resources is also analyzed in this report.

For the purposes of this EA, the types of impacts are analyzed and classified as follows:

- **Positive**- impacts to resources that result in improved changes to the resource compared to existing conditions
- **Negative**- impacts that result in undesirable changes to the resource compared to existing conditions, but the intensity is less than impacts that are adverse
- **Adverse**- impacts that cause substantial undesirable changes to the resource compared to existing conditions, beyond those impacts considered *negative*

The duration of impacts are categorized as:

- **Short-term**- impacts that generally only occur during the implementation of project actions, i.e. the timeframe of construction
- **Medium-term**- impacts that continue after project completion but do not remain in perpetuity; these impacts lessen with time or disappear at a point in time in the foreseeable future
- **Long-term**- impacts that continue after project completion that do not lessen or end in the foreseeable future, but do not remain in perpetuity
- **Permanent**- impacts that result in everlasting changes to the resource that would not lessen or end in the future

Sec. 4.1, Impacts of Past Actions on Resources In & Near GERO

Past actions had various impacts on the environmental, social, and cultural resources in and near GERO. The impacts of these past actions are discussed below for each resource area, and are related to each of the three distinct construction activities that would occur in the Vincennes Levee and Wastewater Infrastructure Rehabilitation project.

Cultural Resources

Construction and renovation projects in GERO have altered the historical designed landscape of the Park since it was constructed in the 1930's; these projects resulted in a range of impacts to above and below ground resources. Prior to construction of the Park, the property within and surrounding the Park was altered by residential, commercial, and industrial development, which also disturbed and negatively impacted cultural resources both above and belowground. Also, the installation of roadways and utility infrastructure using excavation and open trench methods before and after construction of GERO disturbed previously unidentified underground archaeological resources.

Roadways that once traversed the Park property were removed and filled with earthen fill, which had permanent impacts to the historic designed landscape of the Park because the areas where the roadways once existed were altered to the intent of the historical designed landscape of the Park that was developed in the 1930's. Other past actions include the construction of the Park Visitor's Center and maintenance facilities in the 1970's (NPS, 2008). The supporting facilities were constructed at the southern boundary of the Park and replaced a building that existed during the Park's development, and planning for the Visitor's Center and parking lot was accompanied by a landscape plan for the entire Memorial Grounds, which included mass plantings around the building and parking lot to screen them from the remainder of the Park (NPS, 2008).

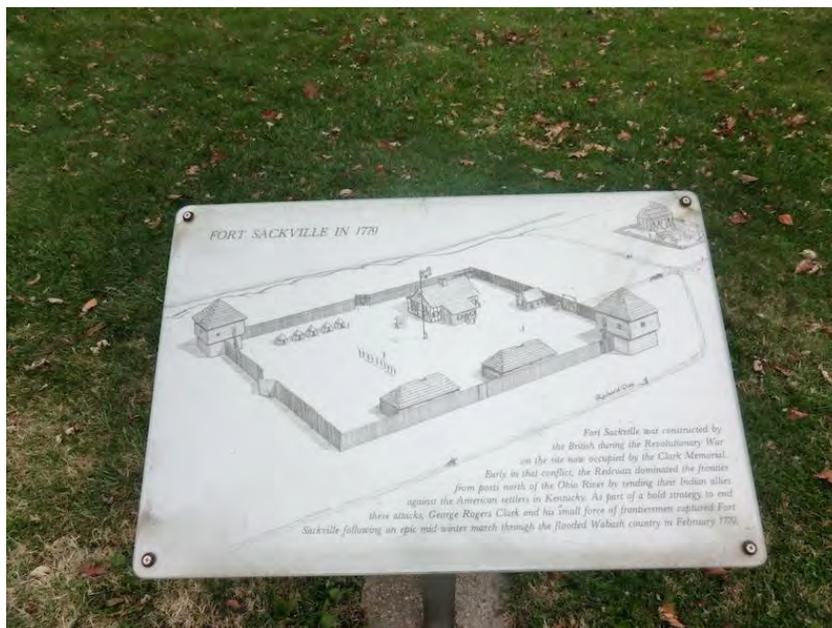


Photo 7: Interpretive sign of Fort Sackville, near Visitor's Center. 11/26/2013

The Visitor's Center was not part of the original Park design plan. Construction of the Center resulted in permanent positive and negative impacts to cultural resources in the Park; it provides a venue for visitors to learn about the history of the Park site and the impacts of the British surrender of Fort Sackville in the broader context of early American history, but the Center, in its current location near the Park memorial building, adversely affects the aesthetic nature of the historic designed landscape (NPS, 2008).

In addition, attempts to stop water leakage from the Park memorial building terrace into the memorial building basement were made in the 1940's through the 1990's. These attempts included the installation of caulking, weatherproof membranes, asphalt, and new concrete on the Park memorial building terrace. The memorial was closed from August 2008 to September 2009 for renovations to the memorial building terrace and access steps to address water leaking into the memorial building basement and to halt deterioration of the structure itself (NPS, 2008). This action resulted in short-term negative impacts to the historical landscape of the Park during construction; however, once complete, this past action led to

permanent positive impacts because the water leaks into the Park memorial building were corrected, thus stopping the potential for continued deterioration of the building's basement.

The landscaping in the Mall area of GERO was permanently altered in 1989 when large Yew plantings were removed to increase safety in the Park and to improve visibility from the Lincoln Memorial Bridge to the Park memorial building, and Junipers were removed in the 1990's from areas around the Park and at Patrick Henry Drive (NPS, 2008). These Yews and Junipers were not part of the original landscape plan by Parsons, and were replaced with Littleleaf Lindens per the original Parsons plan. Therefore, this action to remove the Yews and Junipers resulted in permanent positive impacts to the historical designed landscape of GERO because the area was landscaped in accordance with the original Park landscape plan.

Also, a geothermal heating/cooling system was installed on the south side the GERO memorial building in 2012. This action required the installation of 21 geothermal wells, a transformer adjacent to the Visitor's Center, and grading and re-seeding of the geothermal well field area after installation (F. Doughman, personal communication, Oct. 2013). This action resulted in positive long-term impacts to the Park memorial building because the climate control system of the building was improved; there were no long-term or cumulative negative impacts to the exterior setting around the Park memorial building as a result of this action because the affected lawn area of the well field was returned to its original condition after project completion.

Also, sidewalks have been replaced over time as necessary due to deterioration from weather, and the retaining wall and river walkway along the Wabash River were rehabilitated in recent years. These actions resulted in no negative long-term impacts to the historic landscape of the Park because these amenities were replaced in-kind. The river walkway resulted in permanent positive impacts to the Park's use because it provided visitors with a means to access and view the Wabash River and the Vigo statue, both of which are prominent features of the Park setting. Disturbance caused by these past actions may have permanently and negatively impacted previously undocumented archaeological sites and artifacts located belowground, but based on past archaeological studies of the Park grounds and floods that have occurred in the past, the existence of artifacts along the flood retaining wall and river walkway is unlikely.

A 2002 archaeological study of the Park by the Midwest Archaeological Center indicated that past development of the "downtown and riverfront of the community of Vincennes" has "no doubt adversely impacted the physical remains from the period of colonial conflict" (pg. 11). Also, according to this report earthen fill has been placed in areas at the Lincoln Memorial Bridge approach, the Mall area, and on the south side of the Park memorial building; the area with the least amount of grade change since the period of Clark and Fort Sackville exist between the Mall and the Old Cathedral Cemetery (pg. 9).

The metal railroad tracks and wooden ties of the B&O railroad were removed from the corridor in June 2011; this action resulted in permanent positive impacts the GERO because the tracks and ties presented ongoing safety concerns in the form of trip hazards for visitors

exploring the Park. The railroad corridor was constructed prior to the development of the Park and therefore was incorporated into the original layout and landscape of the Park.

The Brevoort Levee portion south of the Park memorial building was constructed in 1940 (NPS, 2008). According to existing plat information, this portion of the Brevoort Levee was constructed outside of the established levee easement that was set aside for levee construction within the Park boundaries (refer to Appendix A-9 for existing and proposed easement locations for the Park area south of the memorial building). This project proposes that a new easement be established in order to define the limits of the Brevoort Levee within Park boundaries. The impacts of establishing a new easement for construction of the levee modifications on cultural resources are neither positive nor negative because the proposed easement encompasses some areas where the Brevoort Levee exists currently.

Aesthetics & Visual Resources

Past actions that have had impacts to the aesthetics and visual resources at GERO include the construction and renovation projects and removal of landscaping as described above in the *Cultural Resources* section. Also, the exterior heating and cooling system equipment of the Park memorial building was removed as part of the 2012 geothermal heating system installation project, resulting in permanent positive impacts to the aesthetics of the Park memorial building. Due to physical deterioration, the retaining wall along the Wabash River was rehabilitated to its original design and the river walkway was rehabilitated in recent years, resulting in permanent positive impacts to the aesthetics and visual experiences of the western boundary of the Park.

Hydrology & Water Resources

Earthen fill of unknown origins has been added to the majority of the Park property since residential, commercial, and industrial development in the area began; this fill most likely had cumulative impacts to the hydrology of the overall watershed because surface waters and storm water runoff were altered, although the impacts and intensity of these past actions are unknown.

Other past actions in GERO include construction of the Visitor's Center and parking in the 1970's, which involved the installation of storm water drainage systems, and the removal of roadways within park boundaries (Dubois Street and Lower First Street), which involved removal of roadway materials and the placement of earthen fill, topsoil, and turf grass. Also, the retaining wall and river walkway along the Wabash River were rehabilitated in recent years, and included the installation of a drainage system to manage storm water along the walkway. These actions had permanent impacts on the natural flow of storm water runoff within the Park as well as the surrounding areas; these impacts appear to be neither positive nor negative.

According to IDNR water well information report obtained from Indiana Geological Survey online GIS mapping tools (www.maps.indiana.edu), one water well exists within the Park boundaries, approximately 150 feet northeast of the Lincoln Memorial Bridge and 50 feet

southeast of the B&O railroad corridor. This water well is approximately 100 feet southwest of the Main Street temporary floodwall closure location. According to the IDNR report, this water well was completed in 1977 and is still active. The installation and operation of this well have had no apparent positive or negative impacts to hydrology in and around the Park. There is also an irrigation well with a sand trap pit located in the open grassy area on the south side of the memorial building, approximately 150 feet south and west of the steps leading from the concrete apron surrounding the memorial building to the Vigo statue (Appendix A-6).

Floodplains & Flood Protection Systems

For the purposes of this report, two types of floodplains are discussed: the floodplain of the Wabash River as a natural ecosystem, referred to in this report as the “natural floodplain,” and the floodplain zone as designated by FEMA and protected by flood protection systems such as levees.

River floodplains consist of the flat land adjacent to a river, and form due to the actions of the river (IUPUI Center for Earth and Environmental Studies, n.d.). Floodplains in their natural form reduce the number and severity of floods, minimize pollution, and provide unique habitats. Flooding is a natural process that forms and maintains floodplains; these periodic flows support the diversity of riparian corridors, marshes, and other natural areas along rivers (Association of State Floodplain Management, 2008).

Past actions that have permanently and negatively affected the natural floodplain of the Wabash River near Vincennes and GERO include all development of the floodplain areas since the Vincennes area was first settled in the 1700’s and construction of the Vincennes and Brevoort Levee system. Development removed native soils and introduced new soils from outside sources, permanently removed vegetation and wildlife habitat, and involved construction of buildings, roadways, and infrastructure, all of which permanently altered the natural flow of floodwaters in the river’s floodplain. Similarly, construction of the Vincennes and Brevoort levee systems permanently changed the natural flow of floodwaters associated with the Wabash River by directing the river’s floodwater away from developed areas and farmland.

Past actions that have had impacts to FEMA designated floodplains at GERO include the construction of the Brevoort Levee, which resulted in long-term and significant positive impacts in the form of flood protection for the Park and surrounding areas of the City of Vincennes. A portion of the Brevoort Levee was constructed outside of the legal easement originally designated for levee construction, as was the Willow Street temporary flood closure (refer to the Willow Street closure preliminary plans in Appendix A-7 and A-14). The City of Vincennes does not manage the Brevoort Levee; the Brevoort Levee Conservancy District (BLCD) maintains management responsibilities. The City collaborates with the BLCD for flood protection management, and the City is responsible for installing the flood closures at Willow Street and the lawn area south of the GERO Monument building. Therefore, the City is working with the Brevoort Levee Conservancy District to improve the levee system and address deficiencies and issues found during past inspections

of the Brevoort levee by the US Army Corps of Engineers in 2012 (H. Pinnell, personal communications, Dec. 2013).

Willow Street is currently a gravel roadway that travels west along the southern boundary of the Park and between the earthen closure walls of the Brevoort Levee, where the Willow Street temporary closure wall is constructed during flood events (refer to Photo #3 below). West of the temporary closure location, Willow Street turns south and becomes Pearl Drive, paralleling the Wabash River on the west (river) side of the Brevoort Levee system; Pearl Drive dead ends approximately 750 feet south of the Willow Street temporary closure location. Several privately owned structures and vehicles are currently located along Pearl Drive. Construction of Willow Street and Pearl Drive had negligible long-term impacts to floodplains.

The construction of the Vincennes Levee system, which extends along the Wabash River northward from the northern end of the Park, also had long-term and significant positive impacts to flood protection of the Park and surrounding areas of the City. The B&O railroad corridor spur travels through the Park, generally following the Wabash River; due to the corridor's easement location, the Vincennes Levee system was constructed to the Lincoln Memorial Bridge. Permanent floodwalls extend north of this location, and a temporary flood closure wall is installed at the B&O railroad corridor between the permanent floodwalls during flood events (refer to Photo #2 in section 4.2 below).

Also, the retaining wall and river walkway along the Wabash River were rehabilitated in recent years; the retaining wall is not a floodwall, and is not part of the Vincennes-Brevoort Levee system.

According to the FEMA FIRM map for the City of Vincennes dated December 18, 1984, the majority of the City, including the Park, is in the flood designation Zone B, defined by FEMA as a moderate flood hazard area. Zone B areas are those between the limits of the base flood and the 0.2 percent-annual-chance, or 500-year flood (FEMA website, 2013). Areas in Zone B are not required to obtain flood insurance (*The National Challenge*, 2006). Two sections of the Vincennes Levee were left incomplete due to US Army Corps of Engineers (USACE) defunding in 1986 (Appendix D-9).

FEMA has established procedures for determining the accreditation and certification of levees; this determination is used for the administration of floodplain management, flood insurance, and mandatory purchase requirements as part of the NFIP. FEMA levee certification is acquired when a registered professional engineer certifies that a levee system complies with structural requirements outlined in 44 CFR 65.10, Mapping of Areas Protected by Levee Systems (*The National Challenge*, 2006). Once a levee is certified, it may be accredited with FEMA as providing protection from the 100-year flood. Areas impacted by accredited levees are shown as moderate-risk areas, and NFIP floodplain management regulations do not mandate the purchase of flood insurance (refer to FEMA Fact Sheet, Appendix D-3 to D-4). Areas behind non-accredited levees are shown as high-risk floodplain on FIRMs.

The Vincennes Levee was previously determined eligible for the designation of a Provisionally Accredited Levee (PAL), but to date the system has not received PAL designation (Appendix D-7; H. Pinnell, personal communications, April 2014). A PAL designation is an interim designation given to communities to allow them to complete the levee certification process (Appendix D-5 to D-7 for more information regarding PALs). FEMA created the PAL designation to facilitate the certification and accreditation process for communities unable to provide certification documents but “expect levees in the community to provide one-percent-annual-chance flood risk reduction” (FEMA Fact Sheet, Appendix D-5). The Brevoort Levee system is not PAL eligible (Appendix D-7).

In order to ultimately meet FEMA requirements for levee certification, the City of Vincennes requested that the USACE perform a Levee System Evaluation study for the Brevoort and Vincennes levee systems. The report for this study was completed in May 2014 and provided an assessment of the Vincennes and Brevoort levee system’s ability to satisfactorily perform as required by FEMA as part of the NFIP (see Appendix D-16 to D-22 for excerpts of this report; the full report may be downloaded from the City of Vincennes Water Utilities website).

The May 2014 City of Vincennes Levee System Evaluation Report was completed in accordance with 44 CFR 65.10, *Mapping of Areas Protected By Levee Systems*, dated October 1, 2002; Engineering Circular EC 1110-2-6067, *USACE Process for the National Flood Insurance Program (NFIP) Levee System Evaluation*, dated July 30, 2009; and *Analysis and Mapping Procedures for Non-Accredited Levee Systems, New Approach*, dated July 2013. The study included: a review of project historical documentation; a field inspection to review the condition of the project, which included proper operation and maintenance; analysis of the system components; a hydrology and hydraulic analysis; review of the pipeline inspection video and report of the gravity lines through the line of protection; stability analyses of the structures, seepage analyses; and various tests of the levee system’s pumping stations.

The May 2014 USACE report concluded that there were twenty (20) geotechnical, electrical, mechanical, and structural issues with the Vincennes- Brevoort levee systems (refer to Appendix D-20 and D-21). The USACE determined that the levee systems can be provided a positive Levee System Evaluation (LSE) letter once all issues are corrected. This positive letter would be used to support the City of Vincennes’ request for FEMA levee certification; therefore, it is the intent of the City of Vincennes to correct all issues in a timely manner (H. Pinnell, personal communications, August 2014).

Without FEMA accreditation of the Vincennes and Brevoort levee system, areas behind the levees would be shown on future FIRMs as high risk for flooding, and NFIP regulations would require property owners to purchase flood insurance (Appendix D-6). In addition, all properties within the new flood zone designation would be subject to strict building regulations set forth in the Vincennes, Indiana Code of Ordinances regarding construction in flood zones. Therefore, modifications to the Vincennes- Brevoort Levee system are required in order to achieve FEMA certification and accreditation of both levees; this would result in a moderate-risk flood designation in the future, which would exempt areas protected by the

levees from required flood insurance in accordance with NFIP regulations and stricter City building regulations.

Soils

Past actions have permanently altered the soils in and around GERO; all actions resulted in the removal of soils, the introduction of new soils from origins outside of the Park property, and/or compaction of new and existing soils during construction of buildings, pedestrian facilities, and roads. Also, the introduction of earthen fill over the years to raise the elevation of the Park property and areas surrounding the Park to reduce the incidence of flooding had permanent impacts to the original soils that existed prior to development.

Prior to the construction of the Park in the 1930's, the soils that made up the Park property were permanently disturbed and altered during the construction of Fort Sackville in the 1770's. Also, due to industrial, commercial, and residential development and construction of utility and transportation infrastructure throughout the 1800's and 1900's, native soils in the Park were most likely excavated and removed for the construction of building foundations, and soils of unknown origin most likely were brought in for use as fill or topsoil, permanently altering the make-up of soil types. In addition, soils within present Park boundaries were disturbed during the construction of the B&O railroad corridor spur prior to the Park's construction.

Other past actions that have permanently disturbed the soils in the Park include the construction of the Park itself, repairs to the Park memorial building terrace in 2008 and 2009, the installation of the geothermal heating/cooling system on the south side of the Park memorial building in 2012, and other construction projects as described in the *Cultural and Historical Resources* section of this Chapter. Also, the construction of the Brevoort Levee to the south of the Park memorial building when the Park was constructed in the 1930's introduced new soils into this area of the Park. In addition, in 2008 a sinkhole formed after a leak in the wastewater infrastructure in the visitor parking lot in the Park, which was addressed by Vincennes Water Utilities; the infrastructure was repaired and the site returned as close as possible to its previous condition.

In 1859 an MGP was constructed in the same location as the present-day Park visitor parking lot. The MGP operated from 1859 to the early 1930s. By 1937, the aboveground MGP structures had been demolished and the land incorporated into the Memorial. Previous investigations indicate that hazardous substances are present in the vicinity of the former MGP and may pose a threat to public health or welfare or the environment. These investigations identified elevated concentrations of MGP-related contaminants in surface and subsurface soils in the vicinity of former process areas and historic structures, including the following hazardous substances: benzene, toluene, ethylbenzene, and xylene (BTEX) compounds, cyanide, metals, and polycyclic aromatic hydrocarbons (PAHs). NPS has initiated a response action under CERCLA, 42 U.S.C. §§ 9601, *et seq.* to address the releases of hazardous substances due to the former MGP operations (refer to Appendix E-2 to E-7 for an Indiana Geological Survey GIS map of the location and NPS public information pertaining to this site).

Although the soils throughout the Park have been disturbed over the years as a result of a variety of construction activities, the impacts to soils generally have not been significant in the broader context of the Park, with the exception of the former MGP site discussed above.

Terrestrial Habitat & Wildlife

Past actions that have permanently altered the terrestrial habitat and wildlife at GERO include the construction of Fort Sackville in the 1770's and the commercial, industrial, and residential development that occurred throughout the 1800's and 1900's; these actions resulted in the permanent removal of vegetation and the displacement of wildlife. Other past actions include the construction of the Park itself, the construction of the Brevoort Levee at the south end of the Park, and the installation of the geothermal heating/cooling system on the south side of the memorial building in 2012 (as discussed in previous sections of this Chapter). The installation of the geothermal system had negligible and short-term impacts to microhabitats in the construction zone during installation; microhabitats are small-scale, specialized habitats such as a clump of grass or tree stump. However, the area was restored to its original condition after construction.

Other past actions that had negligible negative impacts to terrestrial habitat and wildlife included the removal of large Yew (evergreen shrub) plantings in 1989 to increase safety and visibility from the Lincoln Memorial Bridge to the Park memorial building. Also, Junipers (evergreen shrubs) were removed in the 1990's from areas around the Park and at Patrick Henry Drive. The removal of these plants had negligible, permanent impacts to habitat for small organisms such as insects, small mammals, and birds. The majority of the Little Leaf Lindens that were planted as part of the original cultural landscape plan have been removed since installation in the 1930's due to past construction projects and tree die-off (NPS, 2008). Also, sidewalks in the Park have been replaced over time because of deterioration, which also had minor, short-term negative impacts to microhabitats in turf grass the construction zone; however, the areas around the sidewalk repairs were restored to turf grass after construction.

Socioeconomic Environment & Environmental Justice

Past actions that have had impacts to the socioeconomic environment and environmental justice in and near GERO include the construction of the Park itself, which provided the city of Vincennes with a nationally recognized historic destination that now attracts over 100,000 visitors each year (NPS Use Statistics, 2013). The location of the Park near historic downtown Vincennes also allows visitors access to local businesses and restaurants, thus resulting in long-term positive impacts to local economic activity and regional tourism.

Former President Bill Clinton issued Executive Order 12898 in February 1994, which directed federal agencies to “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” (CEQ, *Guidance Under the National Environmental Policy Act*, 1997).

In order to address the potential for disproportionate impacts of the proposed project to minority and low-income populations near GERO, an Environmental Justice Analysis was conducted. Because there are no tribal lands in the vicinity of the Park, Environmental Justice impacts to Indian tribes were not included in this Analysis. For this analysis, 2010 American Fact Finder data sets for five year population estimates were retrieved using the American Fact Finder tool on the US Bureau of the Census website. This Analysis sought to identify 2010 US Census Tracts near the Park in order to compare the number of minority and low-income persons within these Census Tracts, referred to in the Analysis as an Affected Community (AC), to those populations in the City of Vincennes, which was identified in the Analysis as the Community of Comparison (COC). The Analysis then compared the minority and low-income populations in the ACs to the COC in order to determine if a disproportionate number of minority and low-income persons (defined in the Analysis as 125% of the total population of minority and low-income persons in the COC) reside near the Park.

Three ACs were identified in the Analysis: 2010 Census Tracts 9553, 9554, and 9555, which encompass the Park property and areas around the Park (refer to Appendix F-9 for a US Census data map of these Tracts).

Table 3. 2010 US Census data- total populations of ACs & COC

Census Tracts (ACs)	Total Population
9553, Knox County	3,542
9554, Knox County	1,855
9555, Knox County	3,407
Total of all three Census Tracts	8,804
City of Vincennes (COC)	15,878

The percentages of the minority and low-income populations in the ACs and the COC were then calculated and summarized in Table 3 (refer to Appendix F-8 for Census population totals):

Table 4. Summary of percentages of minority and low-income populations in ACs and COC.

	Percent of Low-Income	Percent Minority
Community of Comparison (COC): City of Vincennes, Indiana	22.10%	9.00%
AC #1: Knox County Census Tract 9553	33.10%	20.80%
AC #2: Knox County Census Tract 9554	27.10%	10.90%
AC #3: Knox County Census Tract 9555	16.50%	4.70%

The Environmental Justice Analysis found that AC #1 and AC #2 had minority and low-income populations that were greater than the COC. The Analysis also found that AC #1 had minority and low-income populations above 125% of the COC:

Table 5. 125% of COC compared to AC #1

125% of low income & minority populations of the COC	27.6%	11.2%
AC #1: Knox County Census Tract 9553	33.1%	20.8%

Thus the Analysis concluded that AC #1 was an Environmental Justice population of concern for this project. The results of this Analysis were used to determine if the actions involved in this project would have adverse impacts to AC #1. Discussions of potential impacts to AC #1 as a result of the alternatives presented in this EA are included in this Chapter. Refer to Appendix F-10 for a breakdown of low income and minority populations in the COC and ACs.

Visitor Use & Experience

Past actions that have impacted visitor use and experience include renovations to the Park memorial Building terrace to stop leakage into the building's basement; the Park was closed from August 2008 to September 2009, resulting in significant short-term negative impacts to visitor use and experience. Other past actions include multiple construction projects such as sidewalk replacement that limited visitor access to areas around the construction zones; however, these impacts were restricted to the period of construction only.

Park Operations

Past actions that have had negative impacts to park operations in the Park include renovations to the terrace surrounding the Park memorial building; this action resulted in the Park being closed from August 2008 to September 2009. The construction of the Visitor's

Center in the 1970's provides ongoing positive impacts to park operations because the building provides a permanent structure for Park employees to conduct administrative activities related to the Park. Similarly, the construction of the Park maintenance facility in 1981 also resulted in positive impacts to park operations in the form of a permanent structure that is used to facilitate maintenance activities and to store equipment and supplies necessary for park operations. Also, a geothermal heating/cooling system that serves the Park memorial building was installed in 2012; the area south of the Park memorial building was excavated for equipment installation. These past actions limited the ability of Park employees to perform maintenance activities of the grounds there during construction. However, these impacts were short-term and limited to the time period of construction, with no long lasting significant and cumulative impacts to park operations.

Public & Private Utilities

Public and private utilities within GERO include:

Electrical: Overhead and belowground power utility lines traverse the Park Mall area to supply electricity to the Lincoln Memorial Bridge, the Park memorial building, the Park maintenance facility, and the Visitor's Center. These power lines cross over the wastewater infrastructure that generally traverses the southeastern boundary of the Park belowground.

Fiber Optic: Fiber optic lines exist underground along Willow Street, outside of the Park boundaries, and travel northward along Lower Second Street, also outside of Park boundaries, to Church Street. At this point, the fiber optic infrastructure travels northward along Patrick Henry Drive, within Park boundaries, and exits the Park property at Second Street.

Gas: Natural gas infrastructure lines also travel underground along Willow Street and Lower Second Street, mostly outside of Park boundaries. The Park Visitor's Center and maintenance facility are served by natural gas lines.

Communications: Telephone lines travel underground from the Park maintenance building northward through the open grassy area on the south side of the Park memorial building to the memorial building and Visitor's Center. Another telephone line travels from a point near the intersection of Willow Street and River Road (also known as Frisz or Henderson Road), inside Park boundaries and in the open lawn area on the southeast side of the visitor parking lot, eastward and then north to an end point at Nicolas Street.

Sanitary Sewer/Wastewater: Wastewater infrastructure that traverses from about the intersection of Willow Street and River Road at the southern boundary of the Park northward, generally parallel to existing sidewalk that travels between the visitor parking lot and the open grassy area on the south side of the Park memorial building. At to a point north of the memorial building, the wastewater infrastructure turns northwest and travels under the flagpole terraces on each side of the Lincoln Memorial Bridge, and continues northward and out of the Park boundaries.

Water: From a point near the intersection of Willow Street and River Road, public water lines travel to the Park maintenance facility as well as northward within Park boundaries, generally following the existing wastewater infrastructure lines between the visitor parking lot and the open grassy area on the south side of the Park memorial building. This water line continues northward to the Barnett Street sidewalk that leads to the Park memorial building; at this point, public water lines travel eastward and northward along the perimeter of the Saint Francis Xavier (Old Cathedral) “French and Indian” Cemetery and within Park boundaries. At the northwest corner of the Cemetery, a water line travels eastward along the northern perimeter of the Cemetery, outside of Park boundaries, to Lower Second Street. At this point a public water line continues along Lower Second Street and Patrick Henry Drive, within Park boundaries, to the intersection of First Street and Patrick Henry Drive. At this point, the water line turns northward and travels along First Street and outside of the Park.

In addition, the Park has an extensive water sprinkler/lawn irrigation system; the main line for the sprinkler system parallels the City’s waterline.

Storm Water Drainage: Storm water infrastructure traverses northward through the Park from a point near the intersection of Willow Street and River Road, generally following the same alignment as the public water lines and wastewater infrastructure northward to a point near the northwest corner of the Saint Francis Xavier (Old Cathedral) “French and Indian” Cemetery. Here, several storm water drainage structures transect the Plaza in front of the Saint Xavier Cathedral and along Church Street. Storm water drainage structures also exist below Second Street between the Plaza and Patrick Henry Drive and Vigo Street/SR 441 between the Lincoln Memorial Bridge approach and the Plaza. The Park memorial building also has a drainage system to convey storm water runoff from the roof and terrace. Storm drainage infrastructure also travels from a point east of the visitor parking lot, along Nicolas Street and within Park boundaries, westward and terminates at the Wabash River. Refer to Appendix F-7 for a map of storm water drainage lines within and near the Park.

Wastewater infrastructure, water service lines, and storm drainage facilities in the City of Vincennes generally follow past and current street rights-of-way.

Past actions that have had impacts to public and private utilities in the Park include the installation of all utility infrastructure and the construction of the Park itself. Also, power utility lines to the Park memorial building were installed and electrical power to the Lincoln Memorial Bridge light system was re-routed within the Park in 2012 (F. Doughman, personal communication Dec. 2013). These actions resulted in long-term positive impacts to public and private utilities because the utilities and services to the Park were improved.

A leak in the aging wastewater infrastructure line that traverses GERO occurred in the Park visitor’s parking lot in 2008, which required emergency repairs by Vincennes Water Utility; the site of the leak was returned as close as possible to its original condition after repairs were made. Negative cumulative impacts to this aging wastewater infrastructure line include leaks that may occur in the future, which would result in the need for additional emergency repairs. Future leaks in this wastewater line would result in short-term negative impacts to

utility users because service would be interrupted during repairs and wastewater may back up into homes and businesses.

Former MGP Site

In 1859 an MGP was constructed in the same location as the present-day GERO visitor parking lot. The MGP operated from 1859 to the early 1930's. By 1937, the aboveground MGP structures had been demolished. Construction of the visitor parking lot in the 1970's occurred within the footprint of the former MGP site (refer to Appendix E for an Indiana Geological Survey GIS map of the location and NPS public information pertaining to this site). Previous investigations of the site have found elevated concentrations of MGP-related contaminants in surface and subsurface soils in the vicinity of the former MGP site (see Appendix E-5). There are currently monitoring wells in the vicinity of the visitor parking lot and open grassy area that are used to monitor groundwater quality.

The NPS has initiated a response action under CERCLA to address the releases of hazardous substances due to the former MGP operations. Soil intrusive work would need to be conducted in accordance with the NPS *Public Information Sheet for Soil Disturbing Activities* ("Guidelines for Health and Safety During Soil Disturbing Construction/Maintenance Activities" section; refer to Appendix E-6 to E-7). By following the guidelines set forth by the NPS, impacts to potentially contaminated soils near the project sites and impacts as a result of exposure to contaminated soils, if any are found, would be greatly reduced.

There are no other identified solid or hazardous waste sites in the project area.

Sec. 4.2, Levee Modifications

This section includes discussion of potential impacts to resources in and near GERO as a result of the alternatives involved in modifications to the Vincennes- Brevoort levee system.

Cultural Resources

For the purposes of analysis in this EA, the types of “cultural resources” that may or may not be affected by the proposed alternatives include:

- The historic designed landscape of the Park, which includes physical attributes of the Park such as plaques, statues, memorials, buildings, walkways, and landscaping, as well as the design intent to commemorate George Rogers Clark and Fort Sackville
- Known and unknown belowground archaeological resources

Alternative A: No Action (“Do Nothing”) Alternative for Levee Modification & Construction of Permanent Closures at Willow & Main Streets

Impacts:

No impacts to above and below ground cultural resources in and near the Park would occur as a result of construction activities associated with the No Action alternative because the landscape would remain unchanged. However, cumulative negative impacts within and beyond the boundaries of the Park would be realized in the form of flooding by taking no action. No additional cumulative impacts to cultural and natural resources in or near the Park are anticipated to occur under the No Action alternative.

Conclusion:

No impacts to above and below ground cultural resources of the Park would result from the No Action alternative. However, the possibility of future flooding of the Park and surrounding areas would remain, and the intensity of this direct and adverse impact would be significant and would have local and regional affects.

Alternative B: Convert Temporary Closures to Permanent Closures Only

Impacts:

Negative visual impacts to above ground cultural resources would occur as a result of this alternative. The proposed permanent flood closure sites at Willow and Main Streets are near the northern and southern boundaries of GERO; these locations are somewhat removed from the remainder of the Park and memorial building.

Also, an asphalt access ramp (with stone materials as an alternative) over the Brevoort Levee near the Willow Street closure is proposed (Appendix A-8), and would be constructed as part of this project to allow for access to Pearl Drive and the west (river) side of the levee system. This ramp would result in minor negative visual impacts to the Park because it would introduce a visible, modern facility that is not consistent with the Park design intent to create a transition from civilization (in the form of the City's downtown area) at the northern part of the Park to wilderness (in the form of the Wabash River and surrounding natural landscape) at the southern end of the Park. However, it is important to note that a gravel roadway through the levee at the Willow Street closure site connects to Pearl Drive currently.

Adverse impacts to undocumented belowground cultural resources may also occur during construction of the permanent closures. However, based on numerous past studies of soil disturbance due to residential, commercial, and industrial development in and near the Park, and because of construction of the Park itself in the 1930's and periodic flooding in the closure locations in the past, the existence of and subsequent disturbance of undocumented cultural and historic resources is unlikely in the areas within and surrounding the permanent closure construction zones. No other cumulative impacts to above ground or belowground cultural resources are anticipated to occur under this alternative.

Conclusions:

Direct and indirect negative impacts to cultural resources would occur as a result of this alternative. However, because the existing temporary flood closures are currently visible from the Park grounds and because the proposed permanent flood closure sites and proposed asphalt access ramp over the Brevoort Levee are somewhat removed from the remainder of the Park and memorial building, these permanent negative impacts would be negligible and not significant in the long term. Also, because the proposed access ramp and the Willow Street permanent closure would be constructed adjacent to the Park maintenance facility, another modern facility not consistent with Parsons' plan, the impacts of this access ramp would be cumulative but negligible and not significant in the long-term.

Should discovery of belowground cultural resources occur during construction of the permanent closures at Willow and Main Streets, Indiana Code (IC) 14-21-1-27 and 29 requires that the discovery be reported to the Indiana Department of Natural Resources Division of Historic Preservation and Archaeology within two business days.

Alternative C: Levee Modification & Construction of Permanent Closures at Willow & Main Streets (PREFERRED ALTERNATIVE)

Impacts:

The levee modification on the south side of the Park memorial building would result in negative impacts to the historic designed landscape of GERO. The proposed construction of the high ground area in the open grassy area on the south side of the Park memorial building would result in the removal of 12 trees: four Northern Red Oaks (*Quercus rubra*), five Crabapples (*Malus spp.*), one Magnolia (*Magnolia grandifolia*), and two Littleleaf Lindens (*Tilia vulgaris*). The two Littleleaf Lindens (*Tilia vulgaris*) that would be removed have been previously identified as likely to be part of the original landscape Parsons design planting (NPS, 2008). The remaining existing trees in the proposed high ground area construction zone would be preserved, which include: one Silver Maple (*Acer saccharinum*); four Crabapples (*Malus spp.*); and one Littleleaf Linden (*Tilia vulgaris*), which was previously identified as likely part of the original Park landscape design planting.

It is important to note that Parsons' design intent was to create formal landscaping to the northeast of the Park memorial building and an "informal, park-like setting" to the southwest of the memorial building, where the proposed high ground area would be located (NPS, 1976). Parsons' design was also intended to create a transition from civilization (in the form of the City's downtown area) at the northern end of the Park to wilderness (in the form of the Wabash River and surrounding natural landscape) at the southern end of the Park. Therefore, removal of any Park trees south of the Park memorial building would not be consistent with Parsons' original design intent.

Also, construction of the proposed high ground area would result in an increase in elevation of the open grassy area of 2.4 feet; the current elevation of the affected area is 426 feet, and the height of the proposed high ground would be 428.4 feet. This proposed increase in elevation would have minor negative impacts to the historic designed landscape of the south side of the Park; this area is already elevated as part of the Brevoort Levee system, which was constructed in 1940, soon after the development of the Park.



Photo 8: Existing conditions- facing south to proposed high ground area from concrete apron surrounding memorial building. 11/26/2013

The proposed construction of the high ground area would result in minor negative impacts to the existing irrigation system of the south side of the Park memorial building grounds; this irrigation system would require alterations to bring the system up to the new elevation of the proposed high ground area. Wells for the geothermal heating and cooling system adjacent to the Park memorial building would also require extension due to construction of the proposed high ground area. Also, historic street lamps dating to the construction of the Park currently located in the open grassy area would need to be removed during construction. Construction of the proposed high ground area would also require removal of the sidewalk located in the open grassy area on the south side of the Park memorial building.

Construction of the proposed permanent levee closures at Willow and Main Streets would have negative impacts to the cultural resources in the Park; however, these closures would be located at the southern and northern park boundaries and somewhat removed from the historic significance of the Park's main cultural landscape features. The permanent closures would be constructed at the same location that the temporary enclosures are installed temporarily during flood events. Cumulative positive impacts would occur in the form of a permanent form of flood protection for cultural and historic resources in the Park. No additional cumulative impacts are anticipated to occur to cultural resources under the preferred alternative.

Impacts to cultural resources as a result of construction of permanent flood closures at Main and Willow Streets as part of this preferred alternative are described above in *Alternative B: Convert Temporary Closures to Permanent Closures Only*.

Conclusion:

Medium-term and direct negative impacts to the cultural resources would occur as a result of this preferred alternative; the proposed high ground area construction would alter the historical designed landscape because 12 trees would be removed.

However, these trees would be replaced with new trees of similar species on Park property after construction of the proposed high ground area. Preliminary project plans include planting 14 total replacement trees, four inches in caliper at planting; species to be planted would be four Red Maple (*Acer rubrum*), six Sugar Maple (*Acer saccharum*), and four Red Oak (*Quercus rubra*). All of these tree species are native to Indiana (Jackson, 2004). All plantings will be in compliance with the 2008 *Cultural Landscape Report* by NPS.

Due to USACE restrictions on vegetation growing on levees, these replacement trees would be planted outside of the proposed 40' permanent right-of-way but on the south side of the Park memorial building and as close as possible to the locations of the trees proposed to be removed as a result this alternative (refer to Appendix A-10 for replacement tree locations). As the new trees grow, these negative impacts to the cultural historic designed landscape of the Park would diminish; therefore, the significance of these impacts would be restricted to the medium term and would not be significant in the long-term.

The existing lawn irrigation system and geothermal heating and cooling system wells on the south side of the Park memorial building would require extension to the new elevation of the proposed high ground area. Also, historic street lamps in the proposed high ground area would require removal during construction and would be reinstalled as close as possible to its current location after the project is complete. Although these impacts would be permanent, impacts would be negligible and would not be significant in the long-term because the irrigation system, the geothermal system, and the historic street lamps would be returned to their current functions after project completion.

A sidewalk south of the Park memorial building would be removed for construction of the proposed high ground area. However, this sidewalk, like many Park sidewalks in the past, would be replaced in-kind upon completion of the proposed high ground construction; thus impacts to cultural resources as a result of this action would be short-term in nature and would not be significant.

The duration, context, and intensity of impacts to cultural resources as a result of construction of permanent flood closures at Main and Willow Streets as part of this preferred alternative are described above in *Alternative B: Convert Temporary Closures to Permanent Closures Only*.

Aesthetics and Visual Resources

Alternative A: No Action (“Do Nothing”) Alternative for Levee Modification & Construction of Permanent Closures at Willow & Main Streets

Impacts:

No impacts to the aesthetics and visual resources at GERO would occur as a result of the No Action alternative because the surrounding landscape as viewed from the Park memorial building and other locations around the Park would remain unchanged. Cumulative impacts include the continued maturation of Park trees south of the memorial building as well as the eventual die-off and removal of Park trees over time. No additional cumulative impacts would occur to aesthetics and visual resources under the No Action alternative.

Conclusion:

No impacts to the aesthetics and visual resources would result from the No Action alternative.

Alternative B: Convert Temporary Closures to Permanent Closures Only

Impacts:

Positive impacts to aesthetics and visual resources would occur as a result of this alternative. The proposed permanent flood closure sites at Willow and Main Streets are near the northern and southern boundaries of the Park and these locations are somewhat removed from the remainder of the Park and memorial building; however, permanent closures in place of temporary closures and sand bags would improve the overall visual experience of the Park, especially during flood events when the temporary closures would otherwise be installed. No other cumulative impacts are anticipated to occur under this alternative.

Conclusions:

Although minor, direct, and permanent, positive impacts would occur under this alternative. No other impacts to aesthetics and visual resources are anticipated to occur as a result of this action.

Alternative C: Levee Modification & Construction of Permanent Closures at Willow & Main Streets (PREFERRED ALTERNATIVE)

Impacts:

The proposed high ground area elevation would be increased by 2.4 feet maximum, from its current elevation of 426 feet to 428.4 feet, resulting in negative impacts to the aesthetics and visual resources in GERO. The proposed high ground area would

taper to match the existing elevation at the toes of slope (refer to preliminary project plan sheet in Appendix A-8). Twelve (12) mature trees are proposed for removal in the proposed high ground area and would result in negative impacts to the aesthetics of the Park south of the Park memorial building.

Impacts to aesthetics and visual resources as a result of construction of permanent flood closures at Main and Willow Streets as part of this preferred alternative are described above in *Alternative B: Convert Temporary Closures to Permanent Closures Only*. No additional cumulative impacts are anticipated to occur to aesthetics and visual resources under the preferred alternative.

Conclusion:

Positive and negative impacts to the aesthetics and visual resources of the Park would occur as a result of the preferred alternative. Negative impacts as a result of tree removal would diminish over time because 14 replacement trees would be planted to restore the aesthetics of the Park property; as these new trees grow, the negative impacts would diminish. By replanting trees, the Park would be able to complete the landscaping actions as recommended in the 2008 *Cultural Landscape Report and Environmental Assessment*. Therefore, these direct negative impacts to aesthetics and visual resources would be limited to the medium term, and the significance of these impacts would diminish as the new trees grow.

The duration, context, and intensity of positive impacts to aesthetics and visual resources as a result of construction of permanent flood closures at Main and Willow Streets as part of this preferred alternative are described above in *Alternative B: Convert Temporary Closures to Permanent Closures Only*.

Hydrology & Water Resources

Alternative A: No Action (“Do Nothing”) Alternative for Levee Modification & Construction of Permanent Closures at Willow & Main Streets

Impacts:

No impacts to hydrology and water resources in GERO would occur as a result of this No Action alternative because these resources would remain unchanged. No additional cumulative impacts would occur to aesthetics and visual resources under the No Action alternative.

Conclusion:

No impacts to the hydrology and water resources are anticipated to occur from this No Action alternative.

Alternative B: Convert Temporary Flood Closures to Permanent Closures Only

Impacts:

This alternative would eliminate the need to manually install the temporary closures at Willow and Main Streets during flood events, and would contribute to the level of long-term flood protection for the Park and surrounding areas of the City of Vincennes. This alternative would likely result in impacts to hydrology and water resources because it proposes replacing temporary flood closures with permanent closures in the same location, which would slightly alter the flow of storm water runoff during normal precipitation events at these locations.

Also, this alternative would involve construction of a permanent asphalt access ramp (with stone materials as an alternative) over the Brevoort Levee near the Willow Street closure, which would result in impacts to storm water runoff; these impacts would be dependent on the nature of precipitation events.

There is one water well approximately 100 feet the Main Street closure site; impacts from construction of the proposed permanent levee structure at Main Street are not anticipated (refer to Water Well Map in Appendix F-2). No other impacts or additional cumulative impacts are likely to occur under this alternative.

Conclusions:

Negligible indirect impacts to storm water runoff in the areas surrounding the temporary closures would occur as the result of construction of permanent closures in the same locations. Storm water currently flows without interruption through and around the temporary closure locations; permanent closures would alter this flow, although the cumulative and long-term impacts of this are anticipated to be minor and not significant. Construction of an asphalt ramp (with stone materials as an alternative) over the Brevoort Levee would have minor permanent impacts to storm water flow at the site; however, this impact is anticipated to be minor and is not anticipated to be significant.

Direct and permanent positive impacts to levee function and maintenance operations would occur because this alternative proposes construction of permanent closures to replace temporary closures, eliminating the need to manually install the temporary closure walls and sand bags during flood events. These impacts would be significant in the long-term for the City in the form of reduced man-hours needed for levee operation and maintenance in the future.

Indirect negative impacts to a water well located near the Main Street closure site may occur but are not likely; these impacts are likely to occur only during construction, and are anticipated to minor and not significant in the long term.

Alternative C: Levee Modification & Construction of Permanent Closures at Willow & Main Streets (PREFERRED ALTERNATIVE)

Impacts:

Construction of the proposed high ground area would impact the hydrology of the Park site because the proposed high ground area would alter the flow of storm water runoff during precipitation events, which may increase hydraulic pressure and water volume on the retaining wall in the Park and to existing storm water drainage systems. Impacts to hydrology and water resources as a result of construction of permanent flood closures in place of temporary closures manually installed during flood events are described above in *Alternative B: Convert Temporary Closures to Permanent Closures Only*. No other impacts or additional cumulative impacts are likely to occur under this alternative.

Conclusions:

The preferred alternative to construct a high ground area on the south side of the Park memorial building would result in indirect impacts to the hydrology and water resources in the Park; although these impacts would occur during and after all future precipitation events, preliminary assessments indicate that these impacts are anticipated to be minor and not significant (K. Steely, PE, personal communications, Jan. 2014). The duration, context, and intensity of impacts to hydrology and water resources as a result of construction of permanent flood closures at Main and Willow Streets as part of this preferred alternative are described above in *Alternative B: Convert Temporary Closures to Permanent Closures Only*.

Floodplains & Flood Protection Systems

Alternative A: No Action (“Do Nothing”) Alternative for Levee Modification & Construction of Permanent Closures at Willow & Main Streets

Impacts:

No impacts to the natural floodplain of the Wabash River would result from the No Action alternative because the levee system would not be modified, thus the natural floodplain as it exists today would remain unchanged.

The No Action alternative would result in changes in the FEMA flood zone designation of the Park and surrounding areas of the City because this alternative would result in the Vincennes-Brevoort Levee system not being eligible for certification by FEMA in the future. Certification is required in order for areas protected by levees to become accredited by FEMA; accreditation affects the FIRM map zone designations for areas protected and not protected by levee systems. Currently the Park and the majority of the City are in Zone B, defined by FEMA as a moderate flood hazard area; Zone B areas are those between the limits of the base

flood and the 0.2 percent-annual-chance, or 500-year flood (FEMA website, 2013). Without FEMA certification and accreditation of the Vincennes-Brevoort Levee system, the flood designation would revert to Zone A or AE, defined by FEMA as a Special Flood Hazard Area (SFHA; H. Pinnell, personal communication, Dec. 2013). SFHAs are areas having a one (1) percent annual chance flood (also referred to as the base flood or 100-year flood; FEMA website, 2013).

A change in the FEMA flood designation for the Park and surrounding areas of the City from Zone B to Zone A or AE in the future would have cumulative impacts to FEMA regulated floodplains in the Park and the City. Upon decertification of the Vincennes-Brevoort Levee system, all properties with a federally backed mortgage within a newly defined FEMA flood Zone A or AE would require additional flood insurance in accordance with National Flood Insurance Program (NFIP) regulations (Appendix D-4).

A change in the FEMA flood designation for the Park and surrounding areas of the City from Zone B to Zone A or AE would also have other cumulative impacts to the FEMA regulated floodplains of a majority of the City. All construction within the floodway would first require a Construction in a Floodway permit from the IDNR prior to the issuance of an Improvement Location Permit by the City of Vincennes Zoning Administrator in accordance with Sec. 160.06 of the Vincennes, Indiana Code of Ordinances.

In areas designated Zone A and AE, development must comply with Sec. 160.07 of the Vincennes, Indiana Code of Ordinances. In accordance with this section, developments in SFHAs must not increase the regulatory flood elevation more than one-tenth (0.1) of one foot; this section also prohibits the storage of chemicals and other hazardous or toxic materials below the Flood Protection Grade. Furthermore, in accordance with Sec. 160.07, new and replacement sanitary sewer lines may be permitted provided all manholes and other above ground openings are located above the Flood Protection Grade or must be watertight if the sewer lines are below the Flood Protection Grade.

Also, in accordance with Vincennes Code of Ordinances, Sec. 160.08, Protecting Buildings, all buildings located in SFHAs must be protected from flood damage below the Flood Protection Grade. These building protection requirements apply to: new buildings greater than 400 square feet; alterations, reconstruction, or repairs to an existing building that increases the market value of the building by more than 50 percent; and recreational vehicles and manufactured homes installed and stored on sites within SFHAs such as Zone A and AE. Furthermore, buildings in SFHAs may be constructed on permanent fill provided the fill is compacted and must be protected against erosion and scour, and should extend at least 10 feet beyond the building foundation before sloping below the Flood Protection Grade. Also, the top of the lowest floor, including basements, must be at or above the Flood Protection Grade.

Conclusion:

Long-term adverse impacts to floodplains as designated by FEMA would result from this No Action alternative because the Brevoort-Vincennes Levee system would not be certified by FEMA. Certification is required in order for areas protected by levees to become accredited by FEMA; accreditation affects the FIRM zone designations for areas protected and not protected by levee systems. The current designation of Zone B, which encompasses the majority of the City of Vincennes and includes GERO, would be changed to SFHA Zone A or AE, and all buildings would be subject to the regulations set forth in Chapter 160 of the Vincennes Code of Ordinances.

Alternative B: Convert Temporary Closures to Permanent Closures Only

Impacts:

No impacts to the natural floodplain of the Wabash River would occur under this alternative because temporary closures are installed during flood events currently; permanent closures would replace the labor involved in installing the temporary closures but would not alter or impact the present state of the natural floodplain.

This alternative would result in positive impacts to the flood protection for GERO and surrounding areas of the City. However, only constructing permanent closures in the place of temporary closures, without construction of the proposed high ground area south of the Park memorial building as part of the preferred alternative for levee modifications, would not meet the minimum flood protection requirements necessary for FEMA levee certification (H. Pinnell, personal communications, Dec. 2013). However, the temporary installation of sandbags and other flood protection elements in the open grassy area where the high ground construction is proposed, in accordance with the City of Vincennes Levee Operations and Maintenance Manual, would provide the same level of flood protection as the proposed construction of a high ground area (refer to Appendix D-13 to D-15 for emergency flood protection design standards). No other cumulative impacts to FEMA designated floodplains would occur.

Conclusions:

This alternative would result in flood protection for the Park and surrounding areas of the City in the form of permanent flood closures instead of temporary closures that must be installed during flood events. However, without construction of a permanent closure at Willow Street in conjunction with construction of either a permanent high ground area or temporary installation of sandbags and other flood protection elements in the open grassy area on the south side of the Park memorial building in accordance with the City of Vincennes Levee Operations and Maintenance Manual, this alternative would not result in the levee system being certified by FEMA. Also, the flood designation zone of approximately 75% of the City of Vincennes, including the Park, would be changed from Zone B to Zone A or

AE, resulting in more stringent building regulations and flood insurance requirements as discussed above in *Alternative A*, the No Action alternative. Therefore, this alternative would result in long-term adverse and significant impacts to flood protection for the Park and surrounding areas, affecting approximately 75% of businesses and residences in Vincennes.

Alternative C: Levee Modification & Construction of Permanent Closures at Willow & Main Streets (PREFERRED ALTERNATIVE)

Impacts:

The purpose of this preferred alternative is to maintain the current FEMA flood zone designation of Zone B for GERO and surrounding areas of the City, and to eliminate the manual labor required to construct temporary closures prior to every flood event. This alternative would result in the flood protection system for Vincennes being certified by FEMA in the future; the levee system would then be eligible for accreditation by FEMA. This accreditation would result in exemption of flood insurance in accordance with the NFIP regulations.



Photo 9: Existing conditions- facing north from Lincoln Memorial Bridge to Main Street temporary closure. The high ground to the right is the Vincennes Levee; this structure was built in the 1950's and currently meets US Army Corps of Engineers standards. 11/26/2013.



Photo 10: Existing conditions- facing west along Willow Street to the temporary closure. 11/26/2013

No impacts to the natural floodplain of the Wabash River are anticipated as a result of this preferred alternative. Temporary closures are currently installed during flood events, and the proposed permanent closures would replace the temporary closures. The elevation of the proposed high ground area would be increased, but the overall footprint of the changes are within the same general area of the existing Brevoort levee at the site. As stated previously, it is important to note that development since the area was settled in the 1700's has greatly altered the natural floodplain of the river in Vincennes and surrounding areas.

Conclusion:

Direct positive impacts to the FEMA designated floodplain zones would result from this preferred alternative because the Brevoort Levee system would be eligible for FEMA certification. Certification is required in order for levee systems to become accredited by FEMA; accreditation affects the FIRM zone designations for areas protected and not protected by levee systems. Upon receipt of FEMA levee system accreditation, properties would not be required to purchase flood insurance in accordance with the NFIP floodplain management regulations in the future (FEMA Fact Sheet, October 2012). In addition, buildings in the current Zone B boundaries would not be subject to strict flood zone regulations specified in Section 160 of the Vincennes, Indiana Code of Ordinances. The substantial positive impacts associated with this preferred alternative would be long-term and significant, and would be felt by property owners within the current Zone B in the City immediately upon completion of the proposed construction in this alternative. The impacts to FEMA floodplain zones as a result of construction of permanent flood closures at Main and Willow Streets as part of this preferred alternative and the context, intensity, and

duration are described above in *Alternative B: Convert Temporary Closures to Permanent Closures Only*.

Soils

Alternative A: No Action (“Do Nothing”) Alternative for Levee Modification & Construction of Permanent Closures at Willow & Main Streets

Impacts:

No impacts to soils in GERO would occur as a result of the No Action alternative because no disturbance, removal, or addition of soils to the project site would occur; soil conditions would remain unchanged. No additional cumulative impacts would occur to soils under the No Action alternative.

Conclusion:

No impacts to the soils would result from the No Action alternative because soils in GERO would remain unchanged.

Alternative B: Convert Temporary Flood Closures to Permanent Closures Only

Impacts:

Negative impacts to soils in the Park would occur as a result of this alternative. Existing soils at the proposed permanent closure sites at Willow and Main Streets would be disturbed and compacted during construction, and would remain compacted indefinitely after the project is complete. In addition, soils from off-site locations may be required to complete construction of the proposed Willow Street permanent closure, which would alter the present soil makeup of soils at these sites.

The former MGP site was located at the present location of the Park’s visitor center parking lot. Previous investigations have identified impacts to surface and subsurface soils as a result of operations at the former MGP site on roughly three acres of GERO, at the southern end of the Park and in the vicinity of the Willow Street closure site. No other cumulative impacts to soils are anticipated to occur as a result of this alternative.

Conclusions:

Negative impacts to soils at the proposed permanent closure sites would occur because existing soils would be compacted indefinitely due to construction activities; however, these impacts would be minor in nature and not significant in the long term. Because contaminated soils may be present within the construction zone of this alternative, soil intrusive work at the Willow Street closure site would need to be

conducted in accordance with the NPS *Public Information Sheet for Soil Disturbing Activities* (“Guidelines for Health and Safety During Soil Disturbing Construction/Maintenance Activities” section; refer to Appendix E-6 to E-7). By following the guidelines set forth by the NPS, impacts to potentially contaminated soils near the project sites and impacts as a result of exposure to contaminated soils, if any are found, would be greatly reduced.

Potential exposure of workers to contaminated soils is discussed further in the “Former MGP Site” impact area section of this Chapter.

Alternative C: Levee Modification & Construction of Permanent Closures at Willow & Main Streets (PREFERRED ALTERNATIVE)

Impacts:

Negative impacts to existing soils in GERO would occur as a result of this preferred alternative because excavating equipment would be required for construction of the proposed high ground area, resulting in compaction of soils throughout the construction area. Soils in the proposed high ground area may have been affected due to the former MGP operations in the southern portion of the Park; however, contaminated soils at the former MGP site location would not be affected.

The impacts to soils as a result of construction of permanent flood closures at Main and Willow Streets as part of this preferred alternative are described above in *Alternative B: Convert Temporary Closures to Permanent Closures Only*. Much of the soils in the Park have been disturbed and compacted by previous development and construction activities, resulting in permanent changes to the make-up of the soils. No other cumulative impacts to soils from the preferred alternative are anticipated.

Conclusions:

Negative impacts to soils would occur because the top layer of soil and turf grass would be removed for construction of the proposed high ground area, and soils would be compacted throughout the construction zone of the high ground area. Impacts to soils from compaction would be negligible in the long-term, and are not anticipated to be significant. The impacts to soils as a result of construction of permanent flood closures at Main and Willow Streets as part of this preferred alternative and the context, intensity, and duration are described above in *Alternative B: Convert Temporary Closures to Permanent Closures Only*.

Because contaminated soils may be present within the construction zone of this alternative, soil intrusive work at the Willow Street closure site would need to be conducted in accordance with the NPS *Public Information Sheet for Soil Disturbing Activities* (“Guidelines for Health and Safety During Soil Disturbing Construction/Maintenance Activities” section; refer to Appendix E-6 to E-7). By following the guidelines set forth by the NPS, impacts to potentially contaminated

soils near the project sites and impacts as a result of exposure to contaminated soils, if any are found, would be greatly reduced.

Potential exposure of workers to contaminated soils is discussed further in the “Former MGP Site” impact area section of this Chapter.

Terrestrial Habitat & Wildlife

Alternative A: No Action (“Do Nothing”) Alternative for Levee Modification & Construction of Permanent Closures at Willow & Main Streets

Impacts:

No impacts to terrestrial habitat and wildlife in GERO would occur as a result of the No Action alternative because there would be no removal of trees or microhabitats that exist in the Park. Existing trees would continue to mature, providing additional habitat for small mammals, birds, and insects in the future. No additional cumulative impacts would occur to terrestrial habitat and wildlife under the No Action alternative.

Conclusion:

Existing trees would continue to provide habitat for small mammals, birds, and insects, resulting in long-term positive impacts to terrestrial habitat and wildlife. No additional impacts to the terrestrial habitat and wildlife would result from the No Action alternative because existing trees and microhabitats in the Park would remain undisturbed.

Alternative B: Convert Temporary Closures to Permanent Closures Only

Impacts:

This alternative would result in negative impacts to terrestrial habitat and wildlife; a small amount of turf grass and fescue grass containing microhabitats would be damaged by excavating equipment during construction, and small amounts of turf grass and fescue grass would be removed. No other cumulative impacts would occur.

Conclusions:

Negligible short-term impacts to microhabitats would occur during construction of the permanent closures; however, these areas would be reseeded after construction, therefore, microhabitats would be restored. In conclusion, no long-term impacts to terrestrial habitat and wildlife would occur as a result of this alternative.

Alternative C: Levee Modification & Construction of Permanent Closures at Willow & Main Streets (PREFERRED ALTERNATIVE)

Impacts:

Construction of the proposed high ground area would result in the removal of 12 trees: four Northern Red Oaks (*Quercus rubra*), five Crabapples (*Malus spp.*), one Magnolia (*Magnolia grandifolia*), and two Littleleaf Lindens (*Tilia vulgaris*; refer to Photo #1 above). These trees provide habitat to small mammals and birds. It is important to note that many trees of similar species and size exist on the southeast side of the proposed high ground area and would not be impacted by the project (refer to Photo #11 below). The impacts to terrestrial habitat and wildlife as a result of construction of permanent flood closures at Main and Willow Streets as part of this preferred alternative are described above in *Alternative B: Convert Temporary Closures to Permanent Closures Only*.



Photo 11: Existing conditions- facing west from north side of visitor parking lot; trees in the foreground of this photo would **not** be removed as part of this alternative. 11/26/2013

Conclusions:

The removal of 12 trees as a result of this preferred alternative would result in negative impacts to terrestrial wildlife and habitat in the Park; however, because these trees would be replaced with similar species on the south side of the Park memorial building and as close as possible to the locations of trees being removed, impacts would be medium-term and would diminish over time as the replacement trees mature. Therefore, these impacts to terrestrial wildlife and habitat in the Park in the long-term would not be significant.

The context, intensity, and duration of impacts to terrestrial wildlife and habitat as a result of construction of permanent flood closures at Main and Willow Streets as part of this preferred alternative and are described above in *Alternative B: Convert Temporary Closures to Permanent Closures Only*.

Socioeconomic Environment & Environmental Justice

No Action (“Do Nothing”) Alternative for Levee Modification & Construction of Permanent Closures at Willow & Main Streets

Impacts:

The No Action alternative would result in impacts to the socioeconomic environment and environmental justice populations because the Vincennes- Brevoort levee system protecting the Park and the majority of the City of Vincennes would not be certified by FEMA, resulting in a change in the FEMA flood designation from Zone B to Zone A. This change would result in additional flood insurance protection requirements in accordance with NFIP for all properties with federally backed mortgages within a newly defined FEMA flood Zone A in the City of Vincennes. Additional cumulative impacts under the No Action alternative include the continued need for flood insurance per NFIP for properties in the designated flood zone (Appendix D-4). These impacts would be felt by all property owners within the affected flood zone, regardless of socioeconomic or minority status.

A change in the FEMA flood designation for the Park and surrounding areas of the City from Zone B to Zone A would also have other cumulative impacts to the socioeconomic environment of the City. All construction within the Zone A designation would first require a Construction in a Floodway permit from the IDNR prior to the issuance of an Improvement Location Permit by the City of Vincennes Zoning Administrator in accordance with Sec. 160.06 of the Vincennes, Indiana Code of Ordinances.

In areas designated Zone A, development must comply with Sec. 160.07 of the Vincennes, Indiana Code of Ordinances. In accordance with this section, developments in SFHAs must not increase the regulatory flood elevation more than one-tenth (0.1) of one foot; this section also prohibits the storage of chemicals and other hazardous or toxic materials below the Flood Protection Grade. Furthermore, in accordance with Sec. 160.07, new and replacement sanitary sewer lines may be permitted provided all manholes and other above ground openings are located above the Flood Protection Grade or must be watertight if the sewer lines are below the Flood Protection Grade.

Also, in accordance with Vincennes Code of Ordinances, Sec. 160.08, Protecting Buildings, all buildings located in SFHAs must be protected from flood damage below the Flood Protection Grade. These building protection requirements apply to:

new buildings greater than 400 square feet; alterations, reconstruction, or repairs to an existing building that increases the market value of the building by more than 50 percent; and recreational vehicles and manufactured homes installed and stored on sites within SFHAs such as Zone A. Furthermore, buildings in SFHAs may be constructed on permanent fill provided the fill is compacted to 95 percent of the maximum density obtainable with the Standard Proctor Test method, and the fill, which must be protected against erosion and scour, should extend at least 10 feet beyond the building foundation before sloping below the Flood Protection Grade. Also, the top of the lowest floor, including basements, must be at or above the Flood Protection Grade.

Conclusion:

The No Action alternative would result in direct, long-term, and adverse impacts to the socioeconomic environment because the levee systems would not be certified by FEMA, making the levee system ineligible for accreditation by FEMA. This would result in changes to FEMA FIRM maps in the future. Currently the majority of the City of Vincennes, including GERO, is in FEMA flood Zone B per the most recent FEMA FIRM map dated December 18, 1984. Without levee system certification, the current FEMA designation would revert to FEMA flood Zone A, and NFIP regulations for floodplain management and flood insurance would apply. Additional flood insurance would be required for properties in the flood zones in accordance with NFIP (refer to Appendix D-3 and D-4 for more FEMA levee certification and accreditation information).

The No Action alternative would have other direct and adverse impacts to the socioeconomic environment of the City. Without FEMA recognized flood protection, business development in the affected flood designation zone would most likely slow, and existing businesses would move to areas outside of the high risk flood areas and away from Vincennes' historic downtown and the Park in order to avoid the local flood regulations in Chapter 160 of the City of Vincennes Code of Ordinances and to avoid paying flood insurance in accordance with NFIP regulations. A change in the flood zone designation for the majority of the City from B to A would also adversely impact land values; past research studies of the effects of floodplain land use management regulations have found that flood hazards reduce land value (Holway & Burby, 1990).

According to a 2010 US Census data report, there are 1,240 business firms (as of 2007) and 8,259 housing units in the City of Vincennes. Approximately 75% of the City is within FEMA flood Zone B. Therefore, under the No Action alternative, as many as 930 businesses (75% of total businesses) and 6,194 housing units (75% of the total) would be adversely impacted under the No Action alternative (refer to Appendix F-8 for 2010 Census Data- Quick Facts). An assessment of the types of existing businesses and facilities within FEMA flood Zone B in Vincennes found 27 federal, state, and local government buildings; 18 educational facilities, as well as all of Vincennes University; 31 restaurants; and seven medical facilities, including

Good Samaritan Hospital, Knox County's largest employer (refer to Appendix F-15 and F-16 for an inventory of major businesses and facilities located in the current flood designation Zone B).

In conclusion, the adverse impacts to the socioeconomic as a result of additional flood insurance requirements in accordance with NFIP regulations would be direct, long-term, and significant, and would effect all property owners within the designated flood zone, regardless of socioeconomic or minority status.

Convert Temporary Closures to Permanent Closures Only

Impacts:

Conversion of the temporary flood closures to permanent closures would result in impacts on the socioeconomic environment, as City residents and businesses would be provided with permanent flood protection. However, without the high ground area as proposed in the preferred alternative below or installation of temporary bags and flood protection elements in the southern grassy area of the Park, constructing only permanent closures would not result in the Vincennes- Brevoort Levee system being certified by FEMA. Without levee certification, the current Zone B flood zone designation for the majority of the City and GERO would revert to Zone A or AE in the future.

Conclusions:

This alternative to construct only permanent levees would result in positive impacts to the socioeconomic environment, but the improved levee system would not be eligible for FEMA certification. Therefore, these positive impacts would not be significant in the short or long term. This alternative would also result in direct, long-term, and adverse impacts to all City residents and businesses as well as GERO because without FEMA levee certification, the flood zone designation that encompasses the majority of the City and the Park would revert to Zone A in the future, thus resulting in flood insurance requirements for property owners in the affected flood zone designation in accordance with NFIP regulations.

Alternative C: Levee Modification & Construction of Permanent Closures at Willow & Main Streets (PREFERRED ALTERNATIVE)

Impacts:

This preferred alternative would have positive impacts on the socioeconomic environment, as City residents and businesses would be provided with adequate flood protection that would meet the levee construction standards as regulated in 44 CFR 65.10. The current FEMA flood zone designation of Zone B for the majority of the City and the Park would remain unchanged in future FEMA maps as applied to current FEMA regulations. Property owners would not be required to purchase flood

insurance in accordance with NFIP regulations; flood insurance costs range widely and are dependent on several factors such as building and site characteristics, but can range from hundreds of dollars to thousands of dollars of additional annual costs to property owners. Also, construction requirements as regulated in Chapter 160 of the Vincennes, Indiana Code of Ordinances for the areas within flood Zone A would not restrict future economic development and structural improvements to existing properties and buildings.

This preferred alternative would not adversely impact income, minority and low-income populations, ethnography, migration patterns, or other forms of infrastructure.

Conclusions:

This preferred alternative would result in positive long-term impacts to the socioeconomic environment; levee modification and construction of two permanent closures at Willow and Main Streets would provide adequate flood protection for FEMA certification. Benefits would extend to all property owners, regardless of income, minority status, ethnography, migration patterns, and other forms of infrastructure, and would be significant in the short and long term.

Visitor Use & Experience

Alternative A: No Action (“Do Nothing”) Alternative for Levee Modification & Construction of Permanent Closures at Willow & Main Streets

Impacts:

No impacts to visitor use and experience in GERO would occur as a result of the No Action alternative because there would be no physical changes to the cultural and historical landscape of the Park; visitors would be able to continue to experience and use the Park grounds in the future in the same manner that it is used today. No additional cumulative impacts would occur to visitor use and experience under the No Action alternative.

Conclusion:

No impacts to the visitor use and experience would result from the No Action alternative because the landscape, use of the memorial building and grounds, and views of the Park would remain unchanged.

Alternative B: Convert Temporary Closures to Permanent Closures Only

Impacts:

A permanent closure at Main Street would limit the ability of Park managers and the City to construct future trails and sidewalks that connect the Park to Main Street and Culbertson Boulevard using the general alignment of the out-of-use B&O railroad corridor; thus, future plans to create a riverfront pathway would not be fulfilled. This would also negatively impact the ability of Park visitors to experience parts of the city north of the Park.

In addition, this alternative proposes construction of an asphalt access ramp over the Brevoort Levee at the Willow Street permanent closure location to allow for access to Pearl Road (stone materials may also be used as an alternative to asphalt). This access ramp would result in negative impacts to vistas from the Park memorial building and other areas on the south side of the Park for visitors. No other cumulative impacts are anticipated to occur to visitor use and experience as a result of this alternative.

Conclusions:

Although this alternative would result in permanent negative impacts to visitor use and visual experiences, the impacts are not anticipated to be significant in the long term because the proposed permanent closures at Willow and Main Streets would be located at the northern and southern Park boundaries, somewhat removed from the Park's main features.

This alternative would negatively impact plans by Park managers and the City to construct a riverfront pathway from the Park to other areas of the City that generally follow the B&O railroad corridor. However, pedestrian routes currently exist that allow visitors to reach Main Street and Culbertson Boulevard from the Park via existing sidewalks, street crossings, and ramps along SR441/Vigo Street, First Street, and Second Street. Infrastructure improvements compliant with the Americans with Disabilities Act (ADA) would further improve this route from the Park to Main Street and downtown Vincennes. Also, the Louisville District of the USACE currently has Standard Operating Procedures for construction of trails on levees that may be applied to construct a pathway on the Brevoort and Vincennes levee systems (dated Nov. 30, 2010; refer to Appendix F-10 to F-13). Therefore, these impacts would be negligible in the long-term and are not anticipated to be significant.

Alternative C: Levee Modification & Construction of Permanent Closures at Willow & Main Streets (PREFERRED ALTERNATIVE)

Impacts:

The elevation of the proposed high ground area would increase by a maximum height of 2.4 feet. Therefore, views of the Park, the Francis Vigo statue, the Park

memorial building, and the Lincoln Memorial Bridge from areas south and east of the proposed high ground area, including the visitor's parking lot, would only be partially blocked by the increase in elevation.

Also, the elevation of the proposed high ground area would increase from 426 feet in elevation at the toe of slope to 428.4 feet at its peak, extending approximately 230 feet between the west and east toe of slopes and 560 feet between the north and south toe of slopes. This increase in grade elevation would be gradual and consistent, and the existing low spots and sunken areas of lawn in this area would be eliminated (refer to Appendix A-5 and A-8 for preliminary plans of the proposed high ground area).

Other positive impacts would also occur as a result of construction of the proposed high ground area. Construction of the high ground area would provide for a more consistent and even grade for participants and event attendees to walk and carry out activities associated with the Annual Spirit of Vincennes Rendezvous held in May, which attracts approximately 35,000 visitors per year.

A gradual change in slope of the existing open grassy area as a result of construction of the proposed high ground area may also have negative impacts to events held in the Park because the gradual elevation change may negatively affect the stability of temporary event structures such as tents and vendor trailers. Temporary event structures may require additional equipment to level structures, including but not limited to guy wires and concrete blocks. However, it is important to note that the current grade of the open grassy area is uneven and did not provide a flat surface for past event activities. Also, local schools often use the proposed high ground area for physical education activities; changes in the slope of the elevation of this area may negatively impact these uses as well for activities that require a flat play area such as soccer. However, the current condition of the open grassy area used by school activities is already uneven.

Additionally, the removal of trees would have negative impacts to visitor use and experience because the shade of these trees would be eliminated; thus, visitors would have fewer shady places in which to enjoy views of the Park and Wabash River. The trees to be removed include three Red Oaks that range from 7 to 32 inches in diameter at breast height (DBH). Also to be removed are four 'Radiant' Crabapples that are 6 to 12 inches in DBH. Also, removal of these trees would negatively impact the visitor's experience of the overall design of the Park as they explore the entire Park grounds. The intent of William E. Parsons' cultural landscape design was to provide a visual link between the downtown area (civilization) to the frontier and wilderness (represented by the trees on the south side of the Park memorial building and natural landscape beyond) that was experienced by George Rogers Clark and his men. No other cumulative impacts to visitor use and experience are anticipated to occur as a result of this preferred alternative.



Photo 12: Existing conditions- facing northwest from the Park visitor parking lot; proposed high ground would only partially block views of Lincoln Memorial Bridge. 11/26/2013

Conclusions:

The actions in this preferred alternative would result in medium-term negative impacts to visitor use and experience because seven trees would be removed; however, trees removed would be replaced with trees of similar species in other approved areas of the Park as part of this project. Therefore, these impacts would diminish as replacement trees mature and provide additional shade for visitors to enjoy, and would not be significant in the long-term.

The proposed high ground area would only partially impact views of the Lincoln Memorial Bridge, primarily from the visitor's parking lot and southernmost boundaries of the Park only (refer to Photo #12 above); although these impacts would be permanent, any negative impacts to views of the Lincoln Memorial Bridge would not be significant.

Also, visitor use of the proposed high ground area for picnicking and for walking about at Park events would be improved because the proposed construction would involve installation of compacted fill over the entire open grassy area south of the Park memorial building in compliance with current USACE standards for levee construction, resulting in a more consistent and even grade for walking and picnicking (currently the grade of this area is uneven). Although the elevation change as a result of the proposed high ground area would create a gradually sloped surface that may affect the stability of temporary structures and vendor trailers at Park events, these structures may be stabilized with additional equipment. Therefore, this impact is not anticipated to be significant in the long-term.

The context, intensity, and duration of impacts to visitor use and experience as a result of construction of permanent flood closures at Main and Willow Streets as part

of this preferred alternative and are described above in Alternative B to convert temporary closures in these locations to permanent closures only.

Park Operations

Alternative A: No Action (“Do Nothing”) Alternative for Levee Modification & Construction of Permanent Closures at Willow & Main Streets

Impacts:

No impacts to park operations at GERO would occur as a result of the No Action alternative because there would be no disruptions to park hours of operations or maintenance activities; Park employees would be able to continue to maintain the Park grounds and memorial building in the same manner that it is today. No additional cumulative impacts would occur to park operations under the No Action alternative.

Conclusion:

No impacts to park operations would result from the No Action alternative because the use of Park and the memorial building would remain unchanged; park operations would not be disrupted.

Alternative B: Convert Temporary Closures to Permanent Closures Only

Impacts:

No impacts to park operations would occur as a result of this alternative because the proposed permanent flood closure sites at Willow and Main Streets are near the northern and southern boundaries of the Park, and these locations are somewhat removed from the remainder of the Park and memorial building. The proposed permanent closures would not prohibit Park employees from accessing areas of the Park or negatively affect maintenance activities, and the proposed asphalt access ramp (with stone as an alternate surface material) over the Brevoort Levee would provide the necessary access to the west (river) side of the existing retaining wall along the Wabash River for inspection and maintenance. The proposed access ramp would be located approximately 40 feet closer to the Park maintenance facility than the existing gravel roadway (Willow Street) that connects to Pearl Drive, thus introducing a potential safety hazard; vehicles traveling over the access ramp may lose control and strike the maintenance facility and/or Park employees. No other cumulative impacts to park operations are anticipated to occur under this alternative.

Conclusions:

No impacts to park operations would occur under this alternative. However, the proposed access ramp over the Brevoort Levee would introduce the potential for

vehicles traveling on the access ramp to strike the Park maintenance facility and/or Park employees. This negative impact would be permanent and potentially significant; however, properly located impact barriers would reduce the potential for accidents.

Alternative C: Levee Modification & Construction of Permanent Closures at Willow & Main Streets (PREFERRED ALTERNATIVE)

Impacts:

Operation of the Park memorial building would not be affected by this preferred alternative. Access would be limited to Park areas on the south side of the memorial building during construction of the proposed high ground area, resulting in negative impacts to Park operations in the open grassy area. Park employees traveling to and from the Park maintenance building (located on the south end of the Park) would need to utilize the visitor parking lot and open lawn areas outside of the high ground construction zone to move equipment and supplies from the maintenance building to other areas of the Park. Once complete, the proposed high ground area in this preferred alternative would result in permanent positive impacts to Park maintenance in the future because construction of the proposed high ground area would eliminate the current low spots and dips in the open grassy area and would result in a more consistent and even lawn grade for mowing. No other cumulative impacts to park operations would occur as a result of this alternative.

Conclusions:

This alternative would result in minor short-term negative impacts to park operations during construction of the proposed high ground area; however, no long-term or significant negative impacts to park operations would occur because after construction, park employees would be able to continue to move equipment and supplies across the new high ground area in the same manner as they do today. The context, intensity, and duration of impacts to park operations as a result of construction of permanent flood closures at Main and Willow Streets as part of this preferred alternative and are described above in *Alternative B: Convert Temporary Closures to Permanent Closures Only*.

Public & Private Utilities

Alternative A: No Action (“Do Nothing”) Alternative for Levee Modification & Construction of Permanent Flood Closures at Willow & Main Streets

Impacts:

No impacts to public and private utilities within GERO would occur as a result of the No Action alternative for levee modification and construction of permanent flood

closures at Willow and Main Streets because there would be no disruptions to utility function and operation; utilities would continue to operate in the same manner as they do currently. No other cumulative impacts would occur to public and private utilities under the No Action alternative for levee modifications.

Conclusion:

No impacts to public and private utilities are anticipated under the No Action Alternative for levee modifications.

Alternative B: Convert Temporary Closures to Permanent Closures Only

Impacts:

Construction of the proposed permanent flood closures at Willow and Main Streets would include the installation of additional sub-drainage structures. Preliminary design plans for this portion of the project propose installation of polyvinyl chloride (PVC) piping and new storm water inlets within the B&O railroad corridor that connect to existing storm drainage structures; these existing structures terminate at existing storm water outfalls draining to the Wabash River. The installation of these additional drainage structures would introduce cumulative positive impacts to the storm drainage system in and near the Park in the form of improved storm water drainage for the areas surrounding the proposed permanent closures. Refer to Appendix A-7 to A-17 for preliminary plans. No other cumulative impacts to public and private utilities would occur as a result of this alternative.

Conclusions:

Permanent positive impacts to storm water drainage in the form of improved drainage systems at Willow and Main Streets would result from this alternative. The significance of these impacts would be dependent on the amount of storm water runoff during precipitation events. No other impacts are anticipated to occur to public and private utilities under this alternative.

Alternative C: Levee Modification & Construction of Permanent Closures at Willow & Main Streets (PREFERRED ALTERNATIVE)

Impacts:

Construction of the proposed high ground area would not affect the wastewater infrastructure line along the southeastern edge of the open grassy area in GERO because it is located outside of the proposed high ground area construction zone; power utility lines that extend from the Park to the traffic signal lights and lighting on the Lincoln Memorial Bridge are also outside of the construction zone.

An existing 24-inch concrete culvert pipe traverses westerly from the visitor parking lot to an existing outfall at the Wabash River. The weight of heavy construction equipment used to remove the top layer of soil and turf grass from the proposed high ground area and used for the construction of the high ground area may cause damage to this culvert pipe. Also, once the proposed high ground area is constructed, future access to this pipe for maintenance or replacement would be limited. The impacts to public and private utilities as a result of permanent closures at Main and Willow Streets are discussed above in *Alternative B: Convert Temporary Closures to Permanent Closures Only*. No other cumulative impacts would occur as a result of this alternative.

Conclusions:

Negative impacts to an existing drainage structure located under the proposed high ground area may occur because the structure may become damaged by the weight of equipment used for construction. Damage may restrict storm water flow during precipitation events, which may in turn result in storm water backing up throughout the associated drainage system. However, these impacts are speculative; the context, duration, and intensity of these impacts to storm water infrastructure would be dependent on the location and extent of failures and the time involved in making necessary repairs.

Construction of the proposed high ground area over this culvert pipe would limit access for repair and/or replacement. The City of Vincennes should coordinate with the USACE to discuss an emergency infrastructure repair process, prior to completion of construction of the high ground area. Proactive coordination with the USACE and implementation of an emergency repair process for this storm water drainage infrastructure would reduce the likelihood and significance of negative impacts as a result of infrastructure damage.

The context, intensity, and duration of impacts to public and private utilities as a result of construction of permanent flood closures at Main and Willow Streets as part of this preferred alternative and are described above in *Alternative B: Convert Temporary Closures to Permanent Closures Only*.

Former MGP Site

Alternative A: No Action (“Do Nothing”) Alternative for Levee Modification & Construction of Permanent Closures at Willow & Main Streets

Impacts:

No impacts to solid and hazardous wastes in the vicinity of or within GERO would occur as a result of the No Action alternative. There would be no soil intrusive work near the former MGP site. The ongoing CERCLA response action at the site would

not be affected by this alternative. No other cumulative impacts would occur to the former MGP site. There are no other identified solid or hazardous waste sites in or near the project area.

Conclusions:

No impacts to the former MGP site in the Park would result from this No Action alternative because there would be no disturbance of the former MGP site or contaminated areas surrounding the site.

Alternative B: Convert Temporary Closures to Permanent Closures Only

Impacts:

This alternative would not result in impacts to the former MGP site located in GERO. Because contaminated soils may be present within the construction zone of this alternative, soil intrusive work at the Willow Street closure site would need to be conducted in accordance with the NPS *Public Information Sheet for Soil Disturbing Activities* (“Guidelines for Health and Safety During Soil Disturbing Construction/Maintenance Activities” section; refer to Appendix E-6 to E-7). No other cumulative impacts are likely to occur.

Conclusions:

No impacts to the former MGP site are anticipated to occur as a result of this preferred alternative. Soil intrusive work at the Willow Street closure site would need to be conducted in accordance with the NPS *Public Information Sheet for Soil Disturbing Activities* (“Guidelines for Health and Safety During Soil Disturbing Construction/Maintenance Activities” section; refer to Appendix E-6 to E-7). Appropriate soil erosion control measures would minimize storm water runoff from the construction site, as proposed in preliminary engineering plans (refer to Appendix A-11). Any contaminated soils removed from the site would require handling and disposal in compliance with CERCLA requirements and, if required by law or regulation, those of other appropriate federal and/or State officials or entities (e.g., Indiana Administrative Code Title 329, Article 3.1 and 40 CFR Parts 260-270 and 273 for waste disposal; IDEM, 2013). By following the guidelines set forth by the NPS, impacts to potentially contaminated soils near the project sites and impacts as a result of exposure to contaminated soils, if any are found, would be greatly reduced.

Alternative C: Levee Modification & Construction of Permanent Closures at Willow & Main Streets (PREFERRED ALTERNATIVE)

Impacts:

This alternative would not result in impacts to the former MGP site located in GERO. Previous investigations have identified impacts to subsurface and surface soils at the proposed high ground area site as a result of former MGP operations near this area. Construction of the high ground area would require removal of topsoil and turf grass, with minimal disturbance of subsurface soils. Nonetheless, soil intrusive work to construct the proposed high ground area would need to be conducted in accordance with the NPS *Public Information Sheet for Soil Disturbing Activities* (“Guidelines for Health and Safety During Soil Disturbing Construction/Maintenance Activities” section; refer to Appendix E-6 to E-7).

Construction of this alternative may also affect the ongoing CERCLA response action to address the releases of hazardous substances due to the former MGP operations because contaminated soils, if present, would be covered by compacted fill used for the proposed high ground area. Also, future investigations (i.e. temporary borings and permanent monitoring wells) and response actions may need to be reviewed by the USACE to ensure compliance with current and future levee standards.

Potential impacts to the former MGP site as a result of construction of permanent flood closures at Willow Street as part of this preferred alternative and are described above in *Alternative B: Convert Temporary Closures to Permanent Closures Only*. No other cumulative impacts are anticipated to occur.

Conclusions:

No impacts to the former MGP site would occur as a result as of this preferred alternative. Soil intrusive work would need to be conducted in accordance with the NPS *Public Information Sheet for Soil Disturbing Activities* (“Guidelines for Health and Safety During Soil Disturbing Construction/Maintenance Activities” section; refer to Appendix E-6 to E-7). By following the guidelines set forth by the NPS, impacts to potentially contaminated soils near the project sites and impacts as a result of exposure to contaminated soils, if any are found, would be greatly reduced. Proactive coordination with the USACE and NPS should also occur prior to project completion to minimize impacts to future CERCLA response actions and any future investigations of soil contamination and mitigation measures related to the MGP site.

Appropriate soil erosion control measures would minimize storm water runoff from the construction site, as proposed in preliminary engineering plans (refer to Appendix A-11).

Potential impacts to the former MGP site as a result of construction of permanent flood closures at Willow Street as part of this preferred alternative and are described above in *Alternative B: Convert Temporary Closures to Permanent Closures Only*.

Sec. 4.3, Wastewater Infrastructure Rehabilitation

This section includes discussion of potential impacts to resources as a result of the alternatives involved in rehabilitation of the existing wastewater infrastructure line that traverses along the southeast side of the open grassy area, the GERO memorial building, and the Mall. At the northern corner of the St. Francis Xavier (Old Cathedral) “French and Indian” Cemetery, the existing wastewater infrastructure line angles north toward the approach to the Lincoln Memorial Bridge, which carries SR 441/Vigo Street over the Wabash River; here the infrastructure line runs under the flagpole terraces on both sides of the Bridge and travels northeasterly through and out of the northern part of the Park (refer to Appendix F-7 for an aerial map showing the existing wastewater infrastructure alignment).

The preferred alternative for rehabilitation of the existing wastewater infrastructure line within GERO boundaries as examined in the sections below involves the installation of synthetic liners in the existing infrastructure using existing manholes for access, with no above ground disturbance. However, the physical condition of the wastewater infrastructure is currently unknown. Therefore, the discussion below also includes *Alternative D: Wastewater Infrastructure Rehabilitation via Excavation*; in the event that rehabilitation using the pipe bursting method as presented in *Alternative B* or synthetic liners as presented in the *Alternative C* (the preferred alternative) is not possible and the wastewater infrastructure line must be excavated with heavy machinery in order to make the necessary repairs, *Alternative D* would be used to complete necessary repairs to the aging wastewater infrastructure.

Cultural Resources

Alternative A: No Action (“Do Nothing”) Alternative for Wastewater Infrastructure Rehabilitation/Repair

Impacts:

No impacts to cultural resources in and near GERO as designed by notable landscape architect William E. Parsons would occur as a result of the No Action alternative because the landscape would remain unchanged. However, long-term negative impacts would occur in the event that the wastewater infrastructure line develops leaks in the future, which would require emergency repairs; such repairs may require excavation of soils and Park sidewalks to complete. No additional cumulative impacts would occur under the No Action alternative for wastewater infrastructure rehabilitation and repair.

Conclusion:

No short-term positive or negative impacts would occur under this alternative because the Park's historic designed landscape would remain unchanged. However, negative impacts to cultural resources would result from the No Action alternative in the future in the event that the aging wastewater infrastructure line developed leaks or other damage that would require emergency repairs, which may result in alterations to the historic designed landscape of the Park. The context, intensity, and duration of these alterations and subsequent impacts would be dependent on the length and location of the infrastructure requiring emergency repairs within the Park and the timeframe needed for repairs.

Alternative B: Pipe Bursting Technique to Repair Wastewater Infrastructure

Impacts:

No visual impacts to cultural resources in GERO would result from this alternative because the work would take place underground using existing manholes for access, with no above ground disturbance. While the process of pipe bursting would not result in visible disturbance to the surrounding landscape above ground, vibrations from the mechanical equipment used and the bursting of the pipes could result in long-term negative impacts to the foundations of nearby structures. Also, because this technique involves bursting the old pipe and forcing the fragments into nearby soils, previously undiscovered archaeological resources may be disturbed, especially along the western perimeter of the Old Cathedral "French and Indian" Cemetery. However, the presence of archaeological resources is unlikely because the area surrounding the existing wastewater infrastructure was excavated to install the existing infrastructure. No other cumulative impacts to cultural resources would occur.

Conclusions:

No long-term positive or negative visual impacts to cultural resources in the Park would result from this alternative because all work would be completed underground using existing manhole covers for access. Long-term negative impacts to cultural and historic resources may occur under this alternative because vibrations from equipment used for pipe bursting may damage the foundations of structures, including the Park memorial building and surrounding walkways, the Park Visitor's Center, the Old Cathedral "French and Indian" Cemetery, and the flagpole terrace on the north side of SR 441/Vigo Street and within Park boundaries. These impacts would be cumulative, and the significance and duration of these impacts would be dependent on how the building foundations react to the vibrations and the current structural condition of the foundations; disturbance may cause the building foundations to deteriorate slowly over time.

Alternative C: Wastewater Infrastructure Rehabilitation using Synthetic Liners
(PREFERRED ALTERNATIVE)

Impacts:

No impacts to cultural resources in GERO would result from this preferred alternative because this portion of the project would involve no physical disturbance above ground; the synthetic sealant liners would be installed using mechanical equipment inside the existing piping using existing manholes for access for the entire length of the infrastructure within Park boundaries. No additional cumulative impacts to cultural resources would occur under the preferred alternative.

Conclusions:

No impacts to cultural resources in the Park would result from this preferred alternative.

Alternative D: Wastewater Infrastructure Rehabilitation via Excavation

Impacts:

The physical condition of the existing wastewater infrastructure inside and outside of Park boundaries is currently unknown. In the event that the preferred alternative (*Alternative C*) to line the infrastructure with synthetic materials is not possible due to advanced physical deterioration of the existing infrastructure, or if the pipe bursting method in *Alternative B* is not a possible option due to infrastructure deterioration, excavation of some or all areas surrounding the existing infrastructure would be required (refer to Appendix A-4 and Appendix F-7 for aerial maps of this wastewater infrastructure alignment location).

The existing infrastructure travels from about the intersection of Willow Street and River Road at the southern boundary of the Park northeast and under the northwestern section of the Park visitor parking lot and the aggregate concrete sidewalks adjacent to the parking lot; these facilities were constructed at the same time as the Visitor's Center in 1976 and were not a part of the original Park plan design. Portions of the parking lot and sidewalks would need to be removed to access the wastewater infrastructure.

According to the 2008 *Cultural Landscape Report/Environmental Assessment* completed by the NPS, the trees on the northeast side of the visitor parking lot were most likely planted when the Visitor's Center and parking lot were built in 1976. The Red Oaks, Crabapples, and Magnolia tree northwest of the aggregate concrete sidewalk leading from the parking lot to the Visitor's Center building are not part of the original cultural landscape plan by William E. Parsons (pgs. 51-52). One Little Leaf Linden approximately 26 inches in diameter and thought to be part of Parsons' original plan is located approximately 50 feet northwest of the aggregate sidewalk. Root systems of these trees may be impacted by excavation of the wastewater

infrastructure, which would result in tree branch dieback and/or death of the trees due to root damage. The extent of root damage would depend on the footprint of the construction zone needed to excavate and make the required repairs to the wastewater infrastructure.



Photo 13: Existing conditions- facing north along existing wastewater infrastructure alignment- aggregate sidewalks located on the northwest perimeter of the visitor parking lot. Note trees on the left side of sidewalk. 11/26/2013.

The existing wastewater infrastructure then travels under the southeastern portion of the aggregate concrete patio that surrounds the Park memorial building and near the Barnett Street sidewalk and granite steps leading to the memorial building (refer to Photo #14 below). It is important to note that the concrete making up the Barnett Street sidewalk and steps is deteriorating and would eventually be replaced by the Park at a later date. Portions of this apron have been replaced in recent years, as indicated by the differences in the coloration of the concrete sections. These features are part of the historic pedestrian circulation design of the Park grounds. Two historic street lamps and two granite benches are also located on the patio, and would be affected by excavation of the patio to repair the wastewater infrastructure.



*Photo 14: Existing conditions- facing north at aggregate concrete apron surrounding Park memorial building; note discolored sections of concrete and Barnett Street Sidewalk and steps to the right.
11/26/2013*

From the aggregate concrete patio surrounding the Park memorial building, the existing wastewater infrastructure continues north, generally following the aggregate concrete sidewalk and line of trees and terminating at SR441/Vigo Street (refer to Photos #15 and #16 below). This section of sidewalk was also replaced in recent years. Trees on the southeast side of this sidewalk and near the wastewater infrastructure alignment include two Red Oaks near the northwest of the Old Cathedral “French and Indian” Cemetery, which appear to be original plantings (NPS, 2008). Also located here are six Sweet Gum trees that were not part of the original Park landscape planting in 1934. Root systems of these trees may be impacted by excavation of the wastewater infrastructure, which may in turn result in tree branch dieback and/or death of the trees due to root damage.



Photo 15: facing southeast toward Old Cathedral, “French and Indian” Cemetery, and Sweet Gum trees. 7/31/2013

At a point near the northwest corner of the Old Cathedral “French and Indian” Cemetery, the wastewater infrastructure line angles northward through the Park Mall, under the wide Mall sidewalks in the northeast section of the Mall, and to the terrace on the south side of the Lincoln Memorial Bridge approach. The infrastructure then travels under SR441/Vigo Street, the flagpole terrace, and concrete walkway on the north side of the Bridge approach. All of these facilities are prominent historic features of the Park. Depending on the footprint of the construction zone required to access the wastewater infrastructure, as many as two granite benches and one historic street lamp in the Mall also original to the Parsons design may require removal during construction (refer to Photo #16 below).



Photo 16: Existing conditions- facing south from Lincoln Memorial Bridge approach to Park Mall area where wastewater infrastructure angles across Mall to south bridge terrace. 7/31/2013.

Conclusions:

Negative impacts to the Park visitor's parking lot and sidewalk adjacent to the parking lot would occur as a result of this alternative. However, because these facilities were constructed in 1976 and were not part of the original historic designed landscape by William E. Parsons, and because these facilities would be returned as close as possible to their current condition after repairs to the wastewater infrastructure were complete, the overall impacts of this alternative to this area of the Park would be short-term and would not be significant.

The root systems of trees adjacent to the wastewater infrastructure alignment near the visitor's parking lot would be negatively impacted by excavation of the infrastructure for repairs. Root damage may cause dieback of branches and/or death of the trees. Removal of dead and/or dying trees in this area would negatively impact the cultural landscape of the Park because these trees represent the transition from civilization to wilderness that Parsons intended to make in the original Park plan. However, in order to maintain the historic designed landscape of the Park, trees removed would be replaced; therefore, the duration of the negative impacts would be medium-term and would not be significant in the long-term. The extent of the root damage would be dependent on the construction zone needed to excavate the infrastructure for repairs.

The excavation of the aggregate concrete patio on the southeast side of the Park memorial building would result in short-term negative impacts to cultural resources

in the Park because access to the memorial building from Second Street would be limited during the construction period for repairs. The affected concrete patio sections would be restored as close as possible to their current conditions; however, the coloration of new concrete materials would be distinctly different from concrete sections untouched by the proposed action. Because portions of the patio have been already replaced in recent years, these impacts to the concrete patio would not be significant in the long term.

The Barnett Street Sidewalk and granite steps would be permanently and negatively affected by excavation to repair the wastewater infrastructure because these facilities are original to the initial construction of the Park and are part of the overall pedestrian circulation design of the Park. It is important to note that, as a result of time and exposure to weather conditions, the concrete on these steps is currently deteriorated and would be replaced by the Park at a later date regardless of the results of this project. As part of this alternative, the granite in these steps would be preserved and reset with the new concrete in order to maintain the historic integrity of this Park feature. The context of these impacts would include the Park as a whole; the duration and intensity of these impacts would be long-term and but not significant because the steps would be replaced in-kind and the historic integrity of the granite would be preserved and returned to their original locations upon construction completion.



Photo 17: facing east at Barnett Street granite steps. 11/26/2013

The sidewalk that traverses northeasterly from the memorial building concrete patio to SR441/Vigo Street would be excavated to access the wastewater infrastructure for repairs. Although this sidewalk is also part of the overall pedestrian circulation

design of the Park, it has been replaced in recent years and would be replaced again as part of this alternative. Therefore, impacts to this portion of the historic designed landscape of the Park would be negligible in the long-term, and would not be significant.

The root systems of trees adjacent to the wastewater infrastructure alignment near the sidewalk discussed in the previous paragraph would be negatively impacted by excavation of the infrastructure for repairs (see Photo #16 above). Root damage may cause dieback of branches and/or death of the trees. In order to maintain the historic designed landscape of the Park, dead trees that are removed would be replaced. It is important to note here that the fruits from the Sweet Gums nearest to the wastewater infrastructure pose a safety hazard to pedestrians because these round spiny fruits fall on the sidewalk. According to the 2008 *Cultural Landscape Report/Environmental Assessment* completed by the NPS (pg. 45), these Sweet Gums were part of the revised Parsons landscape plan for the Park but not part of the original Parsons Park landscape plan. Therefore, the duration of the negative impacts of potential for root damage and subsequent removal these Sweet Gums would not be significant in the long-term because they were not part of the original Park design plan. The extent of the root damage would be dependent on the construction zone needed to excavate the infrastructure for repairs.

Negligible impacts to turf grass in the Park Mall area would result from this alternative; this impact would diminish once the affected turf areas were re-seeded after construction.

As many as two historic granite benches and one historic street lamp original to the Park's historic designed landscape and development in the 1930's may be impacted by excavation of the wastewater infrastructure in the Mall area. However, these amenities would be restored to their original locations upon project completion; therefore, these impacts would be negligible and limited to the time period needed to make the necessary infrastructure repairs.

The impacts to the terraces, walkways, and flagpole at the Lincoln Memorial Bridge approach as a result of excavation of the wastewater infrastructure line that traverses under these historic resources would be negative but short-term. Should excavation of the underground wastewater infrastructure be required at this location, these historic resources original to the historic designed landscape would be removed and preserved during construction, and would be reinstalled to their original location after construction is complete. Aggregate walkways would be replaced in-kind in a similar manner as other past sidewalk repair and replacement projects in GERO. Unique engineering techniques may be required to successfully accomplish the removal and reinstallation of the historic features here. Therefore, impacts to these resources would not be significant in the long-term.

Continued coordination with the IDNR State Historic Preservation Officer and other historic preservation entities would be required throughout design and

implementation of the project. SR441/Vigo Street is a state highway; therefore, coordination with the Indiana Department of Transportation would be required to obtain necessary permits. Coordination with the Illinois Department of Transportation may also be required due to the potential impacts to traffic flow during construction (the Wabash River is the general Illinois/Indiana state line).

In addition, because the Old Cathedral “French and Indian” Cemetery is located within 100 feet of the wastewater infrastructure alignment, a Cemetery Development Plan would be required to delineate the boundaries of this cemetery in accordance with IC 14-21-1-26.5; this development plan would require approval from the Indiana Department of Natural Resources Division of Historic Preservation and Archeology.

Aesthetics & Visual Resources

Alternative A: No Action (“Do Nothing”) Alternative for Wastewater Infrastructure Rehabilitation/Repair

Impacts:

No impacts to the aesthetics and visual resources at GERO would occur as a result of the No Action alternative because the landscape surrounding the aging wastewater infrastructure alignment as viewed from the Park memorial building and other locations around the Park would remain unchanged. No additional cumulative impacts would occur to aesthetics and visual resources under the No Action alternative.

Conclusion:

No impacts to the aesthetics and visual resources would result from the No Action alternative.

Alternative B: Pipe Bursting Technique to Repair Wastewater Infrastructure

Impacts:

No impacts would occur to aesthetics and visual resources as a result of this alternative because all construction work would occur underground; this alternative involves rehabilitating the wastewater infrastructure line within Park boundaries using existing manholes for access. No other cumulative impacts are likely to occur as a result of this alternative.

Conclusions:

No impacts to aesthetics and visual resources would occur under this alternative.

Alternative C: Wastewater Infrastructure Rehabilitation (PREFERRED ALTERNATIVE)

Impacts:

No impacts to aesthetics and visual resources in GERO would occur under the preferred alternative because work would be completed below ground utilizing existing manholes for access. No additional cumulative impacts would occur to aesthetics and visual resources under the preferred alternative.

Conclusions:

No impacts to aesthetics and visual resources would occur under this preferred alternative.

Alternative D: Wastewater Infrastructure Rehabilitation via Excavation

Impacts:

The physical condition of the existing wastewater infrastructure is currently unknown. In the event that the preferred alternative to line the infrastructure with synthetic materials is not possible due to advanced physical deterioration of the existing infrastructure, or if the pipe bursting method in *Alternative B* is not a possible option due to advanced infrastructure deterioration, excavation of some or all areas surrounding the existing infrastructure would be required (refer to Appendix A-4 and Appendix F-7 for aerial maps of this wastewater infrastructure alignment location).

Impacts would occur to aesthetics and visual resources in the Park as a result of this alternative because roots of trees along the wastewater infrastructure alignment would be disturbed, which may result in tree branch dieback, tree death, and eventual removal. Trees near the construction zone of this alternative that would be affected include: Crabapple, Red Oak, Magnolia, Littleleaf Linden, Sugar Maple, and Sweet Gum. Removal of these trees would result in improved views of the Park memorial building from the visitor's center parking lot and from areas outside of the Park. Also, landscaping around the terraces on both sides of the Lincoln Memorial Bridge approach would be removed to access the wastewater infrastructure. It is important to note that less than 10 percent of the original landscape plantings in the Park in the 1930's remains on the site, according to the 2008 *Cultural Landscape Report/Environmental Assessment* completed by the NPS (pg. 44).

Also, sections of sidewalk along the visitor's parking lot and the southeast side of the Mall area as well as the aggregate concrete apron and Barnett Street sidewalk and steps would be removed to access the wastewater infrastructure line; although these pedestrian facilities would be replaced upon project completion, the new concrete would be a lighter color than the existing, undisturbed sidewalks in other areas of the Park.

Similar impacts would result from excavation of the wide aggregate sidewalk near the terraces on both sides of the Lincoln Memorial Bridge approach and the aggregate sidewalks along SR 441/Vigo Street. The terraces on both sides of the Bridge and the flagpole are constructed of granite, and removal of these features would be required to access the wastewater infrastructure. These terraces have visible evidence of deterioration- rust marks on the granite can be seen in several areas on the terraces and along SR 441/Vigo Street (refer to Photos #18 and #19 below). Also, four historic street lamps located along SR 441/Vigo Street would need to be removed. All of these features are original to the time period of the Park's development.

Turf grass, one historic street lamp, and as many as two granite benches in the Park Mall area would be removed as part of this alternative.



Photo 18: Existing conditions- facing west to Lincoln Memorial Bridge; note rust stains on granite approach wall. 7/31/2013.



Photo 19: Existing conditions- facing east to flagpole terrace, north side of Lincoln Memorial Bridge approach; note rust stains on terrace wall. 11/26/2013.

Conclusions:

Medium-term negative impacts to aesthetics and visual resources would occur under this alternative because trees damaged by construction that resulted in tree branch dieback and death would be removed. However, because many of these trees are not original to the Park's landscape installation in the 1930's and because these trees would be replaced with similar tree species upon project completion, these negative impacts would diminish with time and would not result in significant long-term impacts to aesthetics and visual resources.

Similarly, the landscaping in the mulched beds along the Lincoln Memorial Bridge terraces would require removal. These plants would be replaced after construction; therefore, these short-term negative impacts to the aesthetics of this landscaping as it relates to the historic landscape of the Park would not significant in the long-term.

The terraces, staircases, granite inscription panels, and flagpole on both sides of the Lincoln Memorial Bridge approach would be preserved and reinstalled as close as possible to their original design and condition. Existing rust stains on the granite stone could be removed while these components are stored, thus improving the aesthetics of the overall flagpole and terrace site. Therefore, impacts to aesthetics and visual resources in this location would be short-term (restricted to the time of construction) and not significant.



Photo 20: *Existing conditions*- facing north to granite inscriptions telling the story of George Rogers Clark and the British surrender of Fort Sackville, located on the south side of Lincoln Memorial Bridge approach. 11/26/2013.

Turf grass in the Mall area disturbed by this alternative would be reseeded and returned to its current condition after construction, and the historic street lamp and granite benches moved for construction would be reinstalled as close as possible to their original locations after construction completion. Therefore, the impacts historic features and turf grass in the Mall area would be negligible and short-term.

Hydrology & Water Resources

Alternative A: No Action (“Do Nothing”) Alternative for Wastewater Infrastructure Rehabilitation/Repair

Impacts:

Negative impacts to hydrology and water resources in GERO may occur as a result of the No Action alternative because the aging wastewater infrastructure line would not be rehabilitated and would continue to deteriorate, which would potentially result in contamination of groundwater resources due to leakage. The active water well located approximately 90 feet east of the wastewater infrastructure would be directly impacted (refer to Appendix F-2 for an aerial map of the water well location and proposed project area). No additional cumulative impacts would occur to hydrology and water resources under the No Action alternative.

Conclusion:

Negative impacts to the hydrology and water resources would result from the No Action alternative; the context, duration, and intensity would be dependent on the extent of the deterioration and the length of time before leaks were detected and repaired.

Alternative B: Pipe Bursting Technique to Repair Wastewater Infrastructure

Impacts:

No impacts to hydrology and water resources in GERO would occur under this alternative because the work involved would occur underground and the wastewater infrastructure would be rehabilitated, greatly reducing the possibility of wastewater leakage in the future that would contaminate soils and groundwater resources. No other cumulative impacts would occur as a result of this alternative.

Conclusions:

No impacts to hydrology and water resources would occur under this alternative; the wastewater infrastructure line would be rehabilitated, reducing the possibility of wastewater leakage into surrounding soils and groundwater resources.

Alternative C: Wastewater Infrastructure Rehabilitation (PREFERRED ALTERNATIVE)

Impacts:

No impacts to hydrology and water resources in GERO as a result of this preferred alternative would occur because all work would occur underground and would involve installation of synthetic sealant liners inside the infrastructure utilizing existing manholes for access. The wastewater infrastructure line would be rehabilitated, reducing the possibility of wastewater leakage into surrounding soils and groundwater resources in the future. No additional cumulative impacts from this preferred alternative would occur because all work would occur below ground.

Conclusions:

No impacts to hydrology and water resources would occur as a result of this preferred alternative.

Alternative D: Wastewater Infrastructure Rehabilitation via Excavation

Impacts:

The physical condition of the existing wastewater infrastructure is currently unknown. In the event that the preferred alternative to line the infrastructure with

synthetic materials is not possible due to advanced physical deterioration of the existing infrastructure, or if the pipe bursting method in *Alternative B* is not a possible option due to infrastructure deterioration, excavation of some or all areas surrounding the existing infrastructure would be required (refer to Appendix A-4 and Appendix F-7 for aerial maps of this wastewater infrastructure alignment location). No impacts to hydrology and water resources are anticipated as a result of this alternative. The aging wastewater infrastructure would be exposed via excavation for repairs, and the area would be returned as close as possible to its current condition after construction is complete. Erosion control measures would be in place to minimize soil erosion and runoff during precipitation events.

Conclusions:

No impacts to hydrology and water resources would result from this alternative.

Floodplains & Flood Protection Systems

Alternative A: No Action (“Do Nothing”) Alternative for Wastewater Infrastructure Rehabilitation/Repair

Impacts:

The No Action alternative would not result in impacts to the natural floodplain of the Wabash or the FEMA designated floodplain zone because there would be no changes to the areas within or surrounding the wastewater infrastructure alignment. The No Action alternative would not result in any additional cumulative impacts because the wastewater infrastructure would remain unchanged.

Conclusion:

No impacts to natural floodplains or FEMA designated floodplain zones would result from this No Action alternative because the wastewater infrastructure would remain unchanged.

Alternative B: Pipe Bursting Technique to Repair Wastewater Infrastructure

Impacts:

No impacts to natural floodplains or FEMA designated floodplain zones would occur under this alternative because the work involved would occur underground. No other cumulative impacts would occur as a result of this alternative.

Conclusions:

No impacts to natural floodplains or FEMA designated floodplain zones would occur under this alternative.

Alternative C: Wastewater Infrastructure Rehabilitation (PREFERRED ALTERNATIVE)

Impacts:

No impacts to natural floodplains or FEMA designated floodplain zones as a result of this preferred alternative would occur because all work would occur underground and would involve installation of synthetic sealant liners inside the infrastructure utilizing existing manholes for access. No additional cumulative impacts from this preferred alternative would occur because all work would occur below ground.

Conclusions:

No impacts to natural floodplains or FEMA designated floodplain zones would occur as a result of this preferred alternative.

Alternative D: Wastewater Infrastructure Rehabilitation via Excavation

Impacts:

The physical condition of the existing wastewater infrastructure is currently unknown. In the event that the preferred alternative to line the infrastructure with synthetic materials is not possible due to advanced physical deterioration of the existing infrastructure, or if the pipe bursting method in *Alternative B* is not a possible option due to infrastructure deterioration, excavation of some or all areas surrounding the existing infrastructure would be required (refer to Appendix A-4 and Appendix F-7 for aerial maps of this wastewater infrastructure alignment location). No impacts to natural floodplains or FEMA designated floodplain zones as a result of this alternative. The aging wastewater infrastructure would be exposed via excavation for repairs, and the area would be returned as close as possible to its current condition after construction is complete.

Conclusions:

No impacts to natural floodplains or FEMA designated floodplain zones would result from this alternative.

Soils

Alternative A: No Action (“Do Nothing”) Alternative for Wastewater Infrastructure Rehabilitation/Repair

Impacts:

No immediate impacts to soils in GERO would occur as a result of the No Action alternative because no disturbance, removal, or addition of soils to the project site

would occur. However, additional cumulative impacts may occur to soils under the No Action alternative; the aging wastewater infrastructure may develop more leaks over time, leading to sinkholes and contamination of soils.

Conclusion:

Negative impacts to the soils may result from the No Action alternative because soils surrounding the wastewater infrastructure in the Park may become contaminated due to leaks in the aging wastewater infrastructure in the future, and sinkholes may form where leaks occur. The intensity of these impacts would be dependent on the degree of failure of the infrastructure, the length of time until the failure is discovered, and the length of time required to make necessary repairs to the infrastructure.

Alternative B: Pipe Bursting Technique to Repair Wastewater Infrastructure

Impacts:

This alternative would result in impacts to soils in the Park because it involves bursting the existing wastewater infrastructure pipe and forcing the pipe fragments into the surrounding soil. These fragments would contain sewage, therefore contaminating the surrounding soils. No other cumulative impacts to soils would occur.

Conclusions:

This alternative would result in negative impacts to soils because it involves forcing fragments of contaminated wastewater infrastructure pipes into surrounding soils. However, these impacts are anticipated to be negligible and not significant in the long term.

Alternative C: Wastewater Infrastructure Rehabilitation (PREFERRED ALTERNATIVE)

Impacts:

No impacts to soils in GERO would occur as a result of this alternative because all work would occur below grade using existing manhole covers for access. No additional cumulative impacts would occur to soils under the preferred alternative; the aging wastewater infrastructure would be rehabilitated, which would prevent future leaks and subsequent soil contamination and potential for more sinkholes.

Conclusions:

No impacts to soils would occur as a result of this preferred alternative because work involves the installation of synthetic liners inside the wastewater infrastructure line; all work would occur below the existing grade utilizing existing manholes. Negative

impacts to soils may occur in the form of soil compaction from lining equipment; however, these impacts would be negligible and not significant in the short or long term.

Alternative D: Wastewater Infrastructure Rehabilitation via Excavation

Impacts:

The physical condition of the existing wastewater infrastructure is currently unknown. In the event that the preferred alternative to line the infrastructure with synthetic materials is not possible due to advanced physical deterioration of the existing infrastructure, or if the pipe bursting method in *Alternative B* is not a possible option due to infrastructure deterioration, excavation of some or all areas surrounding the existing infrastructure would be required (refer to Appendix A-4 and Appendix F-7 for aerial maps of this wastewater infrastructure alignment location).

Negative impacts to soils in the Park would occur as a result of this alternative because soils surrounding the wastewater infrastructure would become compacted from use of construction equipment. Also, upon construction completion, soils from outside the Park may be used as fill as needed to return the areas as close as possible to existing conditions. No other cumulative impacts are anticipated to occur as a result of this alternative.

Conclusions:

Negative impacts would occur as a result of this alternative. However, because the soils in the construction zone would be returned as close as possible to current conditions after work is completed, these impacts would be negligible and not significant in the long term. Refer to the “Former MGP Site” discussion in this section for more information about soil disturbance activities near the former MGP site, which is located in the vicinity of the southern portion of the wastewater infrastructure alignment.

Terrestrial Habitat & Wildlife

Alternative A: No Action (“Do Nothing”) Alternative for Wastewater Infrastructure Rehabilitation/Repair

Impacts:

No impacts to terrestrial habitat and wildlife in GERO would occur as a result of the No Action alternative because there would be no disturbance of microhabitats (small-scale, specialized habitats) that exist in the Park. No additional cumulative impacts would occur to terrestrial habitat and wildlife under this No Action alternative.

Conclusion:

No impacts to the terrestrial habitat and wildlife would result from the No Action alternative because microhabitats in GERO would remain undisturbed.

Alternative B: Pipe Bursting Technique to Repair Wastewater Infrastructure

Impacts:

No impacts to terrestrial habitat and wildlife would occur under this alternative because the work involved would be underground, using existing manholes for access. No other cumulative impacts would occur as a result of this alternative.

Conclusions:

No impacts to terrestrial habitat and wildlife would occur under this alternative. Negligible impacts to microhabitats may occur during construction from pipe bursting equipment use around the existing manholes; however, these impacts would be short-term and insignificant.

Alternative C: Wastewater Infrastructure Rehabilitation (PREFERRED ALTERNATIVE)

Impacts:

No impacts to terrestrial wildlife or habitat in the Park would occur under this preferred alternative because this alternative involves installing synthetic liners to existing wastewater infrastructure utilizing existing manholes for access; no above ground disturbance would occur. No other cumulative impacts would occur as a result of this preferred alternative.

Conclusions:

No impacts to terrestrial wildlife or habitat in GERO would occur under this preferred alternative because this alternative involves installing synthetic liners to existing wastewater infrastructure utilizing existing manholes for access. Negligible impacts to microhabitats may occur during construction from lining equipment use around the existing manholes; however, these impacts would be short-term and insignificant.

Alternative D: Wastewater Infrastructure Rehabilitation via Excavation

Impacts:

The physical condition of the existing wastewater infrastructure is currently unknown. In the event that the preferred alternative to line the infrastructure with synthetic materials is not possible due to advanced physical deterioration of the existing infrastructure, or if the pipe bursting method in *Alternative B* is not a possible option due to infrastructure deterioration, excavation of some or all areas surrounding the existing infrastructure would be required (refer to Appendix A-4 and Appendix F-7 for aerial maps of this wastewater infrastructure alignment location).

Negative impacts to terrestrial wildlife and habitat in GERO would occur as a result of excavation of the wastewater infrastructure. Microhabitats in turf grass and soil would be removed to access the infrastructure, and grass surrounding the wastewater infrastructure would be damaged by excavating equipment. Also, the roots of trees near the infrastructure alignment would become damaged; this damage may cause dieback of branches and/or death of the trees. A reduction of trees in the Park would result in fewer habitats for small mammals, insects, and birds.

Conclusions:

Negative impacts to microhabitats in turf grass and soil in and around the wastewater infrastructure would be short-term; after rehabilitation of the infrastructure is complete, the area would be returned as close as possible to existing conditions. Therefore, these impacts to microhabitats in turf grass and soil would not be significant in the long term.

Tree death and subsequent removal would result in medium-term negative impacts to habitat for small mammals, insects, and birds; however, trees removed would be replaced. Therefore, these negative impacts would diminish over time and would not be significant in the long term.

Socioeconomic Environment & Environmental Justice

Alternative A: No Action (“Do Nothing”) Alternative for Wastewater Infrastructure Rehabilitation/Repair

Impacts:

The No Action alternative may result in impacts to the socioeconomic environment and environmental justice in and near GERO because future disruptions due to failure of the wastewater infrastructure line within the Park would negatively affect all businesses and residences served by the infrastructure, regardless of income, minority and low-income status, ethnography, or migration patterns. No additional cumulative impacts under the No Action alternative are anticipated.

Conclusions:

Under the No Action alternative, negative impacts to businesses and residents served by the aging wastewater infrastructure may result because the infrastructure in the Park would not be rehabilitated, which may result in future disruptions in wastewater service due to emergency repairs. The context, intensity, and duration of these impacts would be dependent on the location and extent of infrastructure failure and the time involved in making necessary repairs.

Alternative B: Pipe Bursting Technique to Repair Wastewater Infrastructure

Impacts:

Long-term cumulative impacts to the socioeconomic environment and environmental justice would occur as a result of this alternative because wastewater treatment services provided to all businesses and residents, regardless of income, minority status, and ethnography, would be improved. No other cumulative impacts would occur as a result of this alternative.

Conclusions:

This alternative to rehabilitate the wastewater infrastructure in the Park using the pipe bursting technique would result in long-term positive impacts to the Park and all residents in the areas surrounding the Park regardless of income, minority status, or ethnography because wastewater service would be improved. These positive impacts would be significant and would be felt immediately after construction is complete.

Alternative C: Wastewater Infrastructure Rehabilitation (PREFERRED ALTERNATIVE)

Impacts:

Long-term cumulative impacts to the socioeconomic environment and environmental justice in and near GERO would occur as a result of this alternative because wastewater treatment services provided to all businesses and residents, regardless of income, minority status, and ethnography, would be improved. No other cumulative impacts would occur as a result of this alternative.

Conclusions:

This preferred alternative to rehabilitate the wastewater infrastructure in the Park by installing synthetic liners in the existing infrastructure would result in long-term positive impacts to the Park and all residents in the areas surrounding the Park regardless of income, minority status, or ethnography because wastewater service would be improved. These positive impacts would be significant and would be felt immediately after construction is complete.

Alternative D: Wastewater Infrastructure Rehabilitation via Excavation

Impacts:

The physical condition of the existing wastewater infrastructure is currently unknown. In the event that the preferred alternative to line the infrastructure with synthetic materials is not possible due to advanced physical deterioration of the existing infrastructure, or if the pipe bursting method in *Alternative B* is not a possible option due to infrastructure deterioration, excavation of some or all areas surrounding the existing infrastructure would be required (refer to Appendix A-4 and Appendix F-7 for aerial maps of this wastewater infrastructure alignment location).

Long-term, positive cumulative impacts to the socioeconomic environment and environmental justice would occur as a result of this alternative because wastewater treatment services provided to all businesses and residents, regardless of income, minority status, and ethnography, would be improved. No other cumulative impacts would occur as a result of this alternative.

Conclusions:

Long-term positive impacts would occur as a result of this alternative to excavate the wastewater infrastructure in the Park because wastewater treatment services provided to all businesses and residents, regardless of income, minority status, and ethnography, would be improved. No other cumulative impacts would occur as a result of this alternative.

Visitor Use & Experience

Alternative A: No Action (“Do Nothing”) Alternative for Wastewater Infrastructure Rehabilitation/Repair

Impacts:

No immediate impacts to visitor use and experience in GERO would occur as a result of the No Action alternative because there would be no physical changes to the landscape of the Park; visitors would be able to continue to use the Park grounds in the same manner that it is used today. Cumulative negative impacts may occur to visitor use and experience under the No Action alternative because the wastewater infrastructure may develop leaks and sinkholes in the future, which may lead to infrastructure failure; emergency repairs would be required, which may limit visitor’s use of some areas of the Park.

Conclusion:

Negative impacts to the visitor use and experience may result from the No Action alternative because failure of the wastewater infrastructure would require emergency

repairs and may limit visitor's use of some areas of the Park. The context, duration, and intensity of these impacts to visitor use and experience would be dependent on the location and extent of infrastructure failure and the time involved in making necessary repairs.

Alternative B: Pipe Bursting Technique to Repair Wastewater Infrastructure

Impacts:

Negative impacts would occur to visitor use and experience as a result of this alternative because visitors would be temporary inconvenienced by the presence of large machinery and noise in the Park during construction. Also, visitor access to areas within the construction zone of this alternative would be limited during construction. No other cumulative impacts are likely to occur as a result of this alternative.

Conclusions:

No permanent negative impacts to visitor use and experience would occur under this alternative. Negligible negative impacts would occur during the time of construction only due to limited visitor access to areas within the construction zone and the presence of machinery and noise used for this alternative. However, these impacts would be experienced only during the time of construction and would not be significant in the short or long term.

Alternative C: Wastewater Infrastructure Rehabilitation (PREFERRED ALTERNATIVE)

Impacts:

Negative impacts would occur to visitor use and experience in GERO as a result of this preferred alternative because visitors would be temporary inconvenienced by the presence of large machinery and noise in the Park during construction. Also, visitor access to areas within the construction zone of this alternative would be limited during construction. No other cumulative impacts are likely to occur as a result of this alternative.

Conclusions:

No permanent negative impacts to visitor use and experience would occur under this preferred alternative. Negligible negative impacts would occur during the time of construction only due to limited visitor access to areas within the construction zone and the presence of machinery and noise used for this preferred alternative. However, these impacts would be experienced only during the time of construction and would not be significant in the short or long term.

Alternative D: Wastewater Infrastructure Rehabilitation via Excavation

Impacts:

The physical condition of the existing wastewater infrastructure is currently unknown. In the event that the preferred alternative to line the infrastructure with synthetic materials is not possible due to advanced physical deterioration of the existing infrastructure, or if the pipe bursting method in *Alternative B* is not possible, excavation of some or all areas surrounding the existing infrastructure would be required (refer to Appendix A-4 and Appendix F-7 for aerial maps of this wastewater infrastructure alignment location).

Negative impacts would occur to visitor use and experience as a result of this alternative because visitors would be temporarily inconvenienced by the presence of large machinery and noise in the Park during construction. Also, visitor access to areas within the construction zone of this alternative would be limited during construction. No other cumulative impacts are likely to occur as a result of this alternative.

Conclusions:

No permanent negative impacts to visitor use and experience would occur under this alternative. Negligible negative impacts would occur during the time of construction only due to limited visitor access to areas within the construction zone and the presence of machinery and noise used for this alternative. However, these impacts would be experienced only during the time of construction and would not be significant in the short or long term.

Park Operations

Alternative A: No Action (“Do Nothing”) Alternative for Wastewater Infrastructure Rehabilitation/Repair

Impacts:

No immediate impacts to park operations in GERO would occur as a result of the No Action alternative because there would be no disruptions to park hours of operations; visitors would be able to continue to use the Park grounds and memorial building in the same manner that it is used today, and park employees would continue to maintain the Park. Cumulative negative impacts may occur to park operations under the No Action alternative because the wastewater infrastructure may develop leaks and sinkholes in the future, which may lead to infrastructure failure; emergency repairs would be required, which may limit park maintenance activities of areas of the Park near the wastewater infrastructure alignment. Also, in the event of a failure, wastewater service may be unexpectedly interrupted, which would result in temporary closure of the Visitor’s Center and Park memorial building. No other cumulative impacts are anticipated to occur under the No Action alternative.

Conclusion:

Negative impacts to park operations may result from the No Action alternative because failure of the wastewater infrastructure would require emergency repairs and may limit park maintenance activities in some areas of the Park and may result in interruption of Park facility operations. The context, duration, and intensity of these impacts to park operations would be dependent on the location and extent of infrastructure failure and the time involved in making necessary repairs.

Alternative B: Pipe Bursting Technique to Repair Wastewater Infrastructure

Impacts:

No permanent impacts would occur to Park operations as a result of this alternative because all construction work would occur underground; this alternative involves rehabilitating the wastewater infrastructure line within the Park boundaries using existing manholes for access. The Park Visitor's Center and memorial building would experience temporary disruption of the wastewater service, resulting in temporary closure of these facilities. Access to areas of the Park near the wastewater infrastructure line by Park employees for maintenance activities would be temporarily limited during construction. No other cumulative impacts are likely to occur as a result of this alternative.

Conclusions:

Negligible, short-term impacts to park operations would occur under this alternative because access for park maintenance activities in the construction zone associated with this alternative would be limited. However, the duration of these impacts would be limited to the time period of construction only and would not be significant in the short or long term. Also, the Visitor's Center and memorial building would need to close temporarily during construction due to wastewater service interruption. However, Park managers would be able to give advance notice of the closures to scheduled visitor groups; therefore, these impacts would be short-term and not significant.

Alternative C: Wastewater Infrastructure Rehabilitation (PREFERRED ALTERNATIVE)

Impacts:

No permanent impacts would occur to Park operations as a result of this preferred alternative because all construction work would occur underground; this alternative involves rehabilitating the wastewater infrastructure line within the Park boundaries using existing manholes for access. The Park Visitor's Center and memorial building would experience temporary disruption of the wastewater service, resulting in temporary closure of these facilities. Access to areas of GERO near the wastewater infrastructure line by Park employees for maintenance activities would be

temporarily limited during construction. No other cumulative impacts are likely to occur as a result of this alternative.

Conclusions:

Negligible, short-term impacts to park operations would occur under this preferred alternative because access for park maintenance activities in the construction zone associated with this alternative would be limited. However, the duration of these impacts would be limited to the time period of construction only and would not be significant in the short or long term. Also, the Visitor's Center and memorial building would need to close temporarily during construction due to wastewater service interruption. However, Park managers would be able to give advance notice of the closures to scheduled visitor groups; therefore, these impacts would be short-term and not significant.

Alternative D: Wastewater Infrastructure Rehabilitation via Excavation

Impacts:

The physical condition of the existing wastewater infrastructure is currently unknown. In the event that the preferred alternative to line the infrastructure with synthetic materials is not possible due to advanced physical deterioration of the existing infrastructure, or if the pipe bursting method in *Alternative B* is not a possible option due to infrastructure deterioration, excavation of some or all areas surrounding the existing infrastructure would be required (refer to Appendix A-4 and Appendix F-7 for aerial maps of this wastewater infrastructure alignment location).

No permanent impacts would occur to Park operations as a result of this alternative because all construction work would occur underground; this alternative involves rehabilitating the wastewater infrastructure line within the Park boundaries using existing manholes for access. The Park Visitor's Center and memorial building would experience temporary disruption of the wastewater service, resulting in temporary closure of these facilities. Access to areas of the Park near the wastewater infrastructure line by Park employees for maintenance activities would be temporarily limited during construction. No other cumulative impacts are likely to occur as a result of this alternative.

Conclusions:

Negligible, short-term impacts to park operations at GERO would occur under this alternative because access for park maintenance activities in the construction zone associated with this alternative would be limited. However, the duration of these impacts would be limited to the time period of construction only and would not be significant in the short or long term. Also, the Visitor's Center and memorial building would need to close temporarily during construction due to wastewater service interruption. However, Park managers would be able to give advance notice

of the closures to scheduled visitor groups; therefore, these impacts would be short-term and not significant.

Public & Private Utilities

Alternative A: No Action (“Do Nothing”) Alternative for Wastewater Infrastructure Rehabilitation/Repair

Impacts:

No immediate impacts to public and private utilities within the Park would occur as a result of the No Action alternative because there would be no disruptions to utility function and operation; utilities would continue to operate in the same manner as they do currently. Cumulative impacts would occur as a result of this No Action alternative; the aging wastewater infrastructure line in and near the Park would continue to deteriorate, which would lead to infrastructure failure and possible interruptions in service in the future. Also, infrastructure failure may lead to wastewater contaminating storm water drainage systems and potable water supply lines located near the wastewater infrastructure (refer to Section 4.1, Impacts of Past Actions on Resources in and near GERO, at the beginning of this Chapter for descriptions of public and private utility locations and Appendix F-7 for a map of utilities in and near GERO). No other cumulative impacts would occur.

Conclusion:

Negative cumulative impacts to public and private utilities would result from the No Action alternative; the aging wastewater infrastructure line would continue to deteriorate, posing negative impacts to wastewater services in the future and potential contamination of potable water supply lines and storm water drainage systems. The context, duration, and intensity of these impacts would be dependent on the location and extent of infrastructure failure and the time involved in making necessary repairs. No other impacts to public and private utilities are anticipated under the No Action Alternative.

Alternative B: Pipe Bursting Technique to Repair Wastewater Infrastructure

Impacts:

Immediate positive impacts to public and private utilities in the Park would result from this alternative because the wastewater infrastructure would be improved, providing more reliable service to City residents and businesses. Negative impacts to utility systems near the wastewater infrastructure may occur as a result of vibrations from the pipe bursting equipment; nearby utility systems include storm water drainage, potable water supply lines, and telephone lines. Vibrations may negatively affect the quality of sound being transmitted through the telephone lines, and vibrations may cause damage to storm water drainage pipes and water supply lines,

which may lead to future leaks and subsequent emergency repairs. No other cumulative impacts would occur under this alternative.

Conclusions:

Long-term and immediate positive impacts to public and private utilities within and near GERO would result from this alternative because the wastewater infrastructure would be rehabilitated, resulting in improved wastewater service. Park managers and the City would be able to give advance notice to Park visitors, residents, and businesses of temporary disruptions to wastewater service during construction. These positive impacts would be significant because potential impacts to other nearby utility systems in the form of contamination and unexpected disruptions to wastewater service would be eliminated.

Negative impacts to telephone communications due to vibrations as a result of this alternative would be limited to the time of construction and therefore would not be significant in the long term. Damage to storm water drainage and potable water supply systems may occur, potentially resulting in leaks, service disruption, and the need for emergency repairs. However, these impacts are speculative; the context, duration, and intensity of these impacts to storm water drainage and water supply would be dependent on the location and extent of failures and the time involved in making necessary repairs.

Alternative C: Wastewater Infrastructure Rehabilitation (PREFERRED ALTERNATIVE)

Impacts:

Immediate positive impacts to public and private utilities in the Park would result from this alternative because the wastewater infrastructure would be improved, providing more reliable service to City residents and businesses. No impacts to other public and private utilities would occur because work involved in this alternative would be below ground using existing manholes for access. No other cumulative impacts would occur under this alternative.



Photo 21: Existing conditions- facing north along wastewater infrastructure alignment to the Park memorial building. 11/26/2013

Conclusions:

Long-term and immediate positive impacts to public and private utilities would result from this alternative because the wastewater infrastructure would be rehabilitated, resulting in improved wastewater service. Park managers and the City would be able to give advance notice to Park visitors, residents, and businesses of temporary disruptions to wastewater service during construction. These positive impacts would be significant because potential impacts to other nearby utility systems in the form of contamination and unexpected disruptions to wastewater service would be eliminated.

Alternative D: Wastewater Infrastructure Rehabilitation via Excavation

Impacts:

The physical condition of the existing wastewater infrastructure is currently unknown. In the event that the preferred alternative to line the infrastructure with synthetic materials is not possible due to advanced physical deterioration of the existing infrastructure, or if the pipe bursting method in *Alternative B* is not a possible option due to infrastructure deterioration, excavation of some or all areas surrounding the existing infrastructure would be required (refer to Appendix A-4 and Appendix F-7 for aerial maps of this wastewater infrastructure alignment location).

Negative impacts to public and private utilities in the Park may occur as a result of this alternative because heavy excavating equipment would be required to remove soil and turf grass along the existing wastewater infrastructure alignment. The

weight of this equipment may damage other utility systems within the construction zone of this alternative. Damage to other utility systems would require emergency repairs. No other impacts to public and private utilities in the Park are anticipated to occur.

Conclusions:

Negative impacts to public and private utilities in the Park may occur as a result of this alternative. However, the locations of all utilities would be identified using a utility location service (such as Indiana 811) in accordance with IC 8-1-26 prior to construction, and care would be taken to avoid unintentional damage to utility systems near the construction zone. Therefore, these impacts are not anticipated to be significant in the short or long term.

Former MGP Site

Alternative A: No Action (“Do Nothing”) Alternative for Wastewater Infrastructure Rehabilitation/Repair

Impacts:

No impacts to the former MGP site within the Park would occur as a result of the No Action alternative because there would be no disturbance of soils surrounding the wastewater infrastructure line, which traverses near the former MGP operations area. However, the aging wastewater infrastructure would continue to deteriorate, which may result in leaks in the infrastructure in the future that must be quickly repaired. Any soil intrusive work for emergency repair would need to be conducted in accordance with the NPS *Public Information Sheet for Soil Disturbing Activities* (“Guidelines for Health and Safety During Soil Disturbing Construction/Maintenance Activities” section; refer to Appendix E-6 to E-7). No other cumulative impacts would occur to the former MGP site under the No Action alternative because there would be no disturbance of soils near or within the site.

Conclusion:

No impacts to the former MGP site would result from the No Action alternative. If leaks in the aging wastewater infrastructure should occur near the former MGP site, soil intrusive work for emergency repair would need to be conducted in accordance with the NPS *Public Information Sheet for Soil Disturbing Activities* (“Guidelines for Health and Safety During Soil Disturbing Construction/Maintenance Activities” section; refer to Appendix E-6 to E-7). By following the guidelines set forth by the NPS, impacts to potentially contaminated soils near the project sites and impacts as a result of exposure to contaminated soils, if any are found, would be greatly reduced.

Alternative B: Pipe Bursting Technique to Repair Wastewater Infrastructure

Impacts:

This alternative would not result in impacts to the former MGP site because it involves bursting the existing subsurface wastewater infrastructure pipe and forcing the pipe fragments into the surrounding soil. Wastewater forced through the soils during the process could mobilize contaminants present in soil near the former MGP site. No other cumulative impacts would occur under this alternative.

Conclusions:

Impacts to the former MGP site may result from this alternative. The context, duration, and intensity of these impacts would be dependent on the amount of wastewater that is mobilized using the pipe bursting method.

Alternative C: Wastewater Infrastructure Rehabilitation (PREFERRED ALTERNATIVE)

Impacts:

No impacts to the former MGP site would occur as a result of this alternative because there would be no disturbance to soils to rehabilitate the wastewater infrastructure; all work would occur underground, inside the wastewater infrastructure, using existing manholes for access. No other cumulative impacts would occur as a result of this alternative.

Conclusions:

No impacts to the former MGP site would occur as a result of this alternative because there would be no disturbance to soils to rehabilitate the wastewater infrastructure.

Alternative D: Wastewater Infrastructure Rehabilitation via Excavation

Impacts:

The physical condition of the existing wastewater infrastructure is currently unknown. In the event that the preferred alternative to line the infrastructure with synthetic materials is not possible due to advanced physical deterioration of the existing infrastructure, or if the pipe bursting method in *Alternative B* is not a possible option, excavation of some or all areas surrounding the existing infrastructure would be required (refer to Appendix A-4 and Appendix F-7 for aerial maps of this wastewater infrastructure alignment location).

This alternative would not result in impacts to the former MGP site, which is located in the present location of the visitor center parking lot. However, past studies have

indicated that soil contamination from this site may be present in the vicinity of the wastewater infrastructure alignment at the south end of the Park (refer to Appendix E-3 to E-7 for more information regarding the former MGP site). Construction in the project area may expose surface and subsurface soils affected by the former MGP site, if present. Soil intrusive work would need to be conducted in accordance with the NPS *Public Information Sheet for Soil Disturbing Activities* (“Guidelines for Health and Safety During Soil Disturbing Construction/Maintenance Activities” section; refer to Appendix E-6 to E-7). Any contaminated soils removed from the site would require handling and disposal in compliance with CERCLA requirements and, and, if required by law or regulation, those of other appropriate federal and/or State officials or entities (e.g., Indiana Administrative Code Title 329, Article 3.1 and 40 CFR Parts 260-270 and 273 for waste disposal; IDEM, 2013). No other cumulative impacts are likely to occur.

Conclusions:

Negative impacts to the former MGP site located in the Park may occur as a result as of this alternative if contaminated soils are present within the construction area and they are disturbed and exposed during construction. Appropriate soil erosion control measures would minimize storm water runoff from the construction site. Soil intrusive work would need to be conducted in accordance with the NPS *Public Information Sheet for Soil Disturbing Activities* (“Guidelines for Health and Safety During Soil Disturbing Construction/Maintenance Activities” section; refer to Appendix E-6 to E-7). By following the guidelines set forth by the NPS, impacts to potentially contaminated soils near the project sites and impacts as a result of exposure to contaminated soils, if any are found, would be greatly reduced.

Sec. 4.4, Rehabilitation of the B&O railroad corridor

This section includes discussion of potential impacts and the duration and intensity of these impacts to resources as a result of the alternatives involved in rehabilitation of the out-of-use railroad corridor spur that traverses through GERO, generally parallel to the Wabash River.

Cultural and Historic Resources

Alternative A: No Action (“Do Nothing”) Alternative for Rehabilitation of B&O Railroad Corridor

Impacts:

Negative impacts to cultural and historical resources in GERO would occur as a result of the No Action alternative because the landscape would remain unchanged and the historic landscape would not realize the original intent of the Park design. Furthermore, the full design of the Park as recommended in the 2008 *Cultural Landscape Plan and Environmental Assessment* by the NPS would remain

unfulfilled. It is important to note that the railroad corridor was constructed prior to the development of the Park; therefore, negative impacts to the intended cultural and historical landscape in the past as a result of the presence of the railroad corridor in the Park would persist under the No Action alternative. No additional cumulative impacts would occur under this alternative for rehabilitation of the B&O railroad corridor.



Photo 22: Existing conditions- facing south from Lincoln Memorial Bridge to B&O railroad corridor and Park memorial building. 11/26/2013

Conclusion:

Permanent negative impacts to the historic designed landscape would result from the No Action alternative because the landscape would not be rehabilitated to the original intent of Park designers. These impacts would be long term; however, impacts would not be significant because the railroad corridor existed prior to the Park's development.

Alternative B: Rehabilitate Railroad Corridor to Match Existing Cultural Landscape of GERO (PREFERRED ALTERNATIVE)

Impacts:

Positive impacts to cultural resources in the Park would occur as a result of the rehabilitation of the B&O railroad corridor because this preferred alternative would return the corridor alignment to the standards of the existing cultural landscape and as close as practical to the original intent of the Park landscape designer William E. Parsons. Furthermore, the design of the Park as recommended in the 2008 *Cultural*

Landscape Plan and Environmental Assessment by the NPS would be fulfilled. Historic street lamps located near the corridor would need to be removed during construction. No additional cumulative impacts would occur under the preferred alternative for the rehabilitation of the B&O railroad corridor.



Photo 23: Existing conditions- facing north from railroad corridor to the Park memorial building; note grade change from surrounding turf to gravel railroad ballast. 11/26/2013

Conclusions:

Upon completion of this preferred alternative, significant and immediate positive impacts to cultural and historical resources in the Park would occur because the railroad corridor would be rehabilitated as close as practical to the surrounding landscape and the intent of Park designers. This alternative would provide visitors with continuous improved access to historic resources significant to the Park such as views of the Wabash River and the Francis Vigo statue. Historic street lamps located near the railroad corridor would be removed during construction of this alternative but would be returned as close as practical to their original locations; therefore, impacts to these lamps would be short-term and not significant. No other impacts to cultural and historical resources would occur as a result of this preferred alternative. Refer to Photos #22 and #23 above of existing conditions and Figure #2 below for a conceptual drawing of this preferred alternative.



Figure #2: **Conceptual drawing** of GERO Mall with railroad corridor filled in and seeded to match the existing historic designed landscape (facing south from Lincoln Memorial Bridge).

Aesthetics & Visual Resources

Alternative A: No Action (“Do Nothing”) Alternative for Rehabilitation of B&O Railroad Corridor

Impacts:

No impacts to the aesthetics and visual resources at the Park would occur as a result of the No Action alternative because the landscape surrounding the B&O railroad corridor as viewed from the Park memorial building and other locations around the Park would remain unchanged. Although the railroad corridor was constructed prior to the design and development of the Park, by not rehabilitating it to match the existing landscape, the corridor would continue to be a visual interruption to the overall cultural and historical landscape. No additional cumulative impacts would occur to aesthetics and visual resources under the No Action alternative.

Conclusion:

No impacts to the aesthetics and visual resources would result from the No Action alternative, although the area encompassing the railroad corridor would not be rehabilitated to match the existing historic designed landscape.

***Rehabilitate Railroad Corridor to Match Existing Cultural Landscape of GERO
(PREFERRED ALTERNATIVE)***

Impacts:

Continuous, cumulative impacts to aesthetics and visual resources would occur because the railroad corridor would be filled with soil and reseeded, thus rehabilitating the corridor to as close as practical to the surrounding historic designed landscape of the Park, in concert with the original intent and design of the Park; because the railroad corridor extends the entire length of the Park, the aesthetics of the entire Park would be improved. No additional cumulative impacts would occur to aesthetics and visual resources under the preferred alternative.

Conclusions:

Positive and permanent impacts to aesthetics and visual resources would occur under this preferred alternative; the railroad corridor would be filled in to match the existing grade and as close as practical to the original intent of Park designers, improving the overall aesthetics of the entire Park. No additional impacts to aesthetics and visual resources would occur under the preferred alternative.

Hydrology & Water Resources

Alternative A: No Action (“Do Nothing”) Alternative for Rehabilitation of B&O Railroad Corridor

Impacts:

No impacts to hydrology and water resources in GERO would occur as a result of the No Action alternative because these resources would remain unchanged. No additional cumulative impacts would occur to hydrology and water resources under the No Action alternative.

Conclusion:

No impacts to the hydrology and water resources would result from the No Action alternative.

Alternative B: Rehabilitate Railroad Corridor to Match Existing Cultural Landscape of GERO (PREFERRED ALTERNATIVE)

Impacts:

This preferred alternative would impact hydrology and water resources in and near GERO because this alternative involves filling in the railroad corridor to match the existing grade level, which would alter the flow of storm water runoff from Park

property during heavy precipitation events. Currently the top of the existing gravel railroad ballast is approximately four to five feet below surrounding grade. Cumulative impacts may occur as a result of this alternative because the direction of storm water runoff may be affected by the type of fill soil installed in the railroad corridor. Also, due to the installation of unknown fill materials before and after development of the Park in areas surrounding the railroad corridor, impacts of storm water flow from these areas to and through the railroad corridor may occur.

This alternative may negatively impact the hydraulic pressure on the retaining wall that was recently replaced along the Wabash River in the Park because the railroad corridor is in close proximity to the wall; by filling in the railroad corridor, the flow of storm water during precipitation events would be altered.

Conclusions:

Impacts may occur to hydrology and water resources because this preferred alternative would alter the flow of storm water during rain events, which may result in impacts to the retaining wall along the Wabash River in the Park. However, preliminary engineering assessments indicate that these impacts are anticipated to be minor and not significant. The intensity and duration of these impacts would be determined by the amount of precipitation in each event. A hydraulic analysis would be necessary to determine the context, intensity, and duration of impacts and to aid in the design of a drainage system that accounts for changes to storm water runoff flow as a result of this alternative. No other impacts to hydrology and water resources are anticipated to occur as a result of this preferred alternative.

Floodplains & Flood Protection Systems

Alternative A: No Action (“Do Nothing”) Alternative for Rehabilitation of B&O Railroad Corridor

Impacts:

The No Action alternative would not result in any impacts to natural floodplains of the Wabash River or FEMA designated floodplain zones in and near GERO because the B&O railroad corridor as it exists today has no impacts to floodplains. No additional cumulative impacts are likely to occur as a result of this alternative because the B&O railroad corridor would remain unchanged.

Conclusion:

No impacts to natural floodplains of the Wabash River or FEMA designated floodplain zones would result from this No Action alternative because the conditions of the B&O railroad corridor would remain unchanged.

Alternative B: Rehabilitate Railroad Corridor to Match Existing Cultural Landscape of GERO (PREFERRED ALTERNATIVE)

Impacts:

Even though the railroad corridor parallels the east bank of the Wabash River, this preferred alternative to fill in the corridor to match the existing grade and cultural landscape of GERO would have no impacts to the natural floodplains of the Wabash River or FEMA designated floodplain zones. The natural floodplain of the Wabash in GERO and up and down the river's course has been vastly altered in the last 200 years by development and the construction of flood protection systems.

A Flood Protection Works Permit from the Army Corps of Engineers may be required; a Construction in a Floodway Permit from IDNR and a Section 401 Water Quality Certification from Indiana Department of Environmental Management may also be required; coordination with these agencies should occur prior to construction to determine necessary permits. No other cumulative impacts to floodplains are anticipated as a result of this preferred alternative.

Conclusions:

No impacts to natural floodplains of the Wabash River or FEMA designated floodplain zones are anticipated as a result of rehabilitation of the B&O railroad corridor.

Soils

Alternative A: No Action ("Do Nothing") Alternative for Rehabilitation of B&O Railroad Corridor

Impacts:

No impacts to soils in GERO would occur as a result of this No Action alternative because no disturbance, removal, or addition of soils to the project site would occur. No additional cumulative impacts to soils would occur as a result of the No Action alternative.

Conclusion:

No impacts to the soils would result from the No Action alternative because soils in the Park would not be disturbed.

Alternative B: Rehabilitate Railroad Corridor to Match Existing Cultural Landscape of GERO (PREFERRED ALTERNATIVE)

Impacts:

This alternative would negatively impact the soils in the Park during construction because equipment and machinery necessary for filling in the railroad corridor with new soils would result in temporary damage and compaction to surrounding soils. No other cumulative impacts to soils would occur as a result of this preferred alternative.

Conclusions:

This alternative would result in short-term negative impacts to soils surrounding the railroad corridor due to damage and compaction from equipment and machinery necessary for the proposed construction; however, these impacts are not anticipated to be significant in the long-term.

Appropriate soil erosion control measures would minimize storm water runoff from the construction site, as proposed in preliminary engineering plans (refer to Appendix A-10). Once the project is complete, disturbed areas would be graded and reseeded. No other impacts would occur as a result of this preferred alternative.

Refer to the “Former MGP Site” section of this document below regarding analysis of impacts to soils as a result of this preferred alternative.

Terrestrial Habitat & Wildlife

Alternative A: No Action (“Do Nothing”) Alternative for Rehabilitation of B&O Railroad Corridor

Impacts:

No impacts to terrestrial habitat and wildlife in GERO would occur as a result of the No Action alternative because there would be no disturbance of microhabitats that exist in and near the B&O railroad corridor located within the GERO boundaries. No additional cumulative impacts would occur to terrestrial habitat and wildlife under this No Action alternative.

Conclusion:

No impacts to the terrestrial habitat and wildlife would result from the No Action alternative because microhabitats in the areas in and surrounding the B&O railroad corridor would remain undisturbed.

Alternative B: Rehabilitate Railroad Corridor to Match Existing Cultural Landscape of GERO (PREFERRED ALTERNATIVE)

Impacts:

Impacts to microhabitats in the turf grass surrounding the B&O railroad corridor would occur during construction because this preferred alternative would require the use of heavy equipment and machinery to install soil in the corridor to bring the corridor ground elevation up to the elevation of the surrounding grade. No other cumulative impacts would occur as a result of this preferred alternative.

Conclusions:

Impacts to microhabitats in the turf grass surrounding the B&O railroad corridor would occur during construction because this preferred alternative would require the use of heavy equipment and machinery to install soil in the corridor; however, this alternative also includes grading and reseeded the area when the project is complete. Therefore, the impacts to microhabitats would be short term and would not be significant. No other impacts to terrestrial habitat and wildlife would occur as a result of this preferred alternative.

Socioeconomic Environment & Environmental Justice

Alternative A: No Action (“Do Nothing”) Alternative for Rehabilitation of B&O Railroad Corridor

Impacts:

The No Action alternative would not result in impacts to the socioeconomic environment and environmental justice because the B&O railroad corridor within the Park would remain unchanged. No additional cumulative impacts under the No Action alternative would occur.

Conclusion:

No impacts to the socioeconomic environment and environmental justice would result from the No Action alternative because the B&O railroad corridor would remain undisturbed.

Alternative B: Rehabilitate Railroad Corridor to Match Existing Cultural Landscape of GERO (PREFERRED ALTERNATIVE)

Impacts:

No impacts to the socioeconomic environment would occur as a result of this alternative because it involves rehabilitation of an inactive railroad corridor that no

longer provides economic or social benefit to the Park or to the City of Vincennes generally. No cumulative impacts to the socioeconomic environment would occur as a result of the preferred alternative.

Conclusions:

No impacts to socioeconomic environment or environmental justice would occur as a result of this preferred alternative.

Visitor Use & Experience

Alternative A: No Action (“Do Nothing”) Alternative for Rehabilitation of B&O Railroad Corridor

Impacts:

No impacts to visitor use in GERO would occur as a result of the No Action alternative because there would be no physical changes to the landscape of the Park; visitors would be able to continue to use the Park grounds in the same manner that it is used today. Negative impacts to visitor experience in the Park would occur as a result of the No Action alternative because the current landscape of the Park would remain unchanged and would not be returned as close as possible to the original intent of William E. Parsons’ Park design. Furthermore, the 2008 *Cultural Landscape Plan and Environmental Assessment* by the NPS recommended that the railroad corridor be filled with earthen fill to match the existing landscape; this recommendation would remain unfulfilled. No additional cumulative impacts would occur under this alternative for rehabilitation of the B&O railroad corridor. No additional cumulative impacts would occur to visitor use and experience under the No Action alternative.

Conclusion:

No impacts to the visitor use would result from the No Action alternative because the landscape, use of the memorial building and grounds, and views of the Wabash River and the Park would remain unchanged. However, this alternative would result in permanent negative impacts to visitor experience of the Park because the corridor would not be rehabilitated to match the existing grade of the surrounding lawn, and the intent of the historic designed landscape as designed by Parsons and the recommendations made in the 2008 *Cultural Landscape Plan and Environmental Assessment* by the NPS would remain unfulfilled. It is important to note that the railroad corridor existed in its current location when the Park was designed and developed; although the metal tracks and wooden ties were removed in recent years, the corridor has been a permanent feature of the Park that visitors have been seeing since the Park opened. Therefore, the negative impacts to visitor use and experience as a result of the No Action alternative would not be significant in the long-term.

Alternative B: Rehabilitate Railroad Corridor to Match Existing Cultural Landscape of GERO (PREFERRED ALTERNATIVE)

Impacts:

Impacts would result from this alternative because visitors would have a level and consistent walking surface from the Park memorial building to the river walk, retaining wall, and Vigo statue. Also, the NPS would be able to construct an ADA compliant walkway from the memorial building to the river walk and statue; furthermore, the NPS would be able to extend the river walk along the railroad corridor alignment to the north and south. Overall, by filling in the railroad corridor and creating a level walking surface, visitors would be able to access the statue and river walk more safely (see Photo #24 below). Other impacts would result from this alternative because the historic designed landscape along the railroad corridor would be reverted to the original intent of the landscape designers of the Park.



Photo 24: Existing conditions- facing west from concrete apron surrounding Park memorial building to Vigo statue and Wabash River. 11/26/2013

Access to the river walk, the Vigo statue, and views of the Wabash River would be limited during construction.

Conclusions:

This preferred alternative would result in permanent positive impacts to visitor use and experience in the Park because the railroad corridor would be reverted to match the surrounding landscape as designed by the Park landscape designers, and safe access to the river walk, the Vigo statue, and views of the Wabash River would be improved. Furthermore, the corridor would be brought up to the level of surrounding grade, providing a larger area of level grade for Park events, picnicking, and use as an open play area for visitors and area schools. This impact would be significant and

long-term; although the railroad corridor existed prior to development of the Park, overall visitor use and experience would be improved.

Park Operations

Alternative A: No Action (“Do Nothing”) Alternative for Rehabilitation of B&O Railroad Corridor

Impacts:

No impacts to park operations at the Park would occur as a result of the No Action alternative because there would be no disruptions to park hours of operations; visitors would be able to continue to use the Park grounds and memorial building in the same manner that it is used today. However, the railroad corridor would remain approximately five feet below the surrounding grade of the Park; therefore Park maintenance activities would continue to be negatively impacted by this change in grade. The railroad corridor would continue to pose a safety hazard for employees using lawn equipment to maintain the area due to the steep banks on each side of the corridor. Also, the area surrounding the railroad corridor would continue to be a safety hazard for visitors wishing to access the river walk and Vigo statue. No additional cumulative impacts would occur to park operations under the No Action alternative.

Conclusion:

No impacts to park operations would result from the No Action alternative because the use of the Park and the memorial building would remain unchanged; park operations would not be disrupted, although Park maintenance activities would continue to be negatively impacted; due to the change in grade of the railroad corridor, lawn maintenance operations require specific equipment and techniques to maintain the banks of the corridor.

Alternative B: Rehabilitate Railroad Corridor to Match Existing Cultural Landscape of GERO (PREFERRED ALTERNATIVE)

Impacts:

Operation of the Park memorial building would not be affected by rehabilitation of the railroad corridor to match the existing surrounding grade. Access would be temporarily limited to the river walk and retaining wall during construction, which would result in negligible negative impacts to Park operations. Cumulative impacts would occur because Park employees and equipment would have improved access to the river walk and retaining wall for maintenance in the future. Also, ongoing safety concerns exist because the elevation of the railroad corridor is approximately five feet below surrounding grade, and the banks along the corridor are steep. Therefore,

this alternative would result in improved park maintenance operations because the steep banks of the railroad corridor would be eliminated, providing for a consistent elevation of the Park lawn that would be safer and easier to maintain. No other cumulative impacts to Park operations would occur.

Conclusions:

No negative impacts to Park operations would occur as a result of this preferred alternative. Permanent positive impacts include improved access to the river walk and retaining for maintenance and a more consistent lawn grade that would be safer and easier to maintain with lawn care equipment.

Public & Private Utilities

Alternative A: No Action (“Do Nothing”) Alternative for Rehabilitation of B&O Railroad Corridor

Impacts:

No positive or negative impacts to public and private utilities in or near GERO would occur as a result of this No Action alternative because there would be no disturbance of or disruptions to public and private utilities. No additional cumulative impacts would occur to public and private utilities under the No Action alternative.

Conclusion:

No positive or negative impacts to public and private utilities in the Park would result from this No Action alternative to rehabilitate the railroad corridor because utilities would remain unchanged; public and private utilities would not be disrupted.

Alternative B: Rehabilitate Railroad Corridor to Match Existing Cultural Landscape of GERO (PREFERRED ALTERNATIVE)

Impacts:

No impacts to public and private utilities would occur because there are no utilities within the construction zone of the railroad corridor; the wastewater infrastructure located near the intersection of Willow Street and River Road would be outside the construction limits of this alternative (refer to Appendix F-7 for wastewater infrastructure locations). No other cumulative impacts would occur as a result of this alternative.

Conclusions:

No impacts to public and private utilities would occur under this preferred alternative because there are no utilities within the construction zone of the railroad corridor.

Former MGP Site

Alternative A: No Action (“Do Nothing”) Alternative for Rehabilitation of B&O Railroad Corridor

Impacts:

No positive or negative impacts to the former MGP site within the Park would occur in the short term as a result of the No Action alternative because there would be no disturbance of soils surrounding the B&O railroad corridor.

Conclusion:

No impacts to the former MGP site would occur as a result of the No Action alternative.

Alternative B: Rehabilitate Railroad Corridor to Match Existing Cultural Landscape of GERO (PREFERRED ALTERNATIVE)

Impacts:

The former MGP site is located at the present location of the Park visitor parking lot. No impacts to the former MGP site would occur as a result of this alternative. Previous investigations have identified impacts to subsurface and surface soils in the vicinity of the MGP operations and near the railroad corridor; contaminated soils may be disturbed and exposed during construction. No other cumulative impacts are likely to occur.

Conclusions:

Because contaminated soils may be present within the construction zone of this alternative, soil intrusive work would need to be conducted in accordance with the NPS *Public Information Sheet for Soil Disturbing Activities* (“Guidelines for Health and Safety During Soil Disturbing Construction/Maintenance Activities” section; refer to Appendix E-6 to E-7). By following the guidelines set forth by the NPS, impacts to potentially contaminated soils near the project sites and impacts as a result of exposure to contaminated soils, if any are found, would be greatly reduced.

5.0 CONSULTATION & COORDINATION

An introductory project meeting was held at the City of Vincennes Wastewater Facility (301 Perdue Road) on July 31, 2013. The meeting consisted of introductions of key personnel with the City of Vincennes, the NPS, the BLCD, and private consultants from Banning Engineering and Green 3 LLC. Topics of discussion during the meeting included:

- Project preferred and discarded alternatives
- Purpose and need of the project
- Impacts (environmental, social, and cultural)
- Impact assessment methodology
- Use of the PEPC system
- Past and future public involvement activities
- Project schedule
- Existing studies of the environmental, cultural, and historic resources in GERO

The July 31, 2013 meeting concluded with a site visit and onsite discussion of the preferred alternatives of the project.

The Public Scoping Paper was then drafted for the project for public review and comment. This Scoping Paper was released for public review on the NPS's Planning, Environment, and Public Comment (PEPC) system, an online document and comment sharing website, on August 30, 2013 for a 30-day review period, and a press release was drafted by the NPS. No comments were received via PEPC, email, or by mail within the 30-day comment period, which ended on September 30, 2013.

On September 30, 2013, Green 3 LLC sent a project information packet that included a project description, maps, and site photos of existing conditions to local, state, and federal agencies (refer to Appendix B for information packet contents and agency correspondence). The purpose of this early coordination communication was to allow these agencies to provide questions and comments regarding the effects of the project on environmental, social, and cultural resources in and near GERO. The following agencies were sent early coordination project information:

- USFWS
- USACE; Louisville District
- IDNR Fish & Wildlife
- IDEM
- Indiana Geological Survey
- INDOT; project may affect SR 441/Vigo Street
- NRCS
- City of Vincennes Water Utilities
- City of Vincennes Mayor's Office
- City of Vincennes Engineering Department
- City of Vincennes Streets & Sanitation Department

- BLCD
- Knox County Soil & Water Conservation District
- Knox County Drainage Board
- Knox County Surveyor

The Ground Water Section of IDEM, in a letter dated October 1, 2013, stated that the project site was located in a Wellhead Protection Area. Also, the NRCS, in a letter dated October 23, 2013, stated that the project would not cause a conversion of prime farmland.

In addition, the USFWS acknowledged in a letter dated October 23, 2013 that the activities associated with this project would occur on previously disturbed land, and that the project is within the range of the federally endangered Indiana bat (*Myotis sodalis*), the Sheepnose mussel (*Plethobasus cyphus*), and a species proposed as endangered, the Northern long-eared bat (*Myotis septentrionalis*). The agency noted that there were no known occurrences of these species or their habitat within or near the project area, and that the proposed project is not likely to adversely affect these species. In order to avoid impacts to the Wabash River, the agency recommended that soil piles be covered to prevent runoff during construction, that stream banks be stabilized as quickly as possible after construction, and that disturbed areas be re-vegetated with native plant species in areas dominated by natural vegetation.

The IDNR Division of Fish and Wildlife submitted a response letter dated October 25, 2013, in which the agency stated that the project would require formal approval for construction under the Flood Control Act, IC 14-28-1. The agency also found two state and federally endangered mussel species, the Fat Pocketbook (*Potamilus capax*) and the Eastern Fanshell Pearlymussel (*Cyprogenia stegaria*), have been recorded in the Wabash River within one half mile of the project area. The Rabbitsfoot (*Quadrula cylindrica cylindrica*), a state endangered species and candidate for federal listing, and the Ohio Pigtoe (*Pleurobema cordatum*), a state species of special concern, have also been recorded within one half mile of the project in the Wabash River. However, the Division of Fish and Wildlife stated that the mussel species are no longer found in the section of the river near the project, and therefore the agency did not foresee any impacts to these species as a result of the project. The agency also recommended that disturbed areas be re-vegetated with a mixture of grasses, and that erosion control be implemented to prevent sediment from entering the Wabash River or from leaving the construction site, and that slopes 3:1 or steeper be seeded and protected with biodegradable erosion control blankets.

The Indiana Geological Survey responded on November 5, 2013, stating that the project is located in Indiana Seismic Zone 2A, meaning that “the soils are prone to seismic-wave amplification during major earthquake shaking,” but with proper precautions the activities in the proposed project should not affect or be affected by the geology of the area.

In an email dated September 24, 2013, the USACE- Louisville District provided a Flood Protection Works Permit application, an instructions sheet for submitting a Permit for Modification of a Local Flood Protection Project, and a checklist for completing the levee modification permit. No other agency responses were received.

Ongoing communication with NPS, GERO, and City officials for the Vincennes Levee and Wastewater Infrastructure Rehabilitation project in GERO occurred throughout the writing of this report in order to compile accurate data and documentation of past actions and site conditions in GERO, existing facilities and infrastructure, and future plans for Park and other infrastructure improvements. Key personnel that made up the project core team included the following agency officials and private consultants:

- City of Vincennes: Hunter Pinnell, MS4 Coordinator & Levee Superintendent, Vincennes Water Utilities; Kirk Bouchie, General Manager, Vincennes Water Utilities; and Vincennes Mayor Joe Yochum
- BLCD: Rex Marchino, President
- NPS: Frank Doughman, GERO Superintendent; Doug Blome, GERO Maintenance Supervisor; and Nick Chevance, Regional Environmental Coordinator for the NPS Midwest Regional Office
- Banning Engineering PC: Kevin Steely, P.E., CPESC, Project Engineer
- Green 3 LLC: Dawn Kroh, RLA, President; Erin Mulryan, MPA, Technical Writer; and Lyndsay Crespo, Assistant. Erin Mulryan was the primary preparer of this EA report.

These key personnel reviewed the Public Scoping Study and Chapters 1 through 4 and provided valuable input and documentation to support the analysis in this EA report.

Upon completion of this Draft EA, the NPS will consult with the Indiana State Historic Preservation Officer (SHPO) regarding impacts to the aboveground and belowground cultural resources in GERO and possible mitigation efforts, if any, that may be necessary to minimize impacts to the Park's resources. Also, all local, state, and federal agencies as well as the key personnel listed above that were sent early coordination project information will also be sent a copy of the Draft EA for review and comment.

BIBLIOGRAPHY

- Abrell, D.B. (1997). The Southern Lowlands. From *Natural Heritage of Indiana*. Indiana University Press: Bloomington.
- Association of State Floodplain Management. 2008. *Natural and Beneficial Floodplain Functions: Floodplain Management- More than Flood Loss Reduction*. Available online at:
http://www.floods.org/PDF/WhitePaper/ASFPM_NBF%20White_Paper_%200908.pdf
- Central United States Earthquake Consortium. (n.d.). Wabash Valley Seismic Zone information available online at: <http://www.cusec.org/earthquake-information/wabash-valley-seismic-zone.html>
- Council on Environmental Quality. 1997. *Guidance Under the National Environmental Policy Act*. Available online at:
http://www.epa.gov/compliance/ej/resources/policy/ej_guidance_nepa_ceq1297.pdf
- Doughman, Frank. Personal communication. October 2013.
- Federal Emergency Management Agency (FEMA). (n.d.) Definitions of FEMA Flood Zone Designations. Available online at: <http://www.fema.gov/floodplain-management/flood-zones>
- Federal Emergency Management Agency (FEMA). (October 2013). Levee Certification v. Accreditation Fact Sheet. Available online at: <http://www.fema.gov/media-library/assets/documents/22957?id=4828>
- Federal Emergency Management Agency (FEMA). Requirements of 44 CFR Section 65.10. <http://www.fema.gov/media-library/assets/documents/10713?id=2741>
- History Channel. (2013). British Surrender Fort Sackville. Available online at:
<http://www.history.com/this-day-in-history/british-surrender-fort-sackville>
- Holway, James M. & Raymond J. Burby. (1990). The effects of floodplain development controls on residential land values. *Land Economics*, Vol. 66 (Aug.), No.3, pp. 259-271. Retrieved from: <http://www.jstor.org/stable/3146728>
- Indiana Department of Environmental Management Hazardous Waste Program. (2013). <http://www.in.gov/idem/4995.htm>
- Indiana Dept. of Natural Resources. (n.d.). Wabash River History website, <http://www.in.gov/dnr/outdoor/4476.htm>

- Indiana Dept. of Natural Resources. *Archaeology and the French Culture in Indiana*. Available online at: <http://www.in.gov/dnr/files/archaeofrench.pdf>
- Indiana Geological Survey GIS mapping tool. www.maps.indiana.edu.
- Indiana Historical Society. (2004). *Ezra Winter Murals in the George Rogers Clark Memorial Photographs, C.A. 1941*. Manual and Visual Collections Department, William Henry Smith Memorial Library: Indianapolis. Available online at: <http://www.indianahistory.org/our-collections/collection-guides/ezra-winter-murals-in-the-george-rogers-clark.pdf>.
- Indiana Historical Society. (n.d.). Good Samaritan Hospital (history). Available online at: <http://www.indianahistory.org/our-services/books-publications/hbr/good-samaritan-hospital.pdf>
- Indiana-University-Purdue-University-Indianapolis (IUPUI), Center for Earth and Environmental Science. (n.d.). The Function of Floodplains, http://www.cees.iupui.edu/education/Information_Resources/floodplains.htm
- Interagency Levee Policy Review Committee. (2006). *The National Levee Challenge: Levees and the FEMA Flood Map Modernization Initiative*. Prepared for the Federal Emergency Management Agency. Available online at: http://www.fema.gov/media-library-data/20130726-1606-20490-2709/levee_report_final.pdf
- Jackson, Marion T. (2004). *101 Trees of Indiana: A Field Guide*. Indiana University Press.
- National Park Service. (2013). George Rogers Clark National Historical Park website, <http://www.nps.gov/gero/historyculture/fort.htm>
- National Park Service. Public Use Statistics. Available online at: <https://irma.nps.gov/Stats/SSRSReports/Park%20Specific%20Reports/Annual%20Park%20Recreation%20Visitation%20%281904%20-%20Last%20Calendar%20Year%29?Park=GERO>
- Natural Resource Conservation Service (NRCS). Soil Survey of Knox County, Indiana. Available online at: http://soils.usda.gov/survey/online_surveys/indiana/#knox1981
- National Park Service. (2008). *George Rogers Clark National Historic Park: Cultural Landscape Report / Environmental Assessment*. NPS Midwest Regional Office, Omaha, NE.

Nickel, R.K. (2002). An Archeological Overview and Assessment of George Rogers Clark National Historical Park. National Park Service – Midwest Archeological Center, Lincoln NE.

Pinnell, Hunter. Personal communication. December 2013; January 2014; April 2014; August 2014.

Sons of the American Revolution- Indiana, Illinois, Michigan, Ohio, and Wisconsin Societies. Site signage (refer to site photos in Appendix C).

Steely, Kevin. Personal communication. January 22, 2014.

United States Army Corps of Engineers, Louisville District Corps of Engineers. *Levee System Evaluation Report for Vincennes, Indiana*. (May 2014). Available online at: <http://vinutilities.com/>

United States Bureau of the Census. <http://www.census.gov/2010census/>

United States Department of Justice. Overview of National Park Service Organic Act of 1916 (and Amendments). <http://www.justice.gov/enrd/3195.htm>

United States Environmental Protection Agency (USEPA). Hazardous Waste Regulations, available online at: <http://www.epa.gov/osw/laws-regs/regs-haz.htm>. See also CERCLA Overview at: <http://www.epa.gov/superfund/policy/cercla.htm>

Vincennes, Indiana Code of Ordinances, Chapter 160, Flood Damage Prevention. Available online at: [http://www.amlegal.com/nxt/gateway.dll/Indiana/vincennes/cityofvincennesindianacodeofordinances?f=templates\\$fn=default.htm\\$3.0\\$vid=amlegal:vincennes_in](http://www.amlegal.com/nxt/gateway.dll/Indiana/vincennes/cityofvincennesindianacodeofordinances?f=templates$fn=default.htm$3.0$vid=amlegal:vincennes_in)