Five Rivers MetroParks
409 E. Monument Ave., Third Floor • Dayton, Ohio 45402

Great Miami Low Dam Removal Project

Application for Individual Section 401 Water Quality Certification

Ohio EPA Project ID No. 124066

Submitted To:

Ohio Environmental Protection Agency
Division of Surface Water, 401 Unit
50 West Town Street, Suite 700
P.O. Box 1049
Columbus, Ohio 43216-1049

Prepared By:

Coldwater Consulting, LLC
46 West Columbus Street
P.O. Box 0146
Galena, OH 43021-0146
Ph. 740-936-5368

Project Number 019-001

January 2013

TABLE OF CONTENTS:

TABLES:

FIGURES:

1. Site Location Map
2. 2011 Aerial Photograph
3. RiverScape MetroPark Map
4. 1968 Aerial Photograph

APPENDICES:

A. Ohio EPA Qualitative Habitat Evaluation Index (QHEI) Form
B. Agency Correspondence
C. Photographs
D. Design Drawings
E. Miami Conservancy District Flood Control and Channel Improvement Maps

F. Regional Curve for Ohio
G. Buck Creek Project Photographs
H. Terran Corporation Sediment Sampling Report

1.0 Introduction

Five Rivers MetroParks (Five Rivers) requests authorization for removal of the Monument Avenue low dam, construction of two in-stream structures, restoration of a historic point bar, and the improvement of one access point on the Great Miami River adjacent to RiverScape MetroPark in downtown Dayton. This five-foot high low dam creates a stagnant pool, obstructs aquatic movement and flow, is a safety hazard, and hinders recreation. The original purpose of the low dam was to provide an impoundment in downtown Dayton for aesthetics and recreation. Although owned and maintained by the Miami Conservancy District (MCD), the dam has no flood control purpose.

The purpose of this project is to provide safe seasonal recreational river use to a segment of the Great Miami River that is accessible to the public and part of the existing RiverScape MetroPark. Secondary, but year-round benefits include restoring aquatic habitat and flow diversity to this segment of the Great Miami River. In order to meet the project purpose, the need is as follows: 1) remove the existing, hazardous low dam to lower the localized pool level, improve free-flowing conditions, and improve navigability and safety for seasonal recreational river users; 2) install two structures upstream of the low dam location to provide seasonal recreational river use, stabilize the mobile riverbed, restore flow diversity, improve sediment transport, and create a thalweg within the over-widened channel; 3) restore a historic point bar at its former location along the left descending bank of the river to pre-dam conditions and protect an existing waterline; and 4) improve access at the RiverScape to provide a designated public access point, reduce erosion, and protect the existing Great Miami Recreational Trail. The two structures are referred to as: grade control structure #1, which is between the Main Street and Riverside Drive Bridges; and grade control structure #2, which is between the low dam and Main Street Bridge.

1.1 Project Background

Due to the flood control system, the Great Miami River through the City of Dayton is overwidened, and lined on either side with levees. There is no significant riparian cover, and the presence of the flood control system prohibits making habitat improvements (e.g., tree planting) within the floodplain. Thus, the only opportunity for improving the habitat and recreation potential within the river corridor is by addressing the stream channel itself via in-stream structural improvements that create habitat diversity within the existing, historically modified channel.

Project partners include the Downtown Dayton Partnership, University of Dayton's Rivers Institute, MCD, City of Dayton, and Montgomery County. Five Rivers has held community meetings, led fund raising campaigns, and has informed the local governments and officials. Meetings have been conducted with the City of Dayton regarding permitting, the ODOT I-75 project construction team regarding river access, and the City of Dayton Water Department regarding protection of utilities. MCD participates in regular project progress meetings. Representatives of the McPherson Historical Society, Grafton Hill Neighborhood Association, the Wright Dunbar Neighborhood Association, the Dayton Art Institute, the Downtown Dayton Priority Board, the University of Dayton, and the Downtown YMCA have

participated in the public meetings and/or been individually interviewed as project stakeholders. Comments have been solicited during project and public meetings and via email correspondence with the project managers.

The public has been, and will continue to be, informed of this project by Five Rivers MetroParks and the Downtown Dayton Partnership. Several public information meetings have been held to date. Participants have had the opportunity to provide comments regarding the project during meetings and through email contact with the project managers. Project partners and the public continue to receive updates on the project. The Downtown Dayton Partnership maintains a website page with periodic project status reports: http://www.downtowndayton.org/index.php?option=com_content&task=view&id=252.

1.2 Site Description

The project site (Site) lies within the Lower Great Miami River watershed (HUC 05080002), within the urban river corridor in the City of Dayton between the Monument Avenue and Riverside Drive bridges (Figure 1). Land use within the Site is urban and highly developed as shown on the 2011 aerial photograph (Figure 2). Portions of the Site support public infrastructure (e.g., sidewalks/bikepath, amphitheater, river access) as park of existing RiverScape MetroPark (Figure 3). Current public uses include, but are not limited to, fishing, walking/biking, and hand-powered boating. There are paved bike/walking paths along each side of the river, and the majority of the flood control levees are concrete. Detailed Information on historic site disturbance is provided in Section 1.5.3. The entire Site is within the 100-year floodplain.

The Site is located in the Eastern Corn Belt Plains Ecoregion, which is characterized by level to gently sloping land and moderate to low stream gradient. This reach of the Great Miami River is underlain by a buried valley aquifer composed of highly permeable sands and gravel from past glacial events. According to the Montgomery County Soil Survey and as shown on Figure 2, soils mapped within most of the Site include the Riverwash (Rh) unit. Portions of the staging areas are mapped as Urban land, alluvial (Ua) and Fox--Urban land complex (FuB). These units are not listed as hydric soils in Montgomery County. No wetlands were identified on the Site during the field assessment effort.

As mentioned, the Great Miami River is leveed, channelized, and maintained by MCD for flood protection within the Site. MCD actively mows the area to prevent the growth of woody vegetation and also removes accumulated sediment and gravel from the river as necessary to restore capacity. As a result, the river corridor lacks riparian habitat attributes common to large rivers, such as side channels, backwaters, oxbows, and large woody debris. The riparian area that is present consists mostly of common grasses and forbs. In addition, due to the presence of the dam, defined riffle/pool sequences are absent and the river is channelized and over-widened.

1.3 Site History

The Dayton area has historically endured numerous floods from the Great Miami River, with documented flooding events dating back to at least 1805. The most significant of these was the Great

Flood of 1913, the greatest natural disaster in Ohio history. During that flood, water levels rose more than 20 feet and residents were forced to flee to their second floors and attics in order to escape the raging floodwaters. More than 360 people lost their lives, nearly 65,000 people were displaced from their homes and property damage exceeded $100 million (more than $2 billion in present dollars).

In the wake of this disaster, the people of the Miami River Valley rallied to put in place plans for the prevention of future flooding. From those efforts, a regional flood control system was implemented and the Miami Conservancy District (MCD) was formed. Since its inception, the MCD system has protected the region from flooding over 1,700 times. The flood protection system is comprised of a series of five dry dams, 55 miles of levees and 35 miles of modified stream channel in 11 cities along the river. Dayton is the largest city within the MCD system. MCD maintains 19 miles of levee and approximately 8 miles of the Great Miami River channel in Dayton.

The existing low dam was constructed in the late 1970's within the leveed channel system. The original purpose of the low dam was to provide an impoundment in downtown Dayton for aesthetics and recreation. Although owned and maintained by MCD, the dam itself has no flood control purpose.

The low dam is approximately 5-feet high, and extends approximately 470 feet across the Great Miami River. It is a reinforced ogee concrete dam with slide gates built within it to allow lowering of upstream water levels for maintenance. To lower upstream water levels, the gates are pulled upward from the top of the dam, allowing flow to pass from openings along the riverbed. The concrete dam is fixed, and cannot be lowered. After the gates were removed from the low dam in October 2012, it is estimated that the upstream wetted channel/pool width only decreased by approximately 25 feet. However, removal of the gates in October 2012 only dropped the water elevation in the upstream pool by approximately 1 foot. The gates do not have the capacity to keep up with upstream flows during low to normal conditions, and when removed have nearly zero effect during high flow. Based on conversations with MCD personnel, until October 2012, the gates have only been opened two times (1979, 1999) since the dam's construction.

Low dams cause considerable harm to the biological, physical, and chemical processes of rivers and streams. In addition to negative impacts to aquatic ecosystems, low dams also create a boating and safety hazard to humans, thus limiting the recreational potential of the river. Low dams create a submerged hydraulic jump on the downstream side, which can trap kayakers, canoers, swimmers and other water users in the strong recirculating currents. The Great Miami River in Dayton is one of the most paddled stretches of river in Ohio, as evidenced by the presence of the Dayton Canoe Club, Greater Dayton Rowing Association, and Whitewater Warehouse, Inc. near the Site. Saturday kayak rentals from RiverScape alone totaled more than 680 in 2012. Removal of the low dam coupled with the construction of the two structures, will for allow safe passage and will significantly improve upon the recreation potential of this stretch of the river.

1.4 Status of Habitat and Biological Criteria

Low dams cause considerable harm to the biological, physical, and chemical processes of rivers and streams. By blocking flow, dams have significant impacts on fish migration and the movement of freshwater mussels. They create an impoundment of water which limits the diversity of aquatic species, favoring species that are adapted to lake-like bodies of water. Water impounded behind low dams has lower dissolved oxygen levels and higher temperatures than a free-flowing stream. Dams also disrupt the transport of sediments within a stream, which alters physical habitat for a variety of aquatic species.

The Ohio EPA completed the *Biological and Water Quality Study of the Lower Great Miami River and Select Tributaries*[1] in May 2012. Qualitative Habitat Evaluation Index (QHEI) evaluations, completed by Ohio EPA as part of this study, identified multiple attributes contributing to modified habitat within the project area, including silty/mucky substrate and sparse/no cover as attributes with "high influence," along with heavy/moderate silt cover, fair/poor development, low sinuosity, lack of fast current and high/moderate embeddedness as attributes with "moderate influence." The overall QHEI score as calculated by Ohio EPA for this reach of the Great Miami River was 48.0 (see Appendix A), which is indicative of Modified Warmwater Habitat (MWH), rather than the designated aquatic life use for this stretch of Warmwater Habitat (WWH).

Ohio EPA also completed several evaluations of the fish community within the project reach as part of the Biological and Water Quality Study. These evaluations included calculation of the Index of Biotic Integrity (IBI) and the Modified Index of Well-being (MIWb), which are measures of fish community abundance and diversity. While in general, Ohio EPA found that the fish communities met the biocriteria for WWH, they did find a restriction on fish species caused by the low-head dams in Dayton. They noted that "the restriction of fish species, by the dams, combined with comparatively uniform habitat in the leveed reach through Dayton, was reflected in the evenness component of the MIWb, wherein, MIWb scores ran counter to IBI scores with MIWb scores being generally higher in the downstream reaches where species richness was higher, and lower in the upper reaches where the fish community was dominated by several species, notably redhorse suckers, smallmouth bass and spotfin shiners. "

Ohio EPA concluded in the Biological and Water Quality Study that, "the short reaches impounded by the eight low-head dams scattered along the main stem obviously possess marginal habitat" and "the low-head dams may be indirectly limiting by altering water quality, and clearly limit the distribution of fish and mussel species." The grade control structures will help to ameliorate the effects of negative habitat attributes in the leveed and historically modified project reach and, coupled with removal of the dam, will help to improve QHEI scores closer to the expected WWH range.

[1] Ohio Environmental Protection Agency. Biological and Water Quality Study of the Lower Great Miami River and Select Tributaries, May 2012. www.epa.state.oh.us/dsw/document_index/psdindx.html

1.5 Other Permits/Approvals

1.5.1 Clean Water Act Section 404 Individual Permit

The Great Miami River is a jurisdictional water of the U.S. Due to the recreational purpose of this project, Five Rivers is required to obtain a Clean Water Act Section 404 Individual Permit from the U.S. Army Corps of Engineers (USACE), Huntington District prior to any excavation or filling activities below the Ordinary High Water Mark (OHWM) of the river.

1.5.2 Section 10 Permit

A Section 10 Permit from the USACE, Huntington District is required because the Great Miami River is classified as a navigable Section 10 waterway. Although the Great Miami River is classified as navigable, the low dam presents a major obstacle to navigation, motorized or non-motorized.

1.5.3 Cultural Resources

Section 106 of the National Historic Preservation Act requires Federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings. The goal of consultation is to identify cultural resources (i.e., archaeological, historic properties) potentially affected by the undertaking, assess its effects and seek ways to avoid, and minimize or mitigate any adverse effects on historic properties.

A Section 106 Project Summary Form was submitted to the Ohio Historic Preservation Office (OHPO) on November 30, 2012 (Appendix B). The Section 106 Project Summary Form included a Literature Review completed by Weller & Associates, Inc., which indicated that no previously recorded sites are located within the footprint of any proposed new structures. However, there is one archaeological site (33 MY 322) documented within the floodplain along the right descending bank of the river, just upstream of the I-75 bridge. According to the Ohio Archaeological Inventory form for this site, which was submitted with the Section 106 Project Summary Form to OHPO, it is the former McPherson Mill and is documented as being destroyed by flood control projects and road construction.

Documentation of historic Site disturbance is shown on the Miami Conservancy District flood control and channel improvement maps, which were submitted with the Section 106 Project Summary Form to OHPO. The banks and adjacent floodplain within this reach of the river were more recently disturbed during the Dayton Low Dam Channel Improvement Project. That project involved significant cut and fill activities along the river, starting at the existing low dam and extending upstream beyond the limits of this project.

The OHPO responded to the Section 106 Project Summary Form in a letter dated January 3, 2012 (Appendix B). Although the Site is significantly disturbed, the OHPO requested that an archaeological survey be conducted in all areas of ground disturbance, including staging and access areas. The Phase I Cultural Resources Survey Report will be provided to the Ohio EPA upon completion.

1.5.4 Threatened & Endangered Species

U.S. Fish & Wildlife Service

Pursuant to the Fish and Wildlife Coordination Act, the U.S. Fish and Wildlife Service (USFWS) evaluates impacts on fish and wildlife on all new federal projects and federally permitted projects, including projects subject to the requirements of Section 404. Consultation with USFWS is required to ensure that the proposed project is not likely to result in adverse effects to any federally-listed species that are present or potentially present in the project area.

According to the most recent USFWS list of federal species of concern in Montgomery County, Ohio (website accessed November 2, 2012), the Site lies within the range of five federally listed species: Indiana bat (*Myotis sodalis* – Endangered), rayed bean (*Villosa fabalis* – Endangered), snuffbox (*Epioblasma triquetra* – Endangered), Eastern massasauga (*Sistrurus catenatus catenatus* – Candidate), and bald eagle (*Haliaeetus leucocephalus* – Special Concern).

- **Indiana bat**: Summer habitat requirements for the Indiana bat are not well defined, but the following are considered important: (1)Dead or live trees and snags with peeling or exfoliating bark, split tree trunk and/or branches, or cavities, which may be used as maternity roost areas; (2) Live trees (such as shagbark hickory and oaks) which have exfoliating bark; and (3) Stream corridors, riparian areas, and upland woodlots which provide forage sites.

- **Rayed bean**: The rayed bean generally lives in smaller, headwater creeks, but is sometimes found in large rivers. Rayed beans are often found in and around roots of aquatic vegetation, and they prefer gravel or sand substrates.

- **Snuffbox:** The snuffbox is usually found in small- to medium-sized creeks, inhabiting areas with a swift current, but is also found in Lake Erie and some larger rivers. Adults often burrow deep in sand, gravel or cobble substrates, except when they are spawning or the females are attempting to attract host fish.

- **Eastern massasauga:** The Eastern massasauga typically inhabits wet prairies, marshes, and low areas along rivers and lakes. During the winter, massasaugas hibernate in low wet areas with high water tables, primarily in crayfish burrows, but may use other structures. In the summer, massasaugas use drier, open areas mixed with grasses and forbs such as goldenrods and other prairie plants that may be intermixed with trees or shrubs.

- **Bald eagle:** Bald eagles live near rivers, lakes, and marshes where they can find fish, their staple food. Bald eagles will also feed on waterfowl, turtles, rabbits, snakes, and other small animals and carrion. Bald eagles require a good food base, perching areas, and nesting sites. Their habitat includes estuaries, large lakes, reservoirs, rivers, and some seacoasts. In winter, the birds congregate near open water in tall trees for spotting prey and night roosts for sheltering. Although the bald eagle has been removed from the list of threatened and endangered species

under the Endangered Species Act, it is still be protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

An information request letter was submitted to the USFWS on November 5, 2012, and the USFWS responded with comments in a letter dated November 27, 2012 (Appendix B). In the response letter, the USFWS indicated that the project is not expected to impact the bald eagle, Indiana bat, or Eastern massasauga. The USFWS also indicated that federal mussel species are not expected to occur on the Site. The USFWS recommended contacting the Ohio Department of Natural Resources (Ohio DNR) regarding state-listed mussel species.

1.5.5 Ohio Department of Natural Resources

An information request letter was submitted to the Ohio DNR on January 15, 2013 (Appendix B). No response from the Ohio DNR has been received to date.

1.5.6 Floodplain

The Site lies entirely within the floodplain of the Great Miami River (Zone AE). The FEMA Flood Insurance Rate Map of the Site is provided as Figure 2. Five Rivers will obtain a Floodplain Development Permit from the City of Dayton for work located within the floodplain as required by local regulation.

1.5.7 Ohio EPA Construction Stormwater Permit

Coverage under the National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water during Construction Activities (General Permit OH000003) is required for construction activities disturbing one or more acres of land. In order to obtain coverage under this permit, a Storm Water Pollution Prevention Plan (SWP3) has been developed for construction and a Notice of Intent (NOI) will be submitted to Ohio EPA prior to construction. The SWP3 will detail the implementation of standard erosion and sediment controls and storm water management practices addressing all phases of construction.

1.5.8 Miami Conservancy District Land Use Permit

MCD has ownership and easements over land that is necessary for the flood protection system along the Great Miami River. MCD issues a Land Use Permit when an applicant has requested long-term use of MCD-owned land and MCD determines that the use will not conflict with the operation and maintenance of the flood protection system. Accordingly, Five Rivers will obtain the Land Use Permit in accordance with MCD requirements.

2.0 Surface Water Delineation

2.1 Great Miami River

No wetlands were identified on the Site during the field assessment effort. The only regulated surface water that will be impacted by the project is the Great Miami River, which is a Section 10 water although no commercial navigation occurs on this stretch of the Great Miami River.

Based on correspondence with Richard Pruitt of the USACE Louisville District, the OHWM is 724.3 ft amsl (NAD 1983) at the low head dam between Monument Avenue and the I-75 bridge, 725.3 at grade control structure #2 (between low dam and Main Street Bridge), and 726.3 at grade control structure #1 (between Main Street and Riverside Drive Bridges).

By review of current aerial photography (Figure 2), the pool width above the Monument Avenue is approximately 425 feet. The free-flowing channel width below the low dam is approximately 325 feet. The approximate watershed of this reach of the river is approximately 2,600 square miles. Photographs of the river are included in Appendix C.

As previously mentioned, the Ohio EPA completed the *Biological and Water Quality Study of the Lower Great Miami River and Select Tributaries* in May 2012. Qualitative Habitat Evaluation Index (QHEI) evaluations, completed by Ohio EPA as part of this study, identified multiple attributes contributing to modified habitat within the project area, including silty/mucky substrate and sparse/no cover as attributes with "high influence," along with heavy/moderate silt cover, fair/poor development, low sinuosity, lack of fast current and high/moderate embeddedness as attributes with "moderate influence." The overall QHEI score as calculated by Ohio EPA for this reach of the Great Miami River was 48.0, which is indicative of Modified Warmwater Habitat (MWH), rather than the designated aquatic life use for this stretch of Warmwater Habitat (WWH). Ohio EPA's QHEI form for this reach of the river is included in Appendix A.

3.0 Design Alternatives

3.1 Preferred Alternative

The Preferred Alternative involves the removal of the Monument Avenue low dam, construction of two in-stream grade control structures, restoration of a historic point bar, and one improved access point on the Great Miami River near RiverScape MetroPark in downtown Dayton. The improved access point is necessary to provide a designated and safe public access point to the river. Having a designated access point will minimize disturbance to the banks and vegetation at other locations along the river. It will also help to stabilize an eroded bank on the outside bend of the river and protect the existing Great Miami Recreational Trail. The design drawings for the Preferred Alternative are included in Appendix D. Construction is expected to be completed by November 2014.

3.1.1 Great Miami River Impacts

The Preferred Alternative will permanently impact approximately 910 linear feet/5.73 acres, and will temporarily impact 3,050 linear feet/6.78 acres of the Great Miami River. Temporary impacts are associated with access to the proposed in-river features. Table 3-1 provides a summary of Great Miami River impacts associated with implementation of the Preferred Alternative.

Table 3-1: Preferred Alternative Great Miami River Impact Summary				
Item Number	**Description**	**Estimated Quantity**	**Unit**	**Fill or Excavation**
1	**Water Control:** Build coffer dam, pump nuisance water, flip water as necessary to complete work across the entire width of the channel. Includes acquisition, hauling, placement and removal of coffer dam material. Includes all work related to pumping of nuisance water so that the work area is dry during any and all work within the ordinary high water line. Assumes flexibility with scheduling and weather to allow for construction of water control during periods of low flow.			
1A	Dam Demolition Site	1,900	Cubic Yards	Temporary Fill
1B	Grade Control Structure #1	1,900	Cubic Yards	Temporary Fill
1C	Grade Control Structure #2	2,200	Cubic Yards	Temporary Fill
2	**Demolition of Existing Dam Structure:** Includes demolition and removal of material and concrete associated with the structure in order to lower the dam elevation to approximately 720. Assumes concrete is reused on site for rip-rap.			
2A	Existing Dam Structure	450	Cubic Yards	Excavation
3	**Placement of Native Fill at Dam:** Native material, excavated from the site will be placed on the south (river left) side of the channel in order to re-create the historic point bar, maintain a thalweg on the north side, and protect the existing waterline.			
3A	Restore Historic Point Bar with Native Material	1,500	Cubic Yards	Permanent Fill
4	**Construction of Grade Control Structure #1:** Structure located immediately downstream of RiverScape MetroPark.			
4A	Sheet Piling	6,405	Square Feet	Permanent Fill
4B	Class B Rip-Rap-Crib Fill	1,710	Cubic Yards	Permanent Fill
4C	Pool Armoring	470	Cubic Yards	Permanent Fill
4D	3'-5' quarried limestone blocks	565	Cubic Yards	Permanent Fill
4E	North Wing-Class A Rip Rap	560	Cubic Yards	Permanent Fill
4F	Concrete Grout	285	Cubic Yards	Permanent Fill
4G	Pool Excavation	1,100	Cubic Yards	Excavation
5	**Grade Control Structure #2:** Structure located between Main St. and I-75.			
5A	Sheet Piling	6,030	Square Feet	Permanent Fill
5B	Class B Rip-Rap-Crib Fill	1,930	Cubic Yards	Permanent Fill
5C	Pool Armoring	450	Cubic Yards	Permanent Fill
5D	3'-5' quarried limestone blocks	865	Cubic Yards	Permanent Fill
5E	North Wing-Class A Rip Rap	365	Cubic Yards	Permanent Fill
5F	Concrete Grout	350	Cubic Yards	Permanent Fill
5G	Pool Excavation	2,145	Cubic Yards	Excavation
6	**Site Access Improvement:** Located at Riverside Drive Bridge			
6A	ODOT Type A Riprap	14.5	Cubic Yards	Permanent Fill
6B	Aggregate Base Fill	20.1	Cubic Yards	Permanent Fill
6C	Native Material	36.1	Cubic Yards	Excavation

As indicated above in Table 3-1, implementation of the Preferred Alternative will require approximately 6,000 cubic yards of temporary fill, 9,085 cubic yards of permanent fill, 12,435 square feet of sheet piling, and 3,732 cubic yards of excavation below the OHWM of the Great Miami River. In an effort to minimize impacts to the river and its floodplain, the contractor for this project will share access

points/staging areas along the river in the vicinity of the Monument Avenue and Interstate-75 bridges to the extent practicable with the Ohio Department of Transportation (ODOT) contractor for the Interstate-75 Bridge Replacement Project, which is currently under contract and expected to continue through 2017.

3.1.2 Construction Methods

As can be seen on the MCD flood control maps and on the construction drawings for a channel improvement project in 1977 (Appendix E), this reach of the river has been significantly disturbed and over-widened for flood control. As seen on the 1977 construction drawings, that project involved extensive cut along this stretch of the river, resulting in the over-widened channel that exists today.

The 1968 aerial photography shows the width of the channel was about 300 feet prior to construction of the low dam (see Figure 4). The current aerial photograph (Figure 2) shows that the pool width above the Monument Avenue dam is approximately 425 feet. The free-flowing channel below the low dam is approximately 325 feet. The approximate watershed of this reach of the river is approximately 2,600 square miles. Based on this drainage area, the Regional Curve for Ohio (see Appendix F)[2] indicates that the bankfull width should be approximately 300 feet, which is consistent with conditions present at the time of the 1968 aerial photograph and the current widths of the free-flowing segment downstream of the Monument Avenue dam.

As shown on the drawings (Appendix D), approximately 240 feet of the 472-foot long dam will be removed. The design calls for leaving portions of the dam abutments in place following construction to direct flow along the outside bend and allow deposition of sediments along the inside bend at the historic location of a natural point bar. This will restore free flowing conditions to approximately 1,450 linear feet of the river from the low dam location to grade control structure #2.

Removal of the low dam will lower water levels significantly between the low dam and grade control structure #1 (furthest upstream structure) and slightly upstream of grade control structure #1, and will reduce the width of the upstream wetted channel/pool during normal and low flow conditions. There will be no changes to channel characteristics downstream of the low dam. The only locations the channel will physically be narrowed is at the low dam (by leaving a portion of abutments) and at the two grade control structures. However, during high flow conditions the remaining dam abutments and the two grade control structures will be completely inundated. After the gates were removed from the low dam in October 2012, it is estimated that the upstream wetted channel/pool width only decreased by approximately 25 feet. However, removal of the gates in October 2012 only dropped the water elevation in the upstream pool by approximately 1 foot. The gates do not have the capacity to keep up with upstream flows during low to normal conditions, and when removed have nearly zero effect during high flow. Although removal of the gates in the dam slightly lowers upstream water elevations, if not

[2] Sherwood, J.M & Huitger, C.A. Bankfull Characteristics of Ohio Streams and Their Relation to Peak Streamflows, Scientific Investigations Report 2005-5153. http://pubs.usgs.gov/sir/2005/5153/#N1639F

removed, the existing structure will continue to be a safety concern, maintain a constant pool upstream of the dam, and be an obstruction to passage for aquatic life and recreational navigation.

The two areas where the grade control structures are proposed are under the influence of the low dam (impounded) and are not considered free-flowing. The free-flowing conditions in this stretch of the channel will improve after removal of the low dam. The low dam is an existing obstruction to aquatic life and recreational boating in this reach of the Great Miami River, and the grade control structures are designed such that they will allow passage for hand-powered boats. No commercial navigation occurs on this stretch of the Great Miami River.

The existing dam currently provides grade control for the upper reach. Removal of the low dam will lower pool elevations and increase localized flow velocities. This reach of the Great Miami River lacks cohesiveness and has a very mobile bed due to the presence of rounded gravels and cobbles. The two grade control structures are necessary to hold the bed at its current elevation, to create a thalweg within the over-widened channel, and maintain water depths between 1-foot (during low flow) to 4-foot (during high flow) upstream of grade control structure #1 (furthest upstream structure). The increased flow velocity at the grade control structures will also facilitate sediment transport, and will create riffle/ pool habitat at each structure. Localized aeration will improve oxygen content and local water quality. Each structure will have a rock-lined pool on the downstream side of the openings to create diverse bed structure, dissipate flow, and scour.

The two grade control structures were sited based on accessibility and the presence of existing infrastructure and utilities. Modeling data indicates that the two proposed structures will provide adequate riverbed stability, sediment transport, and will not increase upstream flood elevations.

The two grade control structures will function no different than cross vanes, which are a component of natural channel design. The grade control structures will enhance aquatic habitat, hold grade, reduce bank erosion, and improve sediment transport capacity. As described by D.L. Rosgen, cross vanes provide stream habitat improvements by: (1) creating refuge cover during high and low flow periods in the downstream scour pool; (2) increasing bank cover due to a differential raise of the water surface in the bank region; (3) developing feeding lanes in the flow separation zones; and (4) creating spawning habitat in the glide portion of the pool.[3] The cross vane can also indirectly enhance benthic habitat by helping maintain stream capacity, preventing sedimentation and erosion, creating diversity of flow and bed material, creating stream pattern and circulating oxygen.

Due to the mobile bed in this reach of the Great Miami River, sheet piling and grout will need to be incorporated into each structure to ensure stability. The sheet piling will be installed vertically into the bed at the interface of the downstream end of each opening and scour pool, and will not be visible from the surface. The sheet piling will not protrude above the lowest elevation of the grade control structures. Grout will be used to anchor the large stones and prevent movement, as the potential for

[3] Rosgen, D.L. The Cross Vane, W-Weir and J-Hook Vane Structures, Their Description, Design and Application for Stream Stabilization and River Restoration. www.wildlandhydrology.com/assets/cross-vane.pdf.

piping between the rocks on this river is significant. However, the grout will be held back approximately 8" from the surface of the rock, creating openings/crevices between the rocks for aquatic habitat (see photographs from Buck Creek project, Appendix G).

Based on correspondence with Richard Pruitt of the USACE Louisville District, the OHWM is 725.3 at grade control structure #2 (between low dam and Main Street Bridge) and 726.3 at grade control structure #1 (between Main Street and Riverside Drive Bridges). The design calls for the high point of the middle/in-river portion of the structures to be constructed at 723.9 at grade control structure #2 (1.4 feet below OHWM) and 725.3 at grade control structure #1 (1 foot below OHWM). Therefore, the high point of the middle/in-river portion of the structures will only be visible during lower water conditions, as all fill associated with in-river portion of the structures will be below the OHWM.

Terran Corporation performed sampling of the sediments behind the low dam in September of 2010 (Appendix H). According to Terran's report, sediment collected was well-rounded sands, gravel, and cobbles with only trace amounts of silt. The samples were analyzed by Belmont Labs for the following parameters in accordance with U.S. EPA-approved methods:

- ICP Metals
- Mercury
- Ammonia
- Total Phosphorus
- Volatile Organic Compounds (VOCs)
- Semi-Volatile Organic Compounds
- Pesticides including chlordane and toxaphene
- Polychlorinated Biphenyls (PCBs)

Terran's report indicates that the constituents were either not detected or were detected below the sediment quality guidelines (SQGs) for their respective values available in the U.S. EPA Region V Ecological Screening Levels, and that the sediments contain these constituents below levels of concern.

As can be seen on the 1968 aerial photograph (Figure 4), prior to construction of the low dam a natural gravel bar was present along the left descending bank from the Interstate-75 bridge to below the mouth of Wolf Creek. The clean accumulated gravels and cobbles behind the low dam will be used to restore the meander bar along the left descending bank in the vicinity of the low dam to pre-dam conditions. This will also protect an existing water line, which crosses the river just upstream of the low dam, and has been exposed in the over-widened channel upstream of the dam.

The public is currently accessing the river at a location along the south bank, immediately downstream of Riverside Drive. This area is currently experiencing erosion, which is creating a safety concern, causing degradation of the access point, and threatening the existing Great Miami Recreational Trail that is present along the bank of the river. To protect the existing walkway, ensure maintenance of a

safe access point, and enhance usability of the access point, improvements to the access point must be made. This work will involve the installation of large boulders along the toe of the bank to prevent erosion, installation of random block-shaped rocks for seating, and placement of aggregate base and native material. Voids will be left between boulders to allow vegetation to become established to further prevent erosion and improve riparian habitat in the area.

To comply with Ohio EPA's General Construction Storm Water Permit (Ohio EPA Permit No. OH000003) and the storm water pollution prevention plan for this project, the contractor will be required to utilize appropriate sediment and erosion controls for the duration of construction, use cofferdams to isolate in-stream work areas, and to treat water during dewatering activity prior to it being discharged back into the river. A segment of the river will remain open at all times during construction to avoid obstruction to aquatic life or recreational navigation.

3.1.3 Construction Sequence

The sequence for construction is anticipated to be as follows:

1. Install necessary temporary sediment and erosion controls;
2. Install temporary fill for access to low dam (if necessary);
3. Install temporary cofferdam;
4. Remove accumulated sediments (primarily gravels and cobbles) from behind low dam and place on left descending bank to restore historic point bar and protect existing waterline;
5. Remove low dam to finished elevation;
6. Remove any temporary fill used for low dam access;
7. Install temporary fill for access to structure #2 (if necessary);
8. Install temporary cofferdam, dewater, and install southern half of grade control structure #2;
9. Relocate cofferdam and install northern half of grade control structure #2;
10. Remove temporary cofferdam and any temporary access material from location of grade control structure #2 and restore any disturbed banks;
11. Install temporary fill for access to structure #1 (if necessary);
12. Install temporary cofferdam, dewater, and install southern half of grade control structure #1;
13. Relocate cofferdam and install northern half of grade control structure #1;
14. Remove temporary cofferdam and any temporary access material from location of grade control structure #1 and restore any disturbed banks;
15. Install temporary fill for access to site access improvement location;
16. Install site access improvement;
17. Remove any temporary access material used for site access improvement and restore any disturbed banks; and
18. Remove temporary sediment and erosion controls when site reaches final stabilization.

3.2 Minimal Degradation Alternative

As is the case for the Preferred Alternative, the Minimal Degradation Alternative involves the removal of the Monument Avenue low dam, construction of two in-stream structures, and restoration of a historic point bar on the Great Miami River near RiverScape Park in downtown Dayton. However, the Minimal Degradation Alternative will not include the improvements to site access at RiverScape, which will reduce permanent impacts to the Great Miami River by approximately 170 linear feet/0.02-acre. Likewise, temporary impacts associated with river access will reduce by approximately 650 linear feet/0.37 acre. Not having a designated access point could potentially result in multiple access locations along the river, which would present a safety concern due to the existing presence of angular riprap along the banks. Likewise, multiple access locations would disturb the banks/vegetation and increase the potential for bank erosion and the need for on-going maintenance. Design drawings for the Minimal Degradation Alternative are included in Appendix D.

Implementation of the Minimal Degradation Alternative will require approximately 6,000 cubic yards of temporary fill, 9,051 cubic yards of permanent fill, 12,435 square feet of sheet piling, and 3,696 cubic yards of excavation below the OHWM of the Great Miami River. In an effort to minimize impacts to the river and its floodplain, the contractor for this project will share access points/staging areas along the river in the vicinity of the Monument Avenue and Interstate-75 bridges to the extent practicable with the Ohio Department of Transportation (ODOT) contractor for the Interstate-75 Bridge Replacement Project, which is currently under contract and expected to continue through 2017.

3.3 Non-Degradation Alternative

The purpose of this project is to provide safe seasonal recreational river use to a segment of the Great Miami River that is accessible to the public and part of the existing RiverScape MetroPark. Secondary, but year-round benefits include restoring aquatic habitat and flow diversity to this segment of the Great Miami River. In order to meet the project purpose, the need is as follows: 1) remove the existing, hazardous low dam to lower the localized pool level, improve free-flowing conditions, and improve navigability and safety for seasonal recreational river users; 2) install two structures upstream of the low dam location to provide seasonal recreational river use, stabilize the mobile riverbed, restore flow diversity, improve sediment transport, and create a thalweg within the over-widened channel; 3) restore a historic point bar at its former location along the left descending bank of the river to pre-dam conditions and protect and existing waterline; and 4) improve access at the Riverside Bridge to provide a designated public access point, reduce erosion, and protect the existing Great Miami Recreational Trail. None of these objectives can be met without disturbance to the Great Miami River; therefore, the Non-Degradation Alternative is the “no-build” alternative.

4.0 Regional Sewer & Collection Facilities

This project is not part of a regional sewer and collection facility. There are no sanitary sewers involved in any portion of this project.

5.0 Government & Privately Sponsored Conservation Projects

The Great Miami River was designated a State Watertrail in August 2010. This designation is given for rivers and creeks primarily used for recreational canoeing and kayaking. The Great Miami River Bikeway and Recreation Trail is present on each side of the river, and is frequently used by cyclists and joggers. The project also lies within Ohio's Great Corridor, which promotes quality of life to keep Ohio's talent (e.g., young professionals) in Ohio. Some primary goals of Ohio's Great Corridor are to develop City waterfronts, promote recreation and tourism, and protect open spaces. This project will benefit above-mentioned programs through improvements to public access, safety, and recreation opportunities in the Great Miami River.

6.0 Project Costs

6.1 Preferred Alternative

As previously mentioned, the Preferred Alternative involves the removal of the Monument Avenue low dam, construction of two in-stream structures, restoration of a historic point bar, and one improved access point on the Great Miami River near RiverScape MetroPark in downtown Dayton. The estimated cost for the low dam removal and grade controls structures is $3,272,600; the estimated cost for the improved access point is $101,200. The total estimated cost for Preferred Alternative $3,373,800.

Dayton's economy is supported mostly by manufacturing, wholesale and retail trade and services. As is the case around the country, Dayton has lost a number of jobs over the last decade, particularly in the automotive industry. Additionally, local employers have difficulty in recruiting and retaining young professionals. Improvements to the aesthetics, physical conditions, safety, and recreational potential in this reach of the Great Miami River will attract more people to the riverfront, and will help to retain and attract young professionals to the downtown Dayton area. As a result, this project is expected to have significant short-term (construction phase) and long-term benefits to downtown Dayton and the local economy through increased expenditures in food, supplies, retail goods, lodging, and permanent housing.

6.2 Minimal Degradation Alternative

The Minimal Degradation Alternative involves the removal of the Monument Avenue low dam, construction of two in-stream structures, and restoration of a historic point bar on the Great Miami River near RiverScape MetroPark in downtown Dayton. However, the Minimal Degradation Alternative will not include the improvements to site access at the Riverside Drive bridge. The total estimated cost associated with these features is $3,272,600.

6.3 Non-Degradation Alternative

The objectives of this project cannot be met without disturbance to the Great Miami River; therefore, the Non-Degradation Alternative is the "no-build" alternative. This would result in the loss of the short-term and long-term economic benefits discussed above in Section 6.1.

7.0 Water Pollution Control Measures

7.1 Preferred Alternative

Coverage under the National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water during Construction Activities (General Permit OH000003) is required for construction of this project. A Storm Water Pollution Prevention Plan (SWP3) has been developed for construction and a Notice of Intent (NOI) will be submitted to Ohio EPA prior to construction. The SWP3 details the design and implementation of standard erosion and sediment controls and storm water management practices addressing all phases of construction. The estimated cost for water pollution controls is $15,000, which is included in the overall construction cost.

Once final grade is reached, disturbed areas will be stabilized with vegetation to allow sufficient infiltration of storm water runoff. During construction, silt fence will be placed in areas where storm water is expected to concentrate before leaving the Site. Temporary and permanent seed and mulch will be used as necessary for the duration of construction as required by the General Permit.

Most in-river work will require cofferdams, and the contractor will be required to take the necessary steps through the course of the project to avoid the creation of excess turbidity which may degrade water quality or adversely affect aquatic life. The Contractor will be required to prepare a dewatering plan to be approved by Five Rivers prior to commencement of any dewatering activities. All dewatering discharges will be filtered to remove excessive sediments and will be discharged onto an energy dissipation device (e.g., splash pup, concrete weight, or equivalent) prior to discharge back into the Great Miami River. A segment of the river will remain open at all times during construction to avoid obstruction to aquatic life or recreational navigation.

Terran Corporation performed sampling of the sediments behind the low dam in September 2010 (Appendix H). According to Terran's report, sediment collected was well-rounded sands, gravel, and cobbles with only trace amounts of silt. The samples were analyzed by Belmont Labs for the following parameters in accordance with U.S. EPA-approved methods:

- ICP Metals
- Mercury
- Ammonia
- Total Phosphorus
- Volatile Organic Compounds (VOCs)
- Semi-Volatile Organic Compounds
- Pesticides including chlordane and toxaphene
- Polychlorinated Biphenyls (PCBs)

Terran's report indicates that the constituents were either not detected or were detected below the sediment quality guidelines (SQGs) for their respective values available in the U.S. EPA Region V Ecological Screening Levels, and that the sediments contain these constituents below levels of concern.

7.2 Minimal Degradation Alternative

Water pollution control measures for the Minimal Degradation Alternative will be the same as mentioned under the Preferred Alternative; however, the cost for water pollution controls will be slightly less with the smaller area of disturbance.

7.3 Non-Degradation Alternative

The objectives of this project cannot be met without disturbance to the Great Miami River; therefore, the Non-Degradation Alternative is the "no-build" alternative.

8.0 Human Health Impacts

8.1 Preferred Alternative

In addition to negative impacts to aquatic ecosystems, low dams also create a boating and safety hazard to humans, thus limiting the recreational potential of the river. Low dams create a submerged hydraulic jump on the downstream side, which can trap kayakers, canoers, swimmers and other water users in the strong recirculating currents. Low dams have been responsible for several boating accidents in Ohio, some resulting in serious injury and even death. Removal of the Monument Avenue Dam will eliminate this hazard, thereby resulting in a net benefit to human health. Restoration of a free-flowing condition within the river will re-establish seasonal recreation opportunities in the Great Miami River and will improve the quality of life for the public in and around the greater Dayton area.

There will be no expected release of hazardous or toxic materials during project construction. However, emergency response devices will be on-site and ready to deploy in the event of a spill or equipment failure. Potential spills include hydraulic fluid, oil, and fuel leaks from construction equipment during construction activities. In the event of a spill, details will be recorded and the spill report information will be reported to Five Rivers. Where a leak, spill, or other release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity established under 40 CFR Part 110, 40 CFR Part 117, or 40 CFR Part 302 occurs during a 24-hour period, the Ohio EPA Division of Emergency and Remedial Response will be notified as soon as there is knowledge of the discharge.

Removal of the low dam will decrease the size of the constant pool upstream of the dam, improve free-flowing conditions, and restore passage for aquatic life. The grade control structures will function like cross vanes to enhance aquatic habitat, hold grade, reduce bank erosion, and improve sediment transport capacity. As described by D.L. Rosgen, cross vanes provide stream habitat improvements by: (1) creating refuge cover during high and low flow periods in the downstream scour pool; (2) increasing bank cover due to a differential raise of the water surface in the bank region; (3) developing feeding lanes in the flow separation zones; and (4) creating spawning habitat in the glide portion of the pool.

The cross vane can also indirectly enhance benthic habitat by helping maintain stream capacity, preventing sedimentation and erosion, creating diversity of flow and bed material, creating stream pattern and circulating oxygen.

The City of Dayton obtains its water via well fields from the Great Miami Buried Aquifer, which was designated as a sole source aquifer in 1988. No water supply intakes occur in the proximity of this project.

The proposed in-stream habitat improvements will increase the functions and values this segment of the Great Miami River and will not result in adverse impacts to human health.

8.2 Minimal Degradation Alternative

Human health benefits for the Minimal Degradation Alternative will be similar those mentioned under the Preferred Alternative. However, not having a designated access point could potentially result in multiple access locations along the river, which would present a safety concern due to the existing presence of angular riprap along the banks. Likewise, multiple access locations would disturb the banks/vegetation and increase the potential for bank erosion and the need for on-going maintenance.

8.3 Non-Degradation Alternative

The objectives of this project cannot be met without disturbance to the Great Miami River; therefore, the Non-Degradation Alternative is the "no-build" alternative. The low dam would remain under this alternative and continue to be a major obstruction to passage and safety hazard for recreational river users.

9.0 Social & Economic Benefits Lost & Gained

9.1 Preferred Alternative

According to the U.S. Census Bureau, 2010 Census, the population of Montgomery County was 537,602 with 254,513 housing units. The median household income was $44,585 with 16% of individuals below the poverty level. According to the 2000 Census, the population was 559,062 with 248,443 households. The median household income was $40,156 with 11.3% of individuals below the poverty level.

Construction of the project will provide and/or retain temporary jobs for construction laborers and operators. The Dayton community will also benefit from additional spending by the construction workers. The majority of materials used for the project are costly to transport and will therefore likely come from local sources if available, thereby benefitting the local economy.

Dayton's economy is supported mostly by manufacturing, wholesale and retail trade and services. As is the case around the country, Dayton has lost a number of jobs over the last decade, particularly in the automotive industry. Additionally, local employers have difficulty in recruiting and retaining young professionals. Improvements to the aesthetics, physical conditions, safety, and recreational potential in this reach of the Great Miami River will attract more people to the riverfront, and will help to retain and

attract young professionals to the downtown Dayton area. As a result, this project is expected to have significant short-term (construction phase) and long-term benefits to downtown Dayton and the local economy through increased expenditures in food, supplies, retail goods, lodging, and permanent housing.

Negative social and/or economic effects of the project are short term and minor, and will be limited to the temporary closing of portions of RiverScape MetroPark during construction of the project. However, this will only limit access to the river from the park, as passage for recreational river users will be maintained for the duration of construction.

9.2 Minimal Degradation Alternative

Social and economic effects for the Minimal Degradation Alternative will be similar to those mentioned under the Preferred Alternative. However, there would be no improvement to river access at the Riverside Drive Bridge, which would limit public accessibility at that particular location.

9.3 Non-Degradation Alternative

The objectives of this project cannot be met without disturbance to the Great Miami River; therefore, the Non-Degradation Alternative is the "no-build" alternative. This would result in the loss of the short-term and long-term economic benefits discussed above in Section 9.1.

10.0 Environmental Benefits Lost & Gained

10.1 Preferred Alternative

10.1.1 Water Quality

The Monument Avenue Dam is a low head dam. The presence of such dams alters the natural flow of a river and transforms the upstream segment into a pool more akin to a lake or reservoir-like habitat. Because the upstream pool is not free-flowing, increased water temperatures and stagnant conditions result. Removal of the Monument Avenue Dam will improve free-flowing conditions and re-establish natural fluctuations in water levels and velocities. This will result in cooler water temperatures and reduce stagnation, improving overall water quality in the river.

Gravel and cobble that have accumulated behind the dam must be removed to restore free flowing conditions. These materials will be re-located to restore a historical point bar to pre-dam conditions. Terran Corporation performed sampling of the sediments behind the low dam and determined that constituents of concern were below US EPA ecological screening levels (Appendix H). Terran also indicated that sediment collected was well-rounded sands, gravel, and cobbles with only trace amounts of silt. Consequently, relocation of the accumulated materials is not anticipated to affect water quality. The grade control structures and access point improvements will be constructed of clean, non-erodible materials and will therefore not affect water quality in the river.

Coverage under the National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water during Construction Activities (General Permit OH000003) is required for construction of this project. A Storm Water Pollution Prevention Plan (SWP3) has been developed for construction and a Notice of Intent (NOI) will be submitted to Ohio EPA prior to construction. The SWP3 details the design and implementation of standard erosion and sediment controls and storm water management practices addressing all phases of construction. In accordance with the General Permit, the contractor will be required to utilize appropriate sediment and erosion controls for the duration of construction, use cofferdams to isolate in-stream work areas, and to treat water during dewatering activity prior to it being discharged back into the river.

10.1.2 Animal Life

As described in Section 1.5.4, The U.S. Fish and Wildlife Service does not anticipate adverse impacts to federally-listed species. The pool created by the Monument Avenue Dam supports a lake-like habitat, which typically support common, tolerant fish, mussel, and macro-invertebrate species. Construction of the project is not likely to affect mobile animal species such as fish, mammals, and birds as these species will relocate to other suitable habitat that is present in the vicinity of the Site. Impacts to less mobile invertebrates are expected to be minimal as populations of these species consist of common, tolerant species that will remain present in similar, adjacent habitats.

Removal of the dam will lower the localized pool elevation (upstream of the dam) and re-establish riffle/pool complexes within this reach of the Great Miami River. Construction of the two grade control structures will improve habitat for aquatic fauna and add diversity to stream flow near the structures. Additionally, as observed along the banks downstream of the dam, it is expected that native vegetation such as water willow (*Justicia americana*) will populate the newly exposed and shallow areas along the river and near the structures following removal of the low dam, which may provide conditions suitable for mussels and other animal species. Therefore, a negative impact to aquatic fauna within the Site is not expected to occur, as the physical characteristics of the Great Miami River and potential habitat for animal life will improve as a result of this project. The result will be in-stream habitat conditions that are more favorable of less tolerant and more diverse animal assemblages and a net benefit to animal life.

10.1.3 Plant Life

Existing plant life within the Site consists of common grasses and forbs that are maintained by mowing through MCD's flood control maintenance program. Although temporary impacts to maintained grass areas will occur during the project, these impacts will be minimal and temporary, as the contractor will be required to restore these areas to pre-construction conditions. Removal of the dam will lower the localized pool elevation (upstream of the dam) and re-establish riffle/pool complexes within this reach of the Great Miami River. As observed along the banks downstream of the dam, it is expected that native vegetation such as water willow (*Justicia americana*) will populate the newly exposed and shallow areas along the river and near the structures following removal of the low dam. Therefore, the project is expected to result in a net benefit to native plants. No trees or shrubs will be removed during the project.

10.2 Minimal Degradation Alternative

10.2.1 Water Quality

Benefits to water quality gained/lost for the Minimal Degradation Alternative will be similar to those for the Preferred Alternative. However, not having a designated access point could potentially result in multiple access locations along the river, which would disturb the banks/vegetation and increase the potential for bank erosion/sedimentation along the Great Miami River.

10.2.2 Animal Life

Wildlife benefits associated with the Minimal Degradation Alternative would be similar to those described under the Preferred Alternative. However, not having a designated access point could potentially result in multiple access locations along the river, which would disturb the banks and potential wildlife habitat at multiple locations along the river.

10.2.3 Plant Life

Plant benefits associated with the Minimal Degradation Alternative would be similar to those described under the Preferred Alternative. However, not having a designated access point could potentially result in multiple access locations along the river, which would disturb the banks and riparian vegetation at multiple locations along the river.

10.3 Non-Degradation Alternative

10.3.1 Water Quality

The Non-Degradation Alternative is a "no-build" alternative. Under this alternative, the Monument Avenue Dam will not be removed and water quality benefits from its removal will not be realized. Temporary impacts to water quality associated with construction activities will also be avoided; however, the overall effect on water quality will be a reduction in benefits compared to the Preferred and Minimal Degradation Alternatives.

10.3.2 Animal Life

Due to the nature of this project, the Non-Degradation Alternative would be the "no-build" alternative. As a result, there would be no change or improvement to current wildlife use on the Site.

10.3.3 Plant Life

Due to the nature of this project, the Non-Degradation Alternative would be the "no-build" alternative. As a result, there would be no change or improvement to plant life on the Site.

11.0 Mitigation Plan

11.1 Baseline Information

The presence of the Monument Avenue low dam causes considerable harm to the biological, physical, and chemical processes of the Great Miami River. The obstruction to flow has significant impacts on fish migration and movement of freshwater mussels. The impoundment of water created by low dams

limits the diversity of aquatic species, favoring species that are adapted to lake-like bodies of water. Water impounded behind low dams typically has lower dissolved oxygen levels and higher temperatures than a free-flowing stream. Low dams also disrupt the transport of sediments within a stream, which alters physical habitat for a variety of aquatic species.

In addition to negative impacts to aquatic ecosystems, the low dam also creates a boating and safety hazard to humans, thus limiting the recreational potential of the Great Miami River. The low dam creates a submerged hydraulic jump on the downstream side, which can trap kayakers, canoers, swimmers and other water users in the strong recirculating currents. Low dams have been responsible for several boating accidents in Ohio, some resulting in serious injury and even death.

The Ohio EPA completed the *Biological and Water Quality Study of the Lower Great Miami River and Select Tributaries* in May 2012. Qualitative Habitat Evaluation Index (QHEI) evaluations, completed by Ohio EPA as part of this study, identified multiple attributes contributing to modified habitat within the project area, including silty/mucky substrate and sparse/no cover as attributes with "high influence," along with heavy/moderate silt cover, fair/poor development, low sinuosity, lack of fast current and high/moderate embeddedness as attributes with "moderate influence." The overall QHEI score as calculated by Ohio EPA for this reach of the Great Miami River was 48.0 (see Appendix A), which is indicative of Modified Warmwater Habitat (MWH), rather than the designated aquatic life use for this stretch of Warmwater Habitat (WWH).

Ohio EPA also completed several evaluations of the fish community within the project reach as part of the Biological and Water Quality Study. These evaluations included calculation of the Index of Biotic Integrity (IBI) and the Modified Index of Well-being (MIWb), which are measures of fish community abundance and diversity. While in general, Ohio EPA found that the fish communities met the biocriteria for WWH, they did find a restriction on fish species caused by the low-head dams in Dayton. They noted that "the restriction of fish species, by the dams, combined with comparatively uniform habitat in the leveed reach through Dayton, was reflected in the evenness component of the MIWb, wherein, MIWb scores ran counter to IBI scores with MIWb scores being generally higher in the downstream reaches where species richness was higher, and lower in the upper reaches where the fish community was dominated by several species, notably redhorse suckers, smallmouth bass and spotfin shiners. " Ohio EPA concluded in the Biological and Water Quality Study that, "the short reaches impounded by the eight low-head dams scattered along the main stem obviously possess marginal habitat" and "the low-head dams may be indirectly limiting by altering water quality, and clearly limit the distribution of fish and mussel species."

11.2 Self-Mitigating Project

Removal of the low dam will reduce the constant pool upstream of the dam, improve free-flowing conditions, and restore passage for aquatic life. The grade control structures will function like cross vanes to enhance aquatic habitat, hold grade, reduce bank erosion, and improve sediment transport capacity. As described by D.L. Rosgen, cross vanes provide stream habitat improvements by: (1) creating refuge cover during high and low flow periods in the downstream scour pool; (2) increasing bank cover

due to a differential raise of the water surface in the bank region; (3) developing feeding lanes in the flow separation zones; and (4) creating spawning habitat in the glide portion of the pool. The cross vane can also indirectly enhance benthic habitat by helping maintain stream capacity, preventing sedimentation and erosion, creating diversity of flow and bed material, creating stream pattern and circulating oxygen. Riparian enhancement (e.g., woody plantings) above the banks of the river is very limited due to flood management activities performed by MCD. However, Five Rivers proposes to annually assess and treat invasive and exotic species within the Site if they become established.

For the above reasons, the project should be considered "self-mitigating", as the proposed in-stream habitat improvements will increase the functions and values of this segment of the Great Miami River. No additional mitigation should be necessary.

11.3 Monitoring

11.3.1 Monitoring Schedule

Five Rivers proposes to monitor the project for a period of five years, which is proposed to be conducted during the first growing season subsequent to construction. If all or some of the performance criteria are being met prior to the end of the monitoring period, a request may be sent to the Ohio EPA and USACE for an early release from some or all of the monitoring requirements.

11.3.2 Qualitative Habitat Evaluation Index

Five Rivers proposes to perform QHEIs during the growing seasons of monitoring years 1, 3, and 5 at the following locations: 1) low dam removal site; 2) grade control structure #1; and 3) grade control structure #2. Digital photographs will be taken at each QHEI location using the same locations and orientations each monitoring year. Photographs, locations, and orientations will be included in annual monitoring reports. Photographs will also be taken at specified stations prior to commencement of on-site construction activities and immediately following the completion of construction. These photographs will be submitted with the first annual monitoring report.

11.3.3 In-River Improvements

In addition to the QHEI assessments, Five Rivers will annually assess the overall integrity and stability of the river banks and in-river improvements to document signs of erosion, sedimentation, headcutting, aggradation, degradation, or entrenchment. Digital photographs will be taken at representative locations during each monitoring year. Photographs, locations, and orientations will be included in annual monitoring reports.

11.3.4 Riparian Area

Five Rivers proposes to monitor any areas adjacent to the Great Miami River that were disturbed during construction during the growing season of each monitoring year to document that soils have been permanently stabilized with vegetation. As defined in the General Permit for Storm Water Discharges Associated with Construction Activity (Ohio EPA Permit No. OHC000003), the site will be considered to have reached permanent stabilization when a perennial, vegetative cover has grown to a 70 percent density throughout the entire disturbed area. Digital photographs will be taken at representative

locations during each monitoring year. Photographs, locations, and orientations will be included in annual monitoring reports.

11.3.5 Invasive and Exotic Species

Five Rivers will also document the extent of invasive and exotic species listed in Table 11-1 below and if control methods are necessary. Coverage will be determined by percent cover.

Table 11-1: Invasive and Exotic Plant Species	
Common Name	**Scientific Name**
Purple Loosestrife	*Lythrum salicaria*
European Milfoil	*Myriophyllum spicatum*
Lesser Naiad	*Najas minor*
Reed Canary Grass	*Phalaris arundinacea*
Giant Reed	*Phragmites australis*
Curly Pondweed	*Potamogeton crispus*
Lesser Celandine	*Ranunculus ficaria*
European Buckthorn	*Rhamnus frangula*
Narrow-leaved Cattail	*Typha angustifolia*
Hybrid Cattail	*Typha x-glauca*

11.4 Adaptive Management Plan

11.4.1 In-River Improvements & Riparian Area

Routine and minor repairs to the restored segment of the river and adjacent riparian area will be undertaken by the Five Rivers as necessary and will remain consistent with the restoration goals and objectives of this project. Minor corrective actions may consist of repairing channel banks or structures, re-seeding, or replacing or fine-tuning the in-river structures. If it is determined during monitoring that any areas adjacent to the Great Miami River that were disturbed during construction have not been permanently stabilized with vegetation as defined in Section 11.3.4, additional seeding will be performed following methods outlined in *Ohio DNR's Rainwater and Land Development Manual*[4]. In the event that a major repair is necessary, Five Rivers will, at that time, evaluate the problem and determine the necessary course of action. In the instance that a major repair is necessary, Five Rivers will consult with the Ohio EPA, USACE, and the design team on the appropriate remedial measures.

11.4.2 Invasive and Exotic Species Control

If coverage of invasive and exotic species exceeds 15%, control methods will be utilized. Proposed methods for the control of invasive and exotic species include mowing and chemical treatment with an herbicide designated safe for aquatic use (e.g., glyphosate with non-ionic surfactant). Five Rivers may

[4] Ohio DNR, Rainwater and Land Development, Ohio's Standards for Storm Water Management Land Development and Urban Stream Protection, 3rd Ed., 2006.

use any combination of these control measures if necessary to help prevent the re-infestation of invasive or exotic species within the Site.

11.5 Reporting

Annual monitoring reports will be provided to the Ohio EPA and USACE by December 31st of each monitoring year. Annual monitoring reports will include the information collected during the annual monitoring, and discuss the performance of the mitigation with respect to the performance criteria discussed in Section 11.6 of this document. The monitoring reports will also discuss any failures or external disturbances on the site, and describe any management activities and/or corrective measures that were implemented during the previous year.

11.6 Performance Standards

In order to demonstrate that the mitigation has been successful, mitigation monitoring will be conducted to document pre-determined performance criteria. Performance criteria must be met by the end of the five-year monitoring period. If all or some of the performance criteria are being met prior to the end of the monitoring period, a request may be sent to the Ohio EPA and USACE for an early release from some or all of the monitoring requirements.

11.6.1 Qualitative Habitat Evaluation Index

The grade control structures will help to ameliorate the effects of negative habitat attributes in the leveed and historically modified project reach and, coupled with removal of the dam, will help to improve QHEI scores closer to the expected WWH range.

When compared to the Ohio EPA's QHEI form for this reach, it is expected that the proposed project will improve the QHEI score for this reach as follows:

- **Metric 1 (Substrate)** – Reduction in silt and better sediment transport will potentially increase the score of this metric by up to eight points.
- **Metric 2 (Instream Cover)** – Addition of boulder substrate is expected to improve this metric score by one point.
- **Metric 3 (Channel Morphology)** – Improvement in channel development is expected to increase this metric score by one point.
- **Metric 4 (Bank Erosion and Riparian Zone)** – No change in this metric score expected due to floodplain maintenance performed by MCD.
- **Metric 5 (Pool/Glide and Riffle/Run Quality)** – Improvement to flow diversity and re-establishment of riffle/pool complexes is expected to increase this metric score by more than four points.
- **Metric 6 (Gradient)** – No change in this metric score expected.

Based on our review of Ohio EPA's pre-construction QHEI form, we expect that this project has the potential to improve the QHEI score of 48 by as many as 14 points, which would bring this reach of the river closer to the expected WWH range. Five Rivers proposes a post-construction QHEI score greater

than 48 within the five year monitoring period to demonstrate an improvement to the physical conditions of the river.

11.6.2 Invasive and Exotic Species

The coverage of invasive and/or exotic plant species within the Site shall not exceed 15%. Coverage will be measured by percent coverage. Invasive and exotic plant species that pertain to this criterion are listed in Table 11-1.

11.7 Long Term Protection & Maintenance

The Site is within MCD's Great Miami River flood management area, and will always be maintained and protected against flooding and other land uses that are not in line with MCD's Strategic Plan. Per MCD's Strategic Plan, its goals are to: 1) Provide unfailing flood protection to communities along the Great Miami River; 2) Promote the sustainability of the region's water resources; 3) Enhance public use and enjoyment of natural lands and river corridors; and 4) Help communities leverage water resources as an asset to enhance economic vitality and quality of life.

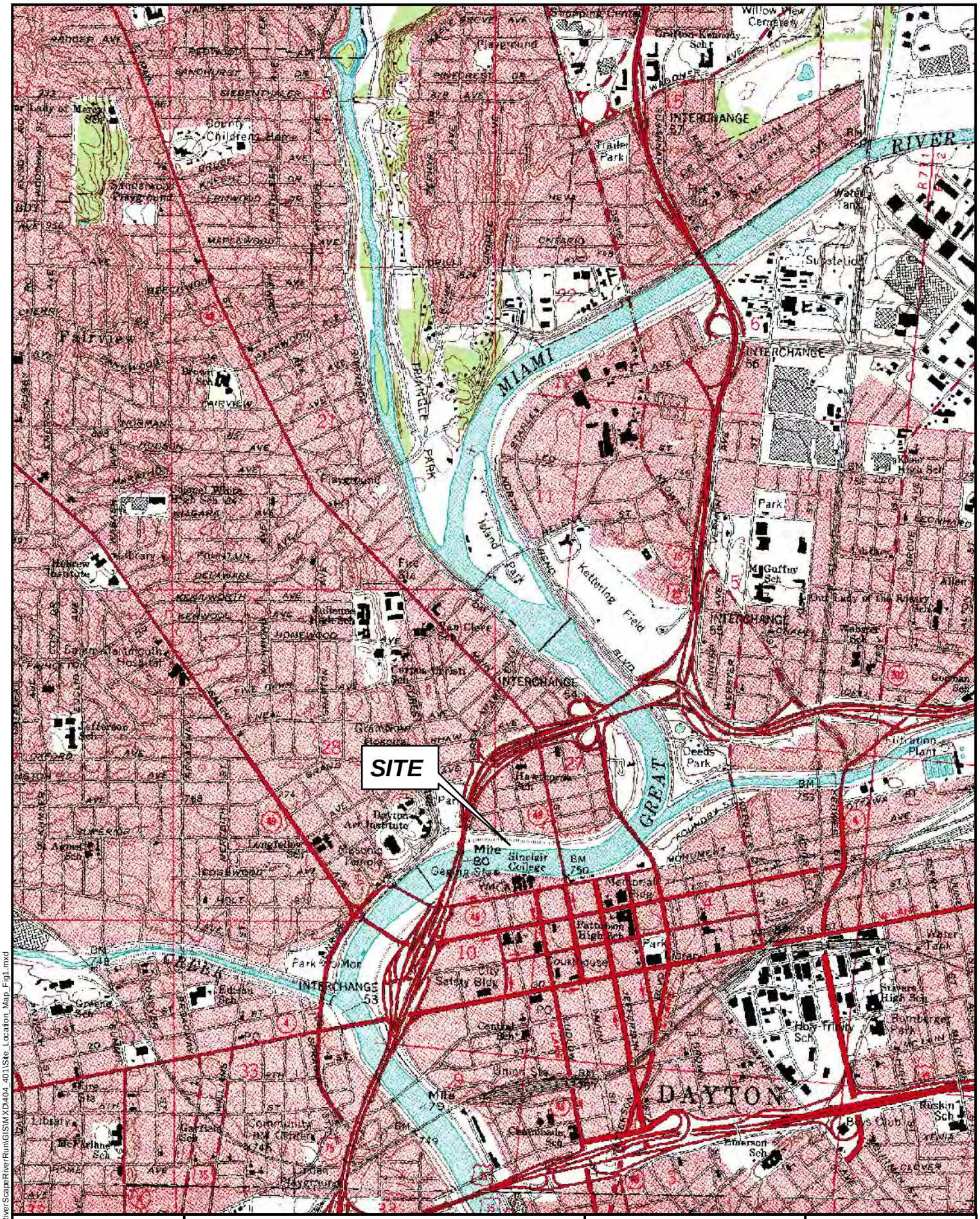
Five Rivers will take ownership of the in-river structures, and will be responsible for any required maintenance of the structures. Five Rivers' vision is to be the conservation leader of a vital, active, nature-based community, with a mission to protect the regions natural heritage and provide outdoor experiences that inspire a personal connection with nature. Their stated purpose is to protect natural areas, parks, and river corridors, and to promote the conservation and use of these lands and waterways for the ongoing benefit of the people in the region.

Based on the long-term responsibilities and goals of MCD and Five Rivers, additional protection (e.g., covenant, conservation easement) for the Site is not proposed.

Five Rivers MetroParks
Great Miami Low Dam Removal Project
Application for Individual Section 401 Water Quality Certification

Figures

Project Number 019-001



COLDWATER CONSULTING, LLC
SUSTAINABLE SOLUTIONS FOR YOUR WATER RESOURCES

GREAT MIAMI LOW DAM REMOVAL PROJECT

FIVE RIVERS METROPARKS

SITE LOCATION MAP

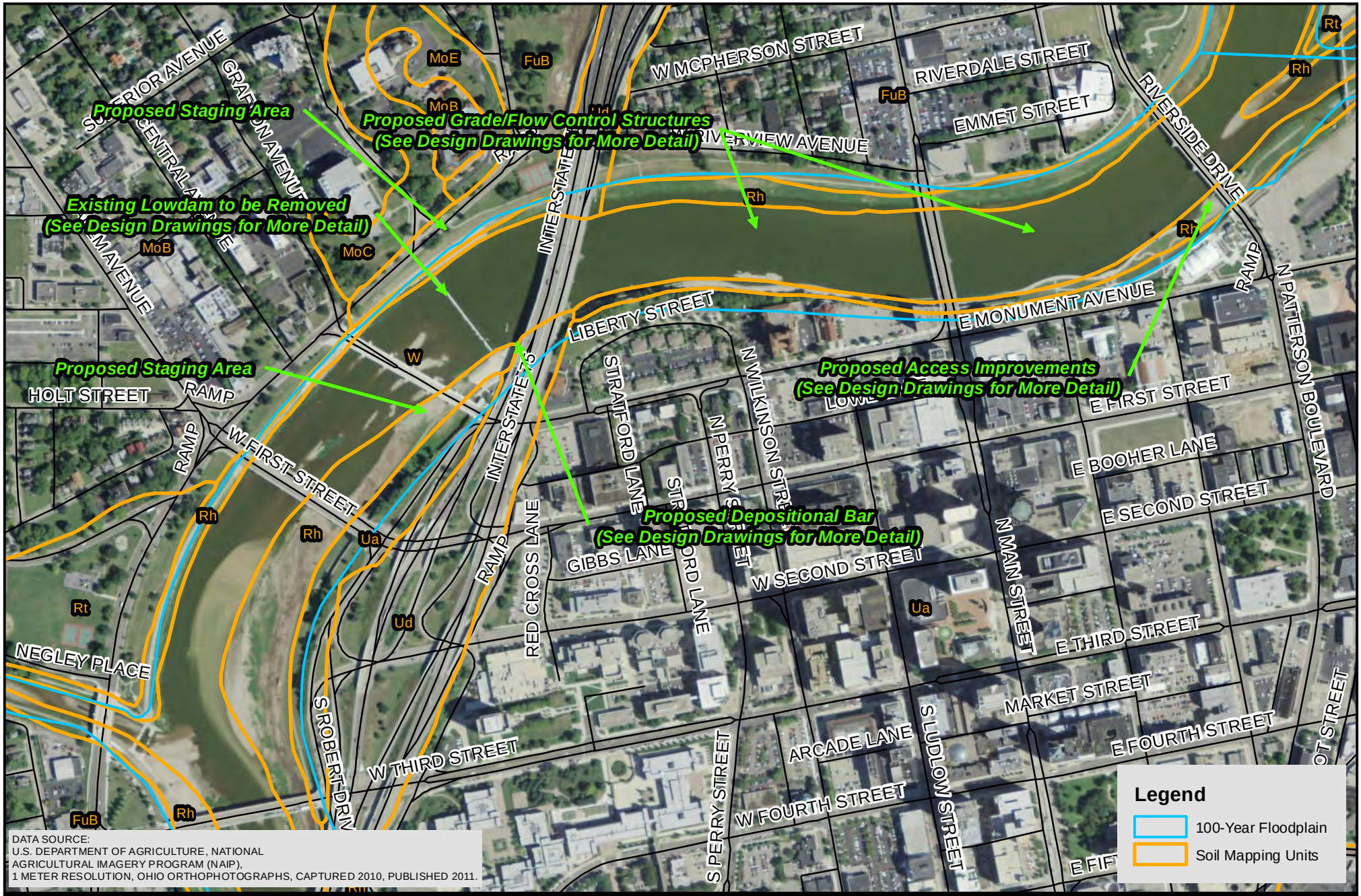
JANUARY 2013

FIGURE 1

0 1,000 2,000 Feet

T:\Projects\019_REP_RiverScapeRiverRun\GIS\MXD\404_401\Site_Location_Map_Fig1.mxd

T:\Projects\019_REP_RiverScapeRiverRun\GIS\MXD\404_401\2011_Aerial_Fig2.mxd



COLDWATER CONSULTING, LLC
SUSTAINABLE SOLUTIONS FOR YOUR WATER RESOURCES

GREAT MIAMI LOW DAM REMOVAL PROJECT

FIVE RIVERS METROPARKS

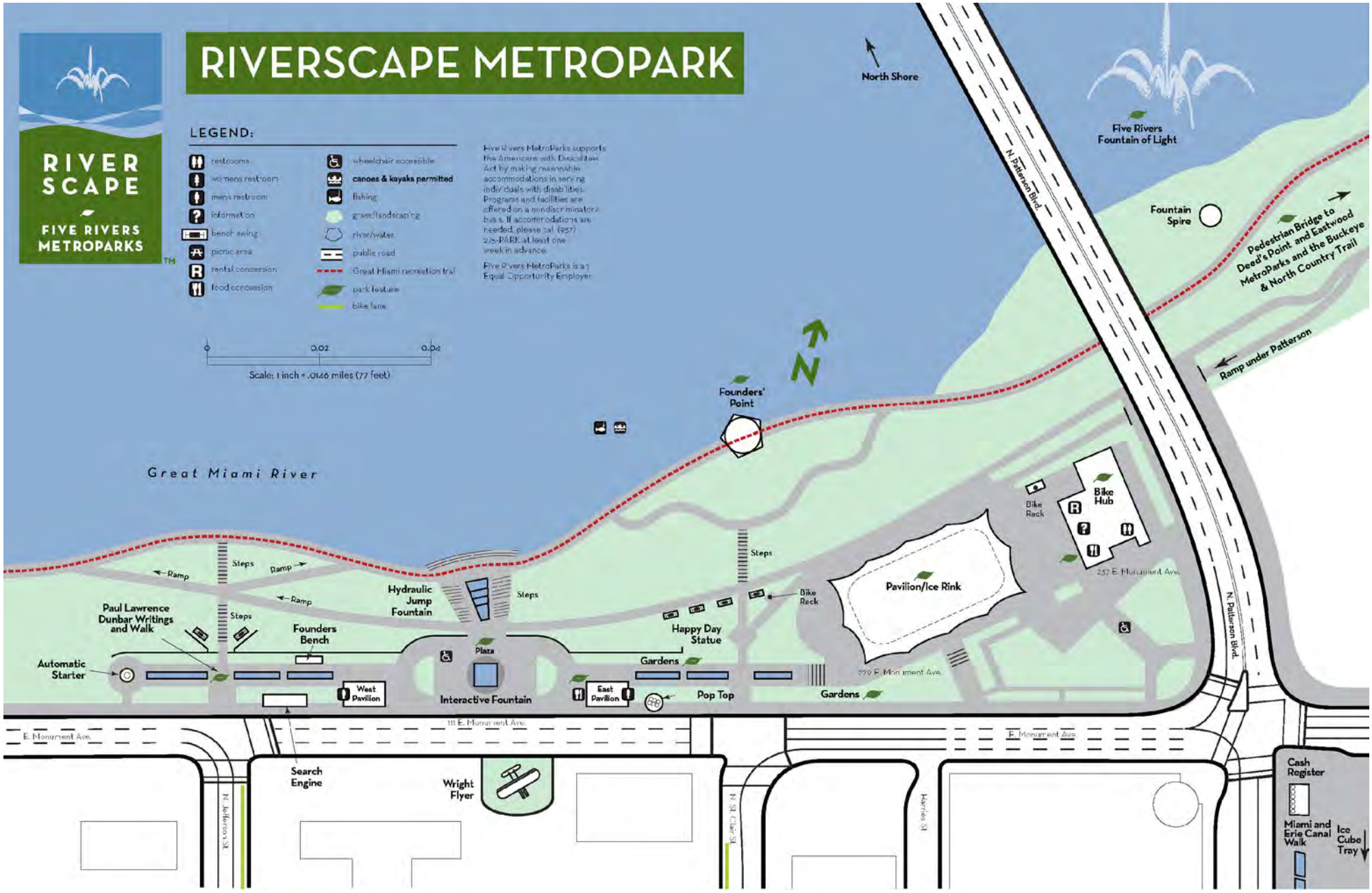
2011 AERIAL PHOTOGRAPH

JANUARY 2013

FIGURE 2

0 300 600 Feet

T:\Projects\019_REP_RiverScapeRiverRun\GIS\MXD\404_401\RiverScape_Fig3.mxd



COLDWATER CONSULTING, LLC
SUSTAINABLE SOLUTIONS FOR YOUR WATER RESOURCES

GREAT MIAMI LOW DAM REMOVAL PROJECT
FIVE RIVERS METROPARKS

RIVERSCAPE METROPARK MAP

JANUARY 2013

FIGURE 3

Not To Scale

T:\Projects\019_REP_RiverScapeRiverRun\GIS\MXD\404_401\1968_Aerial_Fig4.mxd

COLDWATER CONSULTING, LLC SUSTAINABLE SOLUTIONS FOR YOUR WATER RESOURCES	GREAT MIAMI LOW DAM REMOVAL PROJECT FIVE RIVERS METROPARKS	1968 AERIAL PHOTOGRAPH	JANUARY 2013 FIGURE 4 NOT TO SCALE

Five Rivers MetroParks
Great Miami Low Dam Removal Project
Application for Individual Section 401 Water Quality Certification

Appendix A

Ohio EPA Qualitative Habitat Evaluation Index (QHEI) Form

Project Number 019-001

OhioEPA Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 48

Stream & Location: GMR @ Monument Ave **RM:** 8.61 **Date:** 10-1-10

STORET #: H09K20 **Scorer Name & Affiliation:** M. Hax

River Code: 14-001-000 **Lat./Long.:** (NAD 83 - decimal °) **Office verified location** ☐

1] SUBSTRATE
Check ONLY Two substrate TYPE BOXES; estimate % or note every type present

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐ Bedrock			☐ Hardpan		
☐ Boulder			☐ Detritus		
☐ Cobble			☐ Muck		
☑ Gravel			☒ Artificial		
☐ Sand		20	☐ Silt		
☐ Fines			☐ Sludge		

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 1 ☒ 2

Check ONE (Or 2 & average)

ORIGIN: ☐ Natural ☒ Recovered ☐ Recovering ☐ Modified ☐ Modified/Recovering ☐ Artificial

QUALITY: ☐ Silt ☐ Silt/Embedded ☐ Embedded ☐ Normal

Substrate Maximum 20: 17

Comments

2] INSTREAM COVER
Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

0	Bedrock	1	Hardpan	0	Detritus
1	Boulder	0	Detritus	1	Muck
0	Cobble		Muck	1	Artificial

AMOUNT Check ONE (Or 2 & average)

☐ 0 (Absent) ☐ 1 (Very small) ☑ 2 (Moderate) ☐ 3 (Highest)

Cover Maximum 20: 10

Comments

3] CHANNEL MORPHOLOGY
Check ONE in each category (Or 2 & average)

SINUOSITY: ☐ Straight ☐ Moderate ☒ Meandering ☐ Extensive

DEVELOPMENT: ☐ None ☐ Low ☑ Moderate ☐ High

CHANNELIZATION: ☒ Normal ☐ Recovered ☐ Recovering ☐ Modified ☐ Modified/Recovering ☐ Artificial

STABILITY: ☒ High ☐ Moderate ☐ Low

Channel Maximum 20: 16

Comments

4] BANK EROSION AND RIPARIAN ZONE
Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION	L	R	RIPARIAN WIDTH	L	R	FLOOD PLAIN QUALITY	L	R
☐ Natural	☒	☐	☐ Very Wide	☐	☐	☐ Very Extensive	☐	☐
☐ Moderate	☐	☐	☐ Wide	☐	☐	☐ Extensive	☐	☐
☐ Heavy	☐	☐	☐ Moderate	☐	☐	☐ Moderate	☐	☐
☐ Severe	☐	☐	☐ Narrow	☐	☐	☐ Narrow	☒	☒
			☒ Very Narrow	☒	☒	☒ None		

Indicate predominant land use(s) past 100m riparian.

Riparian Maximum 10: 10

Comments

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)

☐ Bedrock ☐ Boulder ☐ Cobble ☒ Gravel ☐ Sand ☐ Fines

CHANNEL WIDTH Check ONE (Or 2 & average)

☐ Very Large ☒ Large ☐ Moderate ☐ Small ☐ Very Small

CURRENT VELOCITY Check ALL that apply

☐ Torrential ☐ Fast ☑ Moderate ☐ Slow ☐ Interstitial ☐ Eddying

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Pool / Current Maximum 12: 10

Comments

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: Check ONE (Or 2 & average). ☐ NO RIFFLE [metric=0]

RIFFLE DEPTH: ☐ Shallow ☐ Moderate ☐ Deep

RUN DEPTH: ☐ Shallow ☐ Moderate ☒ Deep

RIFFLE / RUN SUBSTRATE: ☐ Bedrock ☐ Boulder ☐ Cobble ☐ Gravel ☐ Sand ☐ Fines

RIFFLE / RUN EMBEDDEDNESS: ☐ Extensive ☐ Moderate ☐ Sparse ☐ None

☒ no riffle

Riffle / Run Maximum 8: 8

Comments

6] GRADIENT (5.00 ft/mi) DRAINAGE AREA (251 mi²)

%POOL: %GLIDE: %RUN: %RIFFLE:

Gradient Maximum 10: 10

A] SAMPLED REACH

Check ALL that apply

METHOD

- ☐ [redacted]

STAGE

1st -sample pass- 2nd

- ☐ [redacted]

DISTANCE

- ☐ [redacted]
- ☐ OTHER

meters

CLARITY

1st -sample pass- 2nd

- ☐ [redacted]
- ☐ SECCHI DEPTH

1st _____ cm

2nd _____ cm

CANOPY

- ☐ [redacted]

Comment RE: Reach consistency/ Is reach typical of steam?, *Recreation/* Observed - Inferred, *Other/* Sampling observations, Concerns, Access directions, etc.

B] AESTHETICS

- ☐ [redacted]

C] RECREATION

AREA DEPTH

POOL: ☐ >100ft² ☐ >3ft

D] MAINTENANCE

Circle some & *COMMENT*

PUBLIC / PRIVATE / BOTH / NA
ACTIVE / HISTORIC / BOTH / NA
YOUNG-SUCCESSION-OLD
SPRAY / SNAG / REMOVED
MODIFIED / DIPPED OUT / NA
LEVEED / ONE SIDED
RELOCATED / CUTOFFS
MOVING-BEDLOAD-STABLE
ARMOURED / SLUMPS
ISLANDS / SCOURED
IMPOUNDED / DESICCATED
FLOOD CONTROL / DRAINAGE

E] ISSUES

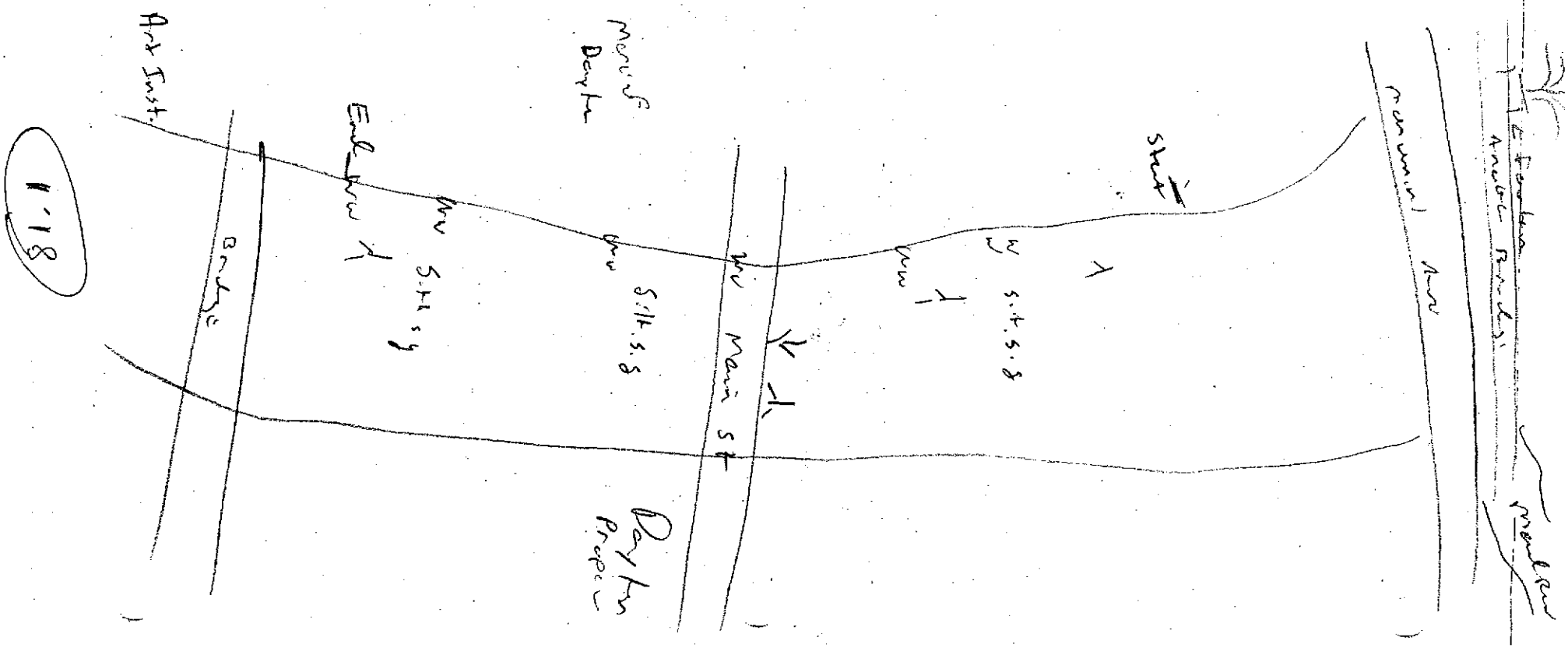
WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMENTS

- ☐ [redacted]

Legacy Tree:

Stream Drawing:



Five Rivers MetroParks
Great Miami Low Dam Removal Project
Application for Individual Section 401 Water Quality Certification

Appendix B

Agency Correspondence

OHIO HISTORICAL SOCIETY
Ohio Historic Preservation Office

OHIO HISTORIC PRESERVATION OFFICE:
RESOURCE PROTECTION AND REVIEW

Section 106 Review - Project Summary Form

For projects requiring a license from the Federal Communications Commission, please use FCC Forms 620 or 621. DO NOT USE THIS FORM.

SECTION 1: GENERAL PROJECT INFORMATION

All contact information provided must include the name, address and phone number of the person listed. Email addresses should also be included, if available. Please refer to the Instructions or contact an OHPO reviewer (mailto:Section106@ohiohistory.org) if you need help completing this Form. Unless otherwise requested, we will contact the person submitting this Form with questions or comments about this project.

Date: **11/30/12**

Name/Affiliation of person submitting form: **Kristen D. Risch/Coldwater Consulting, LLC**

Mailing Address: **46 West Columbus Street, Galena, OH 43021-0146**

Phone/Fax/Email: **(740) 936-5368/kdrisch@coldwaterconsultants.com**

A. Project Info:

1. This Form provides information about:
   New Project Submittal:
   YES ☒ NO ☐

   Additional information relating to previously submitted project:
   YES ☐ NO ☒

   OHPO/RPR Serial Number from previous submission:
   NA

2. Project Name (if applicable):
   Great Miami Low Dam Removal Project

3. Internal tracking or reference number used by Federal Agency, consultant, and/or applicant to identify this project (if applicable):
   Army Corps of Engineers: LRH-2012-311-GMR

B. Project Address or vicinity:
As shown on Figures 1 and 2 (attached) the project occurs on the Great Miami River between W. 1st Street and Riverside Drive.

C. City/Township:
Dayton

D. County:
Montgomery

E. Federal Agency and Agency Contact. *If you do not know the federal agency involved in your project, please contact the party asking you to apply for Section 106 Review, not OHPO, for this information. HUD Entitlement Communities acting under delegated environmental review authority should list their own contact information.*

Federal Agency: U.S. Army Corps of Engineers, Cincinnati Field Office, 10557 McKelvey Road, Cincinnati, OH 45240
Contact: Laurie A. Moore
Phone: (513) 825-1901
Email: Laurie.A.Moore@usace.army.mil

F. Type of Federal Assistance. *List all known federal sources of federal funding, approvals, and permits to avoid repeated reviews.*
Section 404 Permit (not yet submitted)

G. State Agency and Contact Person (if applicable):
NA

H. Type of State Assistance:
NA

I. Is this project being submitted at the direction of a state agency **solely** under Ohio Revised Code 149.53 or at the direction of a State Agency? *Answering yes to this question means that you are sure that no federal funding, permits or approvals will be used for any part of your project, and that you are seeking comments only under ORC 149.53.*

YES ☐ NO ☒

J. Public Involvement- Describe how the public has been/will be informed about this project and its potential to affect historic properties. Please summarize how they will have an opportunity to provide comments about any effects to historic properties. (This step is required for all projects under 36 CFR § 800.2):

The public has been, and will continue to be, informed of this project by Five Rivers MetroParks and the Downtown Dayton Partnership. Several public information meetings have been held to date. Participants have had the opportunity to provide comments regarding the project during meetings and through email contact with the project managers. Project partners and the public continue to receive updates on the project. The Downtown Dayton Partnership maintains a website page with periodic project

status reports:http://www.downtowndayton.org/index.php?option=com_content&task=view&id=252.

Project managers have also met with City of Dayton Neighborhood Priority Boards, community members, and partner orgainization representatives regarding the details of the project.

K. Please list other consulting parties that you have contacted/will contact about this project, such as Indian Tribes, Certified Local Governments, local officials, property owners, or preservation groups. (See 36 CFR § 800.2 for more information about involving other consulting parties). Please summarize how they will have an opportunity to provide comments:

Project partners include the Downstown Dayton Partnership, University of Dayton Rivers Institute, Miami Conservancy District, City of Dayton, and Montgomery County.

Five Rivers MetroParks has held community meetings, led fund raising campaigns, and have informed the local governments and officials. Meetings have been conducted with the City of Dayton One Stop Center regarding City of Dayton permitting, ODOT I-75 project construction team regarding river access, and the City of Dayton Water Department regarding protection of utilities. The Miami Conservancy District is an envolved partner in the project and participates in regular design and engineering review meetings. Representatives of the McPherson Historical Society, Grafton Hill Neighborhood Association, the Wright Dunbar Neighborhood Association, the Dayton Art Institiute, the Downtown Dayton Priority Board, the University of Dayton, and the Downtown YMCA have participated in the public meetings and/or been individually interviewed as project stakeholders. Comments have been solicited during project and public meetings and via email correspodence with the project managers. Over the course of meetings and reviews with the community partners, no one has raised a concern regarding adverse impact to historic resources by the proposed project.

SECTION 2: PROJECT DESCRIPTION AND AREA OF POTENTIAL EFFECTS (APE)

Provide a description of your project, its site, and geographical information. You will also describe your project's Area of Potential Effects (APE). Please refer to the Instructions or contact an OHPO reviewer if you need help with developing the APE or completing this form.

For challenging projects, provide as much information as possible in all sections, and then check the box in Section 5.A. to ask OHPO to offer preliminary comments or make recommendations about how to proceed with your project consultation. This is recommended if your project involves effects to significant historic properties or if there may be challenging procedural issues related to your project. Please note that providing information to complete all Sections will still be required and that asking OHPO for preliminary comments may tend to delay completion of the review process for some projects.

A. Does this project involve any Ground-Disturbing activity: YES ☒ NO ☐
(If **Yes**, you must complete all of Section 2.A. If **No**, proceed directly to Section 2. B.)

1. General description of width, length and depth of proposed ground disturbing activity:

The project location is shown on Figures 1 and 2 (attached). As shown on the low dam removal drawings (attached), the project involves 1) removal of an existing lowhead dam just upstream of Monument Avenue; and 2) construction of two grade control structures in the Great Miami River. The project will require some ground disturbance within and above the banks of the Great Miami River. The total area of potential disturbance, which includes disturbance within the Great Miami River (7.1 acres) as well as temporary construction access/staging (5.5 acres), is approximately 12.6 acres.

2. Narrative description of previous land use and past ground disturbances, if known:

The Site location is shown on Figures 1 and 2. As shown in the attached photographs, the Site has experienced previous disturbance over the past century, including flood control and maintenace activities by the Miami Conservancy District (removal of woody vegetation, maintenance mowing, construction of flood control levees, channel shaping/excavation) and construction of public infrastructure along the river (sidewalks/bikepaths, ampitheatre, access points, utilities etc.). The Site is located within the 100-year floodplain. According to the Montgomery County Soil Survey and as shown on Figure 2, soils mapped within most of the Site include the Riverwash (Rh) unit. Portions of the staging areas are mapped as Urban land, alluvial (Ua) and Fox--Urban land complex (FuB).

Documentation of historic Site disturbance is shown on the Miami Conservancy District flood control and channel improvement maps (attached). The banks and adjacent floodplain within this reach of the river were more recently disturbed during the Dayton Low Dam Channel Improvement Project (see attached 1977 drawings). That project involved significant cut and fill activities along the river, starting at the existing low dam and extending upstream beyond the limits of this project.

It is important to note that this project will be constructed within

the same timeframe of the Ohio Department of Transportation (ODOT) I-75 bridge improvement project, which is located just upstream of the existing low dam. The ODOT work is under contract now and is expected to be under construction through 2017. The ODOT work is independent from the low dam removal project. However, in addition to the staging areas shown on Figure 2, the low dam removal contractor will utilize ODOT's river access for the I-75 work as well as other previously disturbed areas between the dam and upstream structure (e.g., maintained floodplain) to access the Site.

3. Narrative description of current land use and conditions:
   The Site is located in the floodplain of the Great Miami River and is managed and actively maintained by the Miami Conservancy District. Portions of the Site support public infrastructure (sidewalks/bikepath, ampitheatre, river access, utilities, etc.). Current public uses include, but are not limited to, fishing, walking/biking, and hand-powered boating.

4. Does the landowner know of any archaeological resources found on the property?
   YES ☐ NO ☒ If yes, please describe:
   The attached Literature Review completed by Weller & Associates, Inc. indicated that no previously recorded sites are located within the footprint of any proposed new structures. However, there is one archaeological site (33 MY 322) documented within the floodplain along the right descending bank of the river, just upstream of the I-75 bridge. According to the Ohio Archaeological Inventory form for this site (attaced), it is the former McPherson Mill and is documented as being destroyed by flood control projects and road construction.

B. Submit the exact project site location on a USGS 7.5-minute topographic quadrangle map for all projects. Map sections, photocopies of map sections, and online versions of USGS maps are acceptable as long as the location is clearly marked. Show the project's Area of Potential Effects (APE). It should be clearly distinguished from other features shown on the map:
   1. USGS Quad Map Name:
      Dayton North
   2. Township/City/Village Name:
      Dayton

C. Provide a street-level map indicating the location of the project site; road names must be identified and legible. Your map must show the exact location of the boundaries for the project site. Show the project's Area of Potential Effects (APE). It should be clearly distinguished from other features shown on the map:

D. Provide a verbal description of the APE, including a discussion of how the APE will include areas with the potential for direct and indirect effects from the project. Explain the steps taken to identify the project's APE, and your justification for the specific boundaries chosen:

The project involves the removal of an existing low head dam and construction of two grade control structures within the Great Miami River. The improvements will require soil disturbance within and above the banks of the Great Miami River. The APE is considered to be the project's physical boundaries, which is shown on Figures 1 and 2. This project will not result in any new above grade structures outside of the river channel or changes in land use.

The low dam has created a constant pool throughout the Site that fluctuates in depth and width under high and low flow conditions. Removal of the dam and installation of the grade control structures will lower the localized pool elevation (from upstream of the existing low dam to below the upstream grade control structure #1) and re-establish riffle/pool complexes at the grade control structures. The pool elevation will be maintained close to existing upstream of the upstream grade control structure #1. As a result, the physical characteristics of the Great Miami River from a viewshed standpoint will not change.

Weller & Associates, Inc. performed a Literature Review for the project (attached), which encompassed an area within a 2.0 km (1.24 mile) radius from the center of the Site. This review indicated that no previously recorded sites are located within the footprint of any proposed new structures. However, there is one archaeological site (33 MY 322) documented within the floodplain along the right descending bank of the river, just upstream of the I-75 bridge. According to the Ohio Archaeological Inventory form for this site (attaced), it is the former McPherson Mill and is documented as being destroyed by flood control projects and road construction.

E. Provide a detailed description of the project. This is a critical part of your submission. Your description should be prepared for a cold reader who may not be an expert in this type of project. The information provided must help support your analysis of effects to historic properties, not other types of project impacts. Do not simply include copies of environmental documents or other types of specialized project reports. If there are multiple project alternatives, you should include information about all alternatives that are still under active consideration:

As shown on the low dam removal drawings (attached), the existing lowhead dam will be removed and two grade control structures will be installed in the Great Miami River, causing some disturbance to the banks on either side of the river. In addition to the temporary construction staging areas along the river in the vicinity of the I-75 bridge (See Figure 2), the low dam removal contractor will likely utilize ODOT's river access for the I-75 work as well as other previously disturbed areas between the dam and upstream structure (e.g., maintained floodplain, bikepaths) to access the Site. Site photographs are attached.

As can be seen on Figures 1 and 2 and on the attachments to this form, the Site is located immediately adjacent to the Great Miami River in an area that has been severely altered by urban development, flood control and maintenance projects, park and bike trail development, utility construction, and construction associated with the I-75 corridor.

Envronmental benefits of the dam removal will include: (1) removing an impedence to upstream and downstream migration; (2) reducing siltation of habitat above the dam; (3) restoring natural seasonal flow variations; (4) eliminating unnatural temperature and dissolved oxygen variations caused by the dam pool; and (5) allowing woody debris, coarse substrate and nutrients to pass below the dam, creating healthy habitat. The dam removal will also provide significant safety improvements by eliminating the dangerous recirculation pool downstream of the dam that traps swimmers and paddlers. The construction contractor will be required to implement Best Management Practices (BMPs) for the duration of construction to comply with construction storm water regulations.

Five Rivers MetroParks has gained public support of this project through community meetings and fund raising campaigns, and have informed the local governments and officials. Project partners include the Downtown Dayton Partnership, University of Dayton Rivers Institute, Miami Conservancy District, City of Dayton, and Montgomery County.

SECTION 3: IDENTIFICATION OF HISTORIC PROPERTIES

Describe whether there are historic properties located within your project APE. To make that determination, use information generated from your own Background Research and Field Survey. Then choose one of the following options to report your findings. Please refer to the Instructions and/or contact an OHPO reviewer if you are unsure about how to identify historic properties for your project.

If you read the Instructions and you're still confused as to which reporting option best fits your project, or you are not sure if your project needs a survey, you may choose to skip this section, but provide as much supporting documentation as possible in all other Sections, then check the box in Section 5.A. to request preliminary comments from OHPO. After reviewing the information provided, OHPO will then offer comments as to which reporting option is best suited to document historic properties for your project. Please note that providing information to complete this Section will still be required and that asking OHPO for preliminary comments may tend to delay completion of the review process for some projects.

Recording the Results of Background Research and Field Survey:

A. **Summary of discussions and/or consultation with OHPO** about this project that demonstrates how the Agency Official and OHPO have agreed that no Field Survey was necessary for this project (typically due to extreme ground disturbance or other special circumstances). Please **attach copies** of emails/correspondence that document this agreement. You must explain how the project's potential to affect both archaeological and historic resources were considered.

B. **A table that includes the minimum information** listed in the OHPO Section 106

Documentation Table (which is generally equivalent to the information found on an inventory form). This information must be printed and mailed with the Project Summary Form. To provide sufficient information to complete this Section, you must also include summary observations from your field survey, background research and eligibility determinations for each property that was evaluated in the project APE.

C. OHI (Ohio Historic Inventory) or OAI (Ohio Archaeological Inventory) forms- New or updated inventory forms may be prepared using the OHI pdf form with data population capabilities, the Internet IForm, or typed on archival quality inventory forms. To provide sufficient information to complete this Section, you must include summary observations from your field survey and background research. You must also include eligibility determinations for each property that was evaluated in the project APE

D. A historic or archaeological survey report prepared by a qualified consultant that meets professional standards. The survey report should meet the Secretary of the Interior's Standards and Guidelines for Identification and OHPO Archaeological Guidelines. You may also include new inventory forms with your survey, or update previous inventory forms. To complete this section, your survey report must include summary observations from your field survey, background research and eligibility determinations for each property that was evaluated within the APE.

E. Project Findings. Based on the conclusions you reached in completing Section 3, please choose one finding for your project. There are (mark one):

☐ Historic Properties Present in the APE:
☒ No Historic Properties Present in the APE:

SECTION 4: SUPPORTING DOCUMENTATION

This information must be provided for all projects.

A. Photographs must be keyed to a street-level map, and should be included as attachments to this application. Please label all forms, tables and CDs with the date of your submission and project name, as identified in Section 1. You must present enough documentation to clearly show existing conditions at your project site and convey details about the buildings, structures or sites that are described in your submission. Faxed or photocopied photographs are not acceptable. See Instructions for more info about photo submissions or 36 CFR § 800.11 for federal documentation standards.
    1. Provide photos of the entire project site and take photos to/from historic properties from/towards your project site to support your determination of effect in Section 5.
    2. Provide current photos of all buildings/structures/sites described.
B. Project plan, specifications, site drawings and any other media presentation that conveys detailed information about your project and its potential to affect historic properties.
C. Copies or summaries of any comments provided by consulting parties or the public.

SECTION 5: DETERMINATION OF EFFECT

A. **Request Preliminary Comments.** For challenging projects, provide as much information as possible in previous sections and ask OHPO to offer preliminary comments or make recommendations about how to proceed with your project consultation. This is recommended if your project involves effects to significant

historic properties, if the public has concerns about your project's potential to affect historic properties, or if there may be challenging procedural issues related to your project. Please be aware that providing information in all Sections will still be required and that asking OHPO for preliminary comments may tend to delay completion of the review process for some projects.

1. We request preliminary comments from OHPO about this project:
   YES ☐ NO ☒

2. Please specify as clearly as possible the particular issues that you would like OHPO to examine for your project (for example- help with developing an APE, addressing the concerns of consulting parties, survey methodology, etc.):
   Please review the attached Literature Review prepared by Weller & Associates, Inc.

B. **Determination of Effect.** If you believe that you have gathered enough information to conclude the Section 106 process, you may be ready to make a determination of effect and ask OHPO for concurrence, while considering public comments. Please select and mark one of the following determinations, then explain the basis for your decision on an attached sheet of paper:

☒ **No historic properties will be affected** based on 36 CFR § 800.4(d) (1).
Please explain how you made this determination:
This determination is based on the following:

- The Site is immediately adjacent to the Great Miami River and within the 100-year floodplain. As shown in the attached photographs, the Site has experienced previous disturbance over the past century, including flood control and maintenance activities by the Miami Consevancy District (removal of woody vegetation, maintenance mowing, construction of flood control levees, channel shaping/excavation), construction of public infrastructure along the river (sidewalks, bike trails, ampitheater, access points, utilities, etc.), and construction and maintenance associated with Interstate-75 and other bridges across the Great Miami River.

- Documentation of historic Site disturbance is shown on the Miami Conservancy District flood control and channel improvement maps (attached). The banks and adjacent floodplain within this reach of the river were more recently disturbed during the Dayton Low Dam Channel Improvement Project (see attached 1977 drawings). That project involved significant cut and fill activities along the river, starting at the existing low dam and extending upstream beyond the limits of this project.

- The low dam has created a constant pool throughout the

Site that fluctuates in depth and width under high and low flow conditions. Removal of the dam and installation of the grade control structures will lower the localized pool elevation (from upstream of the existing low dam to below the upstream grade control structure #1) and re-establish riffle/pool complexes at the grade control structures. The pool elevation will be maintained close to existing upstream of the upstream grade control structure #1. As a result, the physical characteristics of the Great Miami River from a viewshed standpoint will not change.

- As indicated in the attached Literature Review performed by Weller & Associates, Inc., no previously recorded cultural resources are located within the footprint of any proposed structures.

- One archaeological site (33 MY 322) is documented within the floodplain along the right descending bank of the river, just upstream of the I-75 bridge. According to the Ohio Archaeological Inventory form for this site (attaced), it is the former McPherson Mill and is documented as being destroyed by flood control projects and road construction.

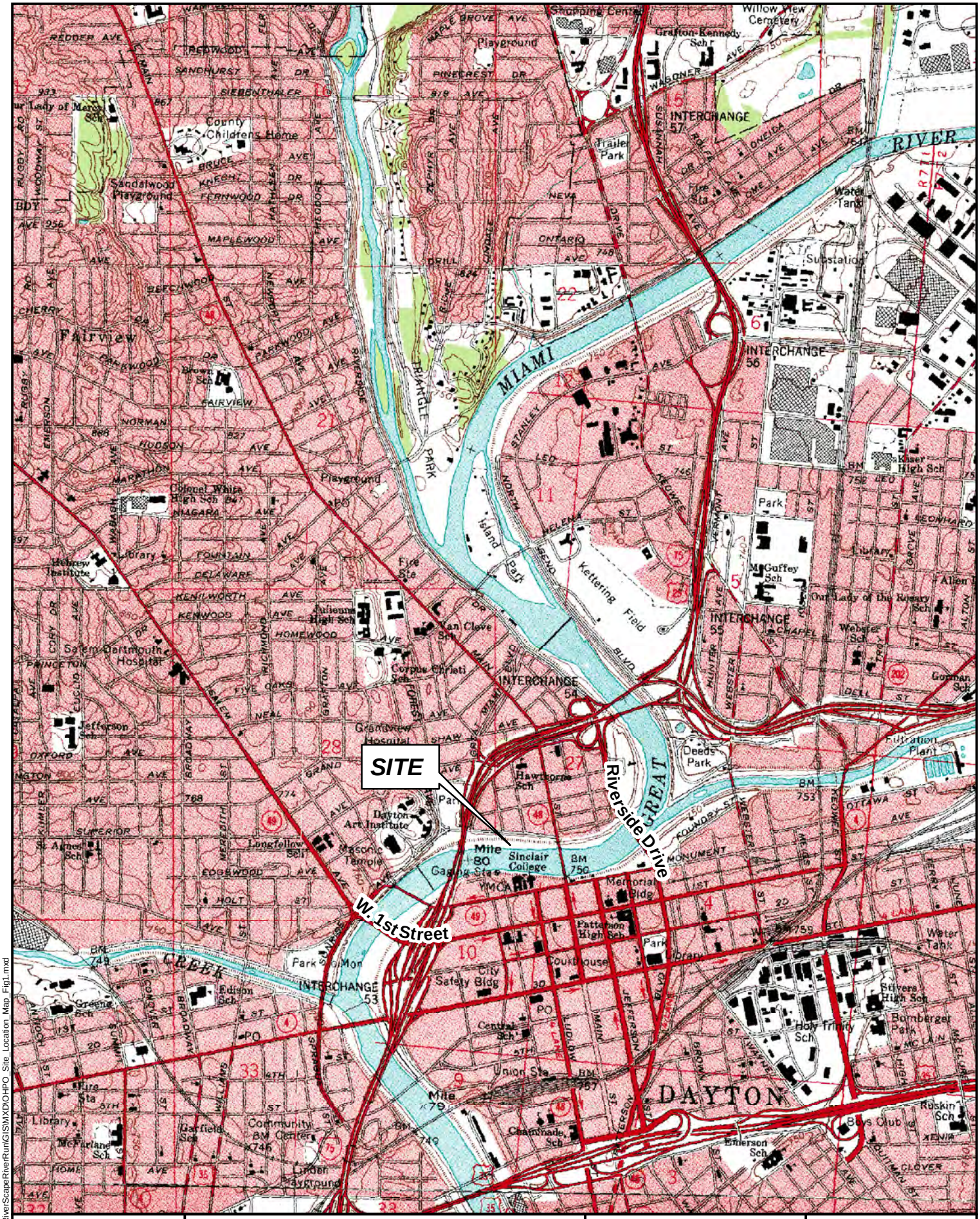
☒ **No Adverse Effect** [36 CFR § 800.5(b)] on historic properties. This finding cannot be used if there are no historic properties present in your project APE. Please explain why the Criteria of Adverse Effect, [36 CFR Part 800.5(a) (1)], were found not to be applicable for your project:

☐ **Adverse Effect** [36 CFR § 800.5(d) (2)] on historic properties. Please explain why the criteria of adverse effect, [36 CFR Part 800.5(a) (1)], were found to be applicable to your project. You may also include an explanation of how these adverse effects might be avoided, reduced or mitigated:

Please print and mail completed form and supporting documentation to:

Ohio Historic Preservation Office
Attn: Mark J. Epstein, Department Head
Resource Protection and Review
1982 Velma Avenue
Columbus, OH 43211-2497

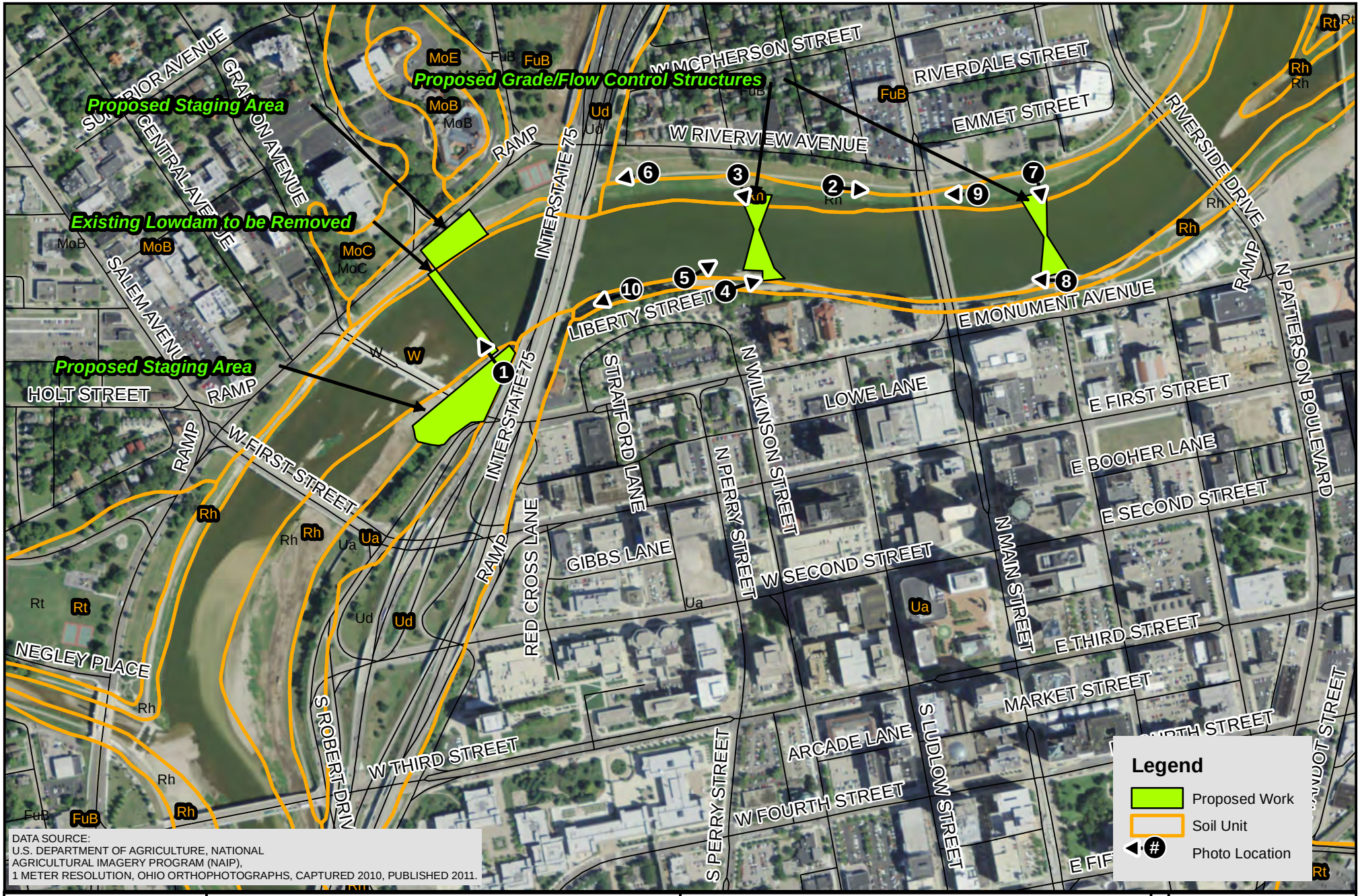
Figures



COLDWATER CONSULTING, LLC SUSTAINABLE SOLUTIONS FOR YOUR WATER RESOURCES	GREAT MIAMI LOW DAM REMOVAL PROJECT FIVE RIVERS METROPARKS	SITE LOCATION MAP	NOVEMBER 2012 FIGURE 1 0 1,000 2,000 Feet

T:\Projects\019_REP_RiverScapeRiverRun\GIS\MXD\OHPO_Site_Location_Map_Fig1.mxd

T:\Projects\019_REP_RiverScapeRiverRun\GIS\MXD\OHPO_Aerial_Map_Fig2.mxd



DATA SOURCE:
U.S. DEPARTMENT OF AGRICULTURE, NATIONAL AGRICULTURAL IMAGERY PROGRAM (NAIP),
1 METER RESOLUTION, OHIO ORTHOPHOTOGRAPHS, CAPTURED 2010, PUBLISHED 2011.

COLDWATER CONSULTING, LLC
SUSTAINABLE SOLUTIONS FOR YOUR WATER RESOURCES

GREAT MIAMI LOW DAM REMOVAL PROJECT

FIVE RIVERS METROPARKS

AERIAL MAP

NOVEMBER 2012

FIGURE 2

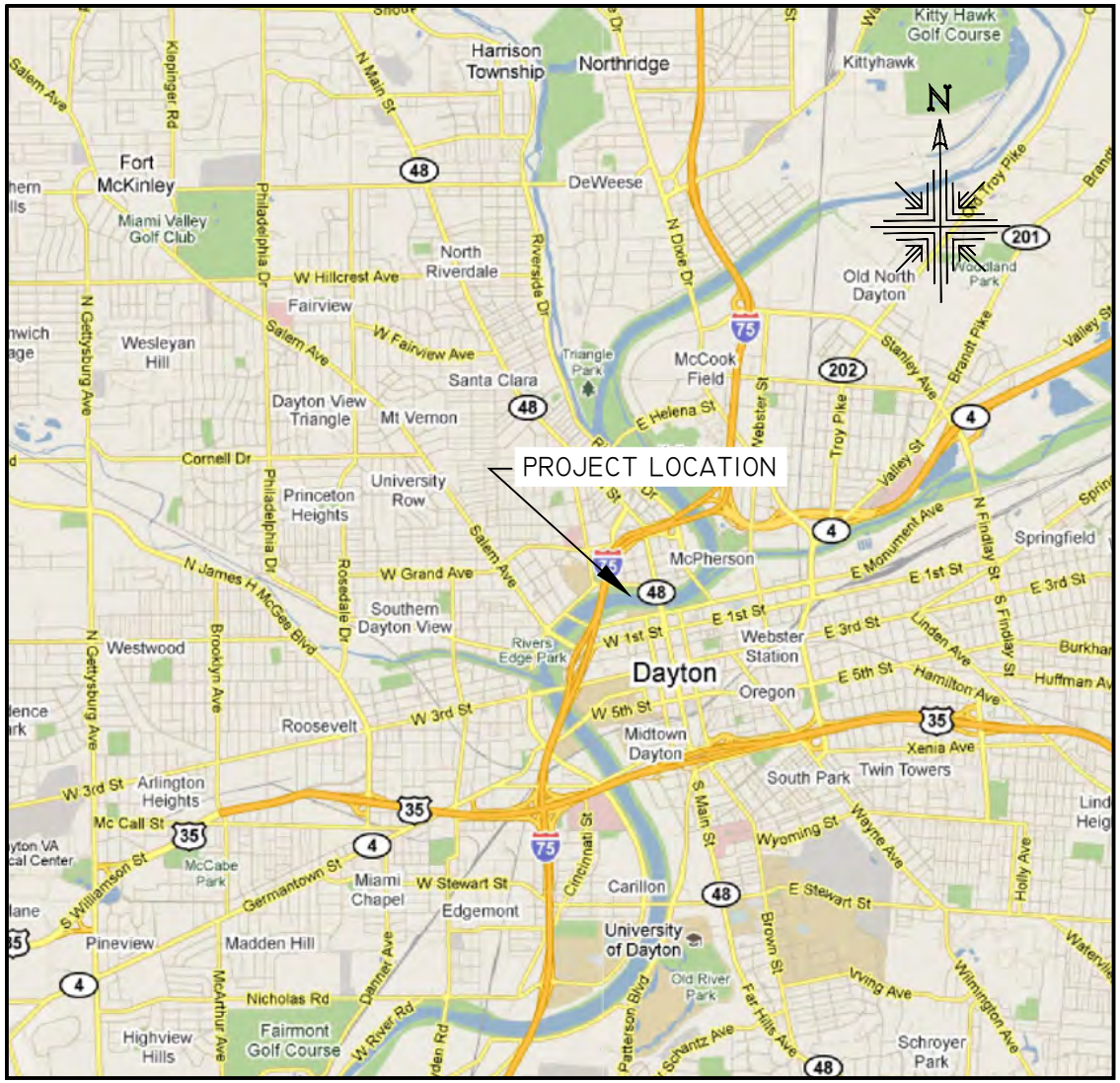
0 300 600 Feet

2012 Low Dam Removal Drawings

GREAT MIAMI LOW DAM REMOVAL PROJECT
GREAT MIAMI RIVER, DAYTON, OHIO

FILE NO.	----
APPLICANT	FIVE RIVERS METROPARKS
LOCATION	GREAT MIAMI RIVER, DAYTON, OHIO MONTGOMERY COUNTY
DATE	OCT 30, 2012
SHEET	1 OF 27

DATE CHECKED: OCT 2012
REVISION: 10/12/12
REVISION: 10/29/12



PROJECT LOCATION MAP

PROJECT OWNER: FIVE RIVERS METROPARKS
409 E MONUMENT AVE.
DAYTON, OHIO 45402
WWW.METROPARKS.ORG

ENGINEER: GARY M. LACY, P.E.
RECREATION ENGINEERING AND PLANNING
485 ARAPAHOE AVE.
BOULDER, CO 80302
303-545-5883
INFO@BOATERPARKS.COM

Recreation Engineering & Planning

TABLE OF CONTENTS

PROJECT LOCATION
LATITUDE 39°45'52.01"N LONGITUDE 84°11'47.94"W

Recreation
Engineering & Planning

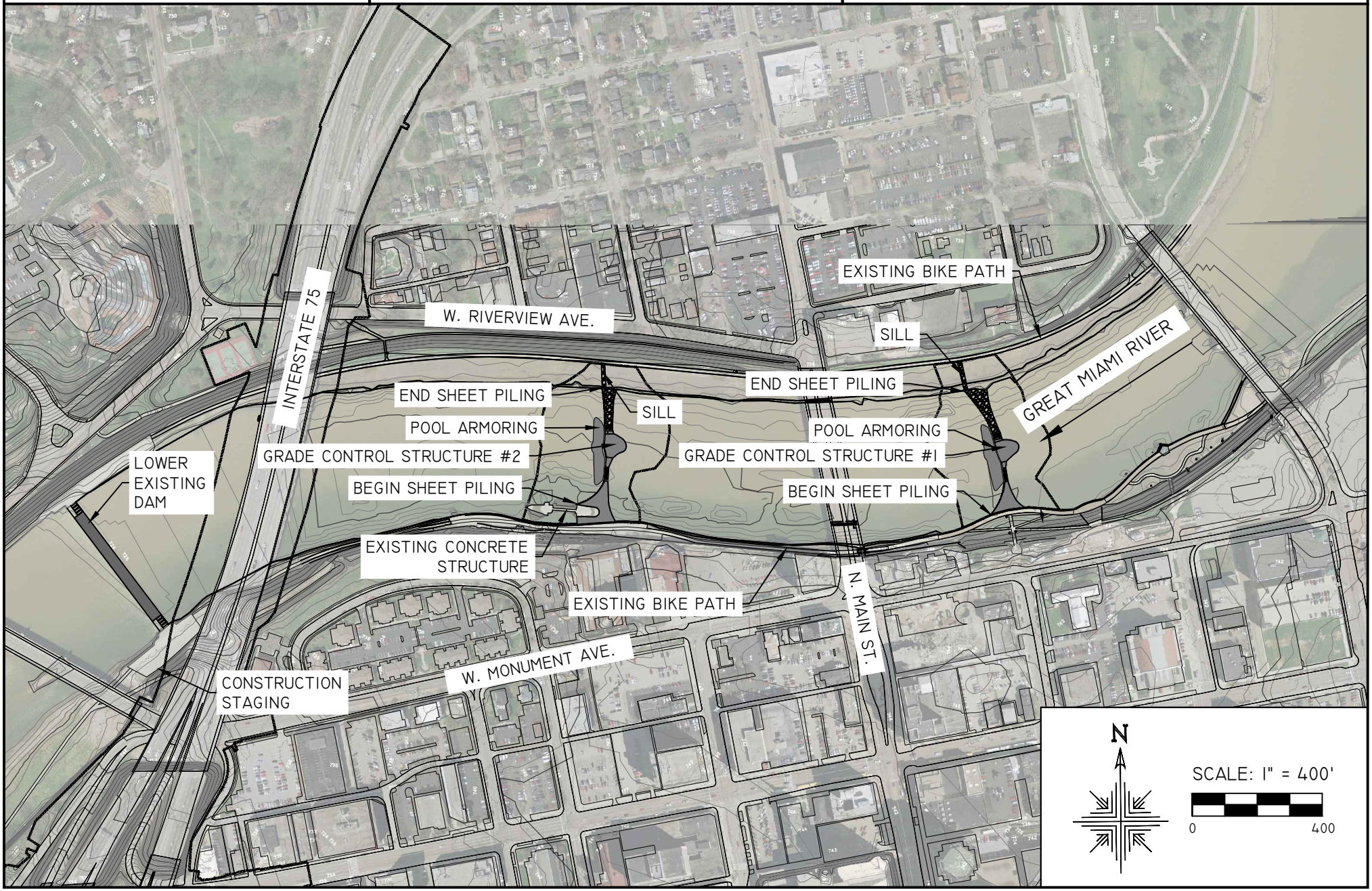
485 Arapahoe Ave.
Boulder | CO | 80302
www.boaterparks.com
(303)-545-5883

Designed: MH, GL
Drafted: AR, MH

GREAT MIAMI LOW DAM REMOVAL PROJECT

PROJECT OVERVIEW PLAN
PRELIMINARY - NOT FOR CONSTRUCTION

FILE NO.	----
APPLICANT	FIVE RIVERS METROPARKS
LOCATION	GREAT MIAMI RIVER, DAYTON, OHIO MONTGOMERY COUNTY
DATE	OCT 30, 2012
SHEET	2 OF 27



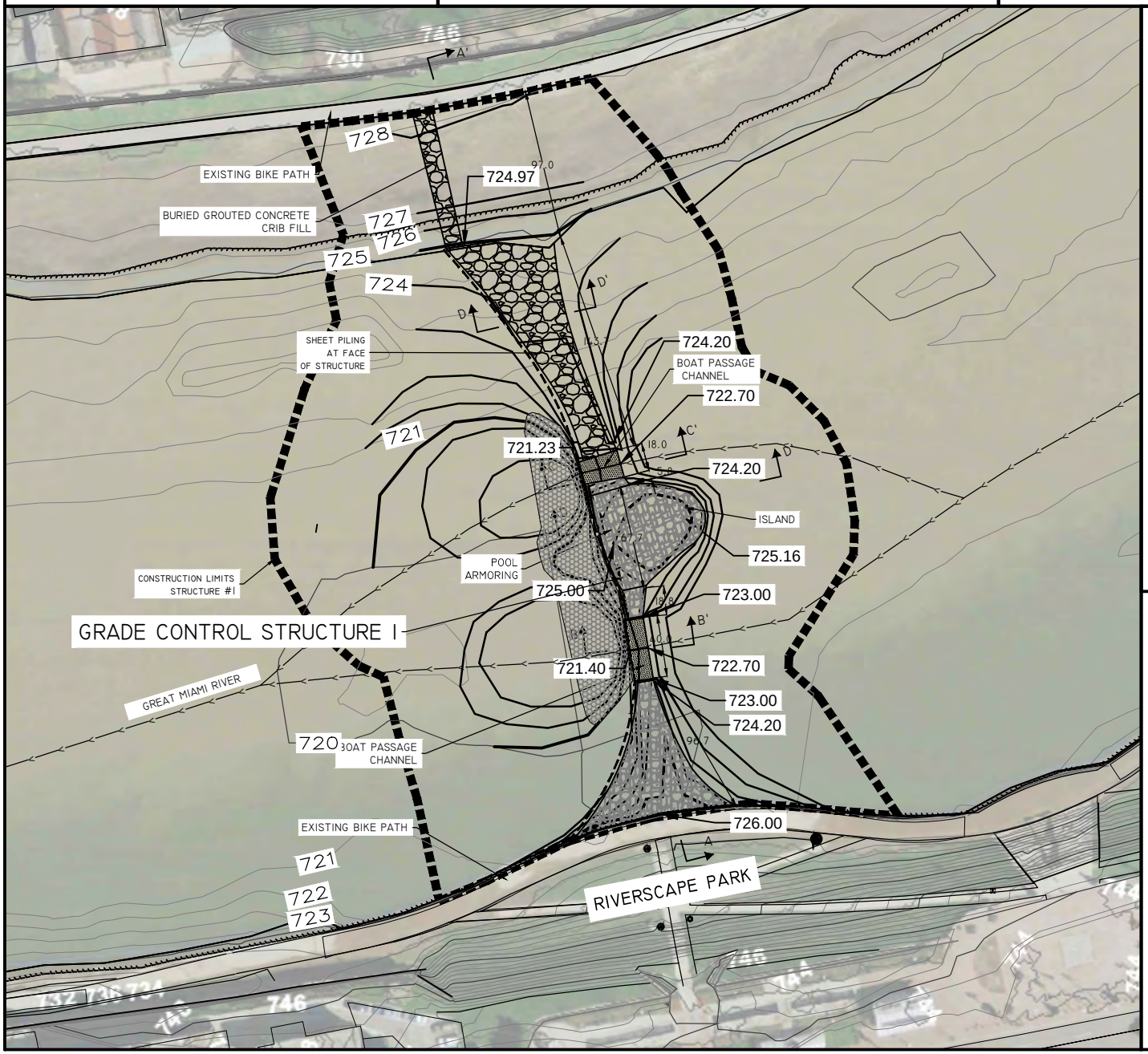
Recreation Engineering & Planning
485 Arapahoe Ave.
Boulder | CO | 80302
www.boaterparks.com
(303)-545-5883
Designed: MH, GL
Drafted: AR, MH

GREAT MIAMI LOW DAM REMOVAL PROJECT

STRUCTURE #1 PLAN VIEW

PRELIMINARY - NOT FOR CONSTRUCTION

FILE NO.	----
APPLICANT	FIVE RIVERS METROPARKS
LOCATION	GREAT MIAMI RIVER, DAYTON, OHIO MONTGOMERY COUNTY
DATE	OCT 30, 2012
SHEET	3 OF 27



LEGEND

- EXISTING CONTOUR LINES
- PROPOSED CONTOUR LINES
- QUARRIED STONE VENEER
- STRUCTURE LOW FLOW
- CUTOFF TRENCH
- POOL ARMORING
- ORDINARY HIGH WATER MARK (OHWM)
- THALWEG AND DIRECTION OF FLOW
- CONSTRUCTION LIMITS

GENERAL NOTES:

1. All elevations given in feet above sea level.
2. Rock fill/hatch and vegetative images shown for illustrative purposes. Not to scale.
3. An REP representative shall be present during construction of all structures and terracing.
4. All original dam construction drawings and the original FEMA FIS are based on the NGVD 1929 datum. This plan set and all the associated hydraulic modeling is based on NAD 1988.

N

SCALE: 1" = 100'

0 100