

---

# Beaver Creek Hydrology, LLC

---

## **Proposal** for the **Muddy Creek Restoration Project** **St. Susanna Site**

**Prepared for:**

**The City of Mason, Ohio**

**October 18, 2010**



Beaver Creek Hydrology, LLC  
907 National Avenue  
Lexington, Kentucky 40502  
Phone: (615) 491-1967



## BEAVERCREEK HYDROLOGY, LLC

907 National Avenue  
Lexington, Kentucky 40502  
Phone (615) 491-1967  
[www.beavercreekhydrology.com](http://www.beavercreekhydrology.com)

October 18, 2010

Art Oliver, PE  
Project Coordinator  
Engineering and Building  
City of Mason  
6000 Mason-Montgomery Road  
Mason, OH 45040

Re.: **Request for Proposals for Stream Restoration Services  
Muddy Creek Restoration Project – St. Susanna Site**

Dear Mr. Oliver:

Beaver Creek Hydrology, LLC (BCH) is pleased to submit this proposal to perform stream restoration services for the Muddy Creek Restoration Project on the St. Susanna Site. Our company has the experience, expertise and capacity to perform all of the services required for a project of this size and scope.

BCH was formed in 2006 to provide civil engineering services with an emphasis on stream restoration services. Our founders are Case Davis, PE and Brian Belcher, PE, Ph.D. Both Case and Brian began their careers at Fuller, Mossbarger, Scott and May Engineers, Inc. (FMSM) in Lexington, Kentucky. We are a small firm with only one other employee, Tien Mun Yee, EIT, Ph.D. We produce all of our design plan sheets, project specifications, design reports, permit applications and all other correspondence in-house. We have successfully completed projects of similar size and scope to the Muddy Creek Restoration Project. We have completed six stream restoration projects as a firm with several other projects in various stages of completion. We have included project descriptions in Appendix A of this proposal with client contact information for your review. We follow standard engineering practice of quality control and assurance to provide plans that are accurate. We are very familiar with all of the tasks that are requested in the RFP documents and we feel this team is uniquely qualified to provide classroom and field curriculum for the school and the community. Brian Belcher and Tien Mun Yee are both Ph.D.'s in hydraulic engineering and are well qualified to teach. Brian is currently developing curriculum for a stream restoration 3-day course with Dr. Carmen Agouridis at the University of Kentucky. This class will take place on October 26-28<sup>th</sup> at the University of Kentucky campus. Both Brian and Yee will be teaching courses at UK in the future. Brian has also taught courses on Rivermorph and for Dave Rosgen at Wildland Hydrology. Brian has numerous other stream restoration projects to his credit, including some work in Mason.

Our expertise is evidenced in our project descriptions provided in appendix A of this proposal. We have worked on several streams of this size and some that are larger. Our first project as a company was on Clear Creek in Golden, Colorado. That project involved several property owners and was located in an

urban corridor. We were required to provide grading plans, no rise certification and all necessary permits. The hydraulic model was tied in to a recent flood study that had just been completed for the area. Both Brian and Case are experienced in surveying, geotechnical engineering slope stability, hydrologic and hydraulic modeling, natural channel design, soil bioengineering and construction monitoring. We both bring strong skills that complement the design and construction process.

BCH is committed to beginning this project immediately upon notice to proceed. We will have one project under construction sometime in the winter and will be working as a subcontractor to another firm on two other projects in the coming year. We have over 1200 hours available during the next 12 months to work on this project. We take an additional interest in providing projects on time and within budget because we are owners in the company. We have built our reputation by providing high quality products in a timely manner.

We are all familiar with bringing together many different groups of people including landowners, businesses, government organization and watershed groups to achieve a common goal. We were instrumental in developing the Harpeth River Restoration Project with the Harpeth River Watershed Association and the City of Franklin in Tennessee. All of our projects require coordination with landowners and government agencies to make them work. We are familiar with all of the requirements and regulations regarding stream restoration and water quality certification and have not had any major issues with obtaining permits. We have also worked on projects in Colorado, Tennessee and Kentucky that have endangered species such as Indiana Bats, Nashville Crayfish, and Ute ladies tresses.

We carry a \$2,000,000 professional liability insurance policy and will certify the City of Mason as additional insured prior to project commencement. Brian is licensed as an Ohio PE. His status is currently inactive but will be activated as necessary for this contract.

We appreciate the opportunity to work with you on these projects. We are sure that we can provide you with a product that you can be proud of and we understand the 319 grant funds are geared at educating the public on the importance of stream restoration. We have seen so much degradation of our streams and rivers due to mining, road construction, development, poor stormwater design, agricultural practices and poor land use practices. We feel that this is an opportunity as engineers to help restore and revitalize the ecosystem that has been overlooked and neglected. We look forward to working with you and your community on this project.

Sincerely,



Case Davis, P.E.

President

Beaver Creek Hydrology, LLC

case@beavercreekhidrology.com

## Table of Contents

1. Statement of Project Requirements .....	3
2. Scope of Work.....	3
3. Personnel .....	7
4. Cost .....	7
Appendix A – Project Descriptions.....	9
Appendix B – Project Team Resumes .....	18

### 1. Statement of Project Requirements

This proposal is to perform stream restoration services to successfully complete the Muddy Creek Restoration Project on the St. Susanna Site. The St. Susanna site is located adjacent to the St. Susanna Church and elementary school. The project will be performed to reduce erosion and sediment input to the creek, stabilize the banks and protect the sanitary sewer and provide enhancements to the aquatic habitat in the reach. The proposed design will address restoration of approximately 1,000 feet of Little Muddy Creek and will consist of 1) installing cross vanes to provide grade control, 2) construction of a floodplain bench on the inside of the meander bend, and 3) establishment of a riparian zone with desirable native species.

In addition to design services and construction oversight services for this project reach, it is also required that BCH provide an educational outreach curriculum via interpretive signage and classroom activities for St. Susanna's School. In addition to the educational component, BCH will work with the school and the church to provide a written maintenance plan for the riparian buffer corridor. BCH will utilize the scope of work as outlined in the RFP documents and as summarized in the following section to accomplish these requirements.

### 2. Scope of Work

BCH is prepared to accomplish the required project objectives for the St. Susanna site by following the outline of tasks that the City of Mason has provided in the Request for Proposals. We are providing dates for each task on the assumption that the project will begin on November 1, 2010. We can revise and adjust dates as necessary based on the actual notice to proceed date.

#### **Task A – Project Review and Pre-Construction Field Surveys (November 1-November 23)**

The BCH team will work with the City of Mason to begin gathering all of the available information from local and state resources. Our field crew will spend several days along the creek to perform all field assessment.

##### *Subtask A-1: Review of Existing Information and Evaluation of Project Area*

- Assemble and review all existing information



- Visit the site and determine all engineering constraints/relevant project criteria
- Determine mapping needs for design parameters
- Determine geomorphology needs
- Examine flood mapping
- Develop design/performance objectives

#### *Subtask A-2: Field Surveys and Evaluation of Project Sites Report*

- Geomorphic Assessment of the project site
- Reference reach survey
- Sediment study including Wolman Pebble Count, Bar Samples, Bank Samples
- Design report that includes:
  - Background site information
  - Hydraulics and biology
  - Geotechnical considerations
  - Rivermorph file
  - Engineering constraints in regards to property, flood elevations, infrastructure protection, property boundary issues
  - Design criteria that includes dimensionless ratios used in natural channel design, streamtype, channel slope, project extents
  - Any other relevant information that will influence the design.

#### **Task B: Preliminary Tasks (November 1 – December 10)**

These tasks will begin concurrently with Task A to get the project in motion. Correspondence with SHPO and USFW will occur shortly after initial field visits. BCH will hire a local surveyor that the City of Mason approves and will direct that surveyor in the field to gather necessary topographic data. We feel that local surveyors are much better equipped to handle local property boundary surveys that will be required for this project. BCH team members are very familiar with all of the surveying techniques needed for these projects and we are experienced at hiring and directing local surveyors for this type of work.

#### *Subtask B-1: Baseline Survey*

- Perform topographic survey
- Set project control for construction
- Locate all utilities, property boundaries and other relevant features
- Delineate wetlands if necessary

#### *Subtask B-2: Permitting and Easements*

- Submit jurisdictional waters determination form to USACE
- Prepare 404 permit to USACE
- Coordinate USFW T&E species screen
- Ohio SHPO correspondence
- Prepare any easement plats for the Final Design and the Final Restoration Plan as required by OEPA.

- Incorporate any permitting issues or ecological expectations into the final design
- Prepare and coordinate all permitting required (assumed 404 and 401 as well as grading plans/permits from local government)

#### **Task C: Preliminary Design (December 10 – January 28, 2011)**

Preliminary design will begin as soon as all of the topographic data has been collected and upon completion of the geomorphic assessments. Hydraulic modeling will be done to verify bankfull determinations and to verify no impact to the 100 year flood levels. Permits will be submitted on January 28<sup>th</sup>. The subtasks will be accomplished as follows:

##### ***Subtask C-1: General***

- Prepare a 30% design submittal including any project alternatives
- Prepare a 60% design memo/report
- Hydraulic modeling results showing no impact to 100 year water surface
- Include all details and design considerations for the project and review all channel capacity calculations, sediment transport competency and ecological considerations
- Investigate impacts to all existing structures upstream, within and downstream of the project reach

#### **Task D: Final Design (January 28, 2011 – April 1, 2011)**

The dates for this task assume a 4 week review period by the City. Upon design review by the City, School and other adjacent landowners, BCH will prepare final design plans, specifications and reports as required.

##### ***Subtask D-1: General***

- Prepare bid documents upon incorporation of all comments from the Preliminary design review.
- Prepare final report with all major design calculations
- Prepare drawings, specifications and cost estimate for construction

##### ***Subtask D-2: Plans***

- Prepare Plan set with all required civil engineering details for stream restoration projects including:
  - Title sheet
  - SWPPP
  - Survey data/control
  - Plan/Profile
  - Cross section views
  - Details
  - Construction sequence
  - Construction techniques
  - Access Plans
  - Easement boundaries
  - Bid tabulation of quantities
  - Planting plan

- Erosion control
- Any other relevant project details as required

#### **Task E: Project Construction (July 15, 2011-August 31, 2011 with planting in the dormant season)**

Assuming that the permitting process will require 4 months, permits should be ready by the end of May. Project Construction could begin as soon as July 15, assuming a 30 day bid period beginning on June 1 and a two week contract period. Plantings can only be done in the dormant season, approximately from December through March.

Project construction will be performed by a contractor. BCH will provide:

- Engineering oversight of construction activities along with the City of Mason.
- Site visits will be scheduled for engineering oversight of construction activities
- Verification that plan is being constructed to the design specifications

#### ***Subtask E-1: On-going maintenance recommendations/Estimate of costs***

- Provide post-construction monitoring recommendations/cost estimates

#### **Task F: Project Administration**

Project administration will occur throughout the project duration. Services will be provided as requested.

#### ***Subtask F-1: Project Organization and Management***

- Maintain master project schedule and provide updates regularly for the City of Mason

#### ***Subtask F-2: Project Collaboration with School District***

- BCH will build a relationship with the school and assist them in developing outreach opportunities and involvement for each of their classes. We will involve the school at the beginning of the design process and explain to them our design approach and address any concerns as the project develops. We will also target the curriculum to the school grades 1 – 8 to teach them the importance of stream restoration and reducing impacts on the ecosystem. Three Field Days will be provided with a classroom presentation for the entire Church and School. These Field Days will be taught before construction, during construction, and after construction.

#### ***Subtask F-3: Additional Educational Requirements***

- BCH will provide three field presentations for City of Mason staff and anyone else in the community that is interested. We will work with the City staff to adequately advertise the dates of these classes
- Four articles will be generated about the project for posting on related websites and for Mason Matters.
- An informational display will be developed for display at the Heritage Festival, Scout Day and Earth Day.



- An interpretive educational sign will be design and posted at each site and will include project objectives and sponsors.
- Educational activities will begin at project construction

#### *Subtask F-4: Progress Meetings*

- BCH will host progress meetings with the City of Mason staff on a quarterly basis and BCH will submit a progress report 5 days in advance of the meeting.

#### *Subtask F-5: Document and Data Management*

- All reports, plans, specifications, meeting minutes, educational curricula, and other relevant documents will be provided to the City of Mason as needed.

### **3. Personnel**

BCH personnel that will be involved with this project are Case Davis, Brian Belcher and Tien Mun Yee. Resumes are posted for our team in Appendix B of this proposal. Case will provide all administrative project management for the project and Brian will guide all of the design for the project. Field assessments and direction of the surveyors will be done by Case and Brian. Yee will provide project hydraulic modeling and design layout under the direction of Brian. All work will be verified and checked by Case prior to submittal.

We will hire a local surveyor to perform all surveying services. Any geotechnical testing will also be subcontracted out. We do not anticipate needed any borings for this project.

### **4. Cost**

Project costs are outlined in the attached spreadsheet. We have not included costs for any expenses that may be required for permitting or SHPO authorization. We will assume that the City of Mason will provide expenses for any permitting or regulatory fees.

The total not-to-exceed cost for this proposal is \$36,800. This includes all of the tasks discussed here with the exception of permitting or regulatory fees. This fee also does not cover costs for sign construction or installation.

#### **St. Susanna Site - Preliminary Project Schedule**

<b>Task</b>	<b>Start Date</b>	<b>End Date</b>	<b>Weeks</b>
Initial Data Gathering	11/1/2010	12/10/2010	6
Preliminary Design	12/10/2010	1/28/2011	7
Design Review	1/28/2011	2/11/2011	2
Submit Permits	2/11/2011	2/13/2011	1
Permit Review	2/13/2011	5/14/2011	13
Final Design	2/11/2011	4/1/2011	7
Prepare Bid/Advertise	4/1/2011	5/31/2011	9
Construction	7/15/2011	8/29/2011	7



**Muddy Creek Restoration Project - St. Susanna School Site**

**Beaver Creek Hydrology Fee Proposal**

<b>Task</b>	<b>Description</b>	<b>Hours</b>	<b>Rate</b>	<b>Fee</b>
A	Project Review and Pre-Construction Field Surveys			
A-1	Review of Existing Information and Evaluation of Project Area	4	\$ 100.00	\$ 400.00
A-2	Field Surveys and Evaluation of Project Sites Report	36	\$ 100.00	\$ 3,600.00
B	Preliminary Tasks			
B-1	Baseline Survey	62	\$ 100.00	\$ 6,200.00
B-2	Permitting and Easements	16	\$ 100.00	\$ 1,600.00
C	Preliminary Design			
C-1	General	42	\$ 100.00	\$ 4,200.00
D	Final Design			
D-1	General	24	\$ 100.00	\$ 2,400.00
D-2	Plans	52	\$ 100.00	\$ 5,200.00
E	Project Construction	50	\$ 100.00	\$ 5,000.00
E-1	On-going Maintenance Recommendations/Estimate of Cost	2	\$ 100.00	\$ 200.00
F	Project Administration			
F-1	Project Organization and Management	6	\$ 100.00	\$ 600.00
F-2	Project Collaboration with School District	40	\$ 100.00	\$ 4,000.00
F-3	Additional Educational Coordination	26	\$ 100.00	\$ 2,600.00
F-4	Progress Meetings	8	\$ 100.00	\$ 800.00
Totals		368		\$ 36,800.00

## **Appendix A – BCH Project Descriptions**

## *Harpeth River Dam Removal and Restoration Project*

### **Project Name**

Harpeth River Dam Removal and Restoration Project

### **Location**

Nolensville, Tennessee

### **Owner/Client**

Harpeth River Watershed Association  
Executive Director: Dorie Bolze  
P.O. Box 1127  
Franklin, TN 37065  
Phone: 615-790-9767

### **Size**

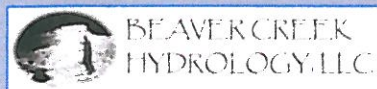
1,800 Linear Feet  
Project Budget: \$1,000,000

### **Status**

Final Design Phase

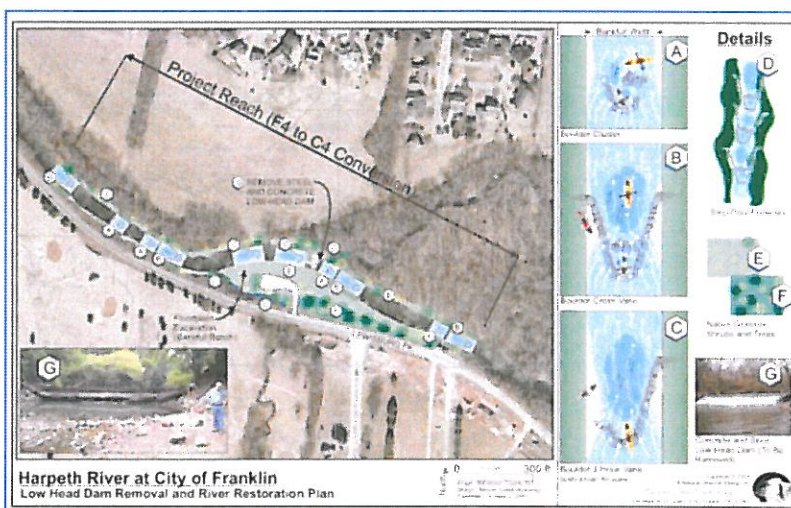
### **Project Members**

Case Davis, Project Manager  
Brian Belcher, Project Design  
Tien Mun Yee, Hydraulic Modeling



The Harpeth River Dam Removal and Restoration Project involves providing design services for removing a low head dam on the Harpeth River and restoring the habitat within the reach. BCH and HRWA submitted a proposal to remove the low head dam on the Harpeth River and it was selected as the top priority for the Southeast Aquatic Resources Partnership (SARP) program for funding. This project will restore fish habitat and fish passage to the Harpeth River and will also provide erosion control within the project reach. This project has the approval of all of the relevant agencies in Tennessee including Tennessee Department of Environment and Conservation (TDEC), the Tennessee Wildlife Resources Agency, the National Resources Conservation Service, and all of the other members of the SARP. Hydraulic boulder structures will provide grade control and habitat enhancement in the project reach. Hydraulic modeling including flood wave analysis using HEC-RAS has been performed to determine flood flow characteristics and water elevation profiles. BCH is providing design and construction management for the project.

The budget for this project is approximately \$1,000,000 and is in the final design phase. BCH plans for construction of this project in the Fall of 2011.



*Conceptual Design*



## *Mill Creek Restoration Project*

### **Project Name**

Mill Creek Restoration Project

### **Location**

Nolensville, Tennessee

### **Owner/Client**

Tennessee Stream Mitigation  
Program

Attn: Eric Chance, Project  
Manager

5000 Linbar Drive, Suite 265  
Nashville, TN 37211  
Phone: 615-831-9311

### **Size**

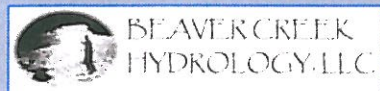
2,400 Linear Feet  
Project Budget \$250,000

### **Status**

Complete

### **Project Members**

Case Davis, Project Manager  
Brian Belcher, Project Design



The Mill Creek Restoration Project consisted of restoring approximately 2,400 linear feet of a 3rd Order stream and creating wetland areas to buffer runoff from a new development adjacent to the project site. This project also required special consideration of federally endangered species, the Nashville Crawfish, which lives within the reach. The scope for this project included:

- Full geomorphologic assessment,
- Conservation Easement survey and legal plat,
- Reference Reach design approach,
- Bank stabilization
- Instream stabilization/habitat structures,
- Wetland BMP areas,
- Removal of two private bridges from the reach,
- Floodplain modeling – including FEMA No-Rise Certification,
- Priority II Restoration and Enhancement of project reach,
- Riparian Buffer Design including plantings at 400 stems/acre,
- Management of the Nashville Crawfish during construction,
- Cattle exclusion from the property,
- Construction oversight/management by BCH team.

The budget for this project is approximately \$250,000 for design and construction. This project is substantially complete and is in the monitoring phase.



*Bank Stabilized with J-Hook Vane and  
Native Vegetation*



*Floodplain Excavation*



## *Murfrees Fork Stream Restoration Project*

### **Project Name**

Murfrees Fork Stream  
Restoration Project

### **Location**

Nolensville, Tennessee

### **Owner/Client**

Tennessee Stream Mitigation  
Program  
Attn: Joey Woodard, Program  
Director  
5000 Linbar Drive, Suite 265  
Nashville, TN 37211  
Phone: 615-831-9311

### **Size**

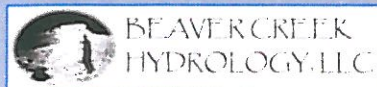
12,000 Linear Feet  
Project Budget \$1.2 Million

### **Status**

Complete

### **Project Members**

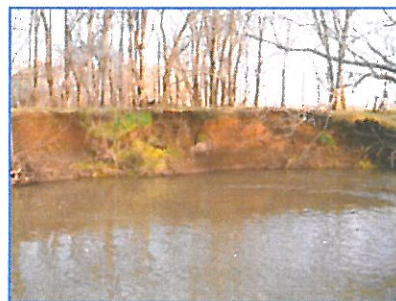
Case Davis, Project Manager  
Brian Belcher, Project Design



The Murfrees Fork Restoration Project consisted of restoring approximately 12,000 linear feet of degraded 1st – 3rd order streams in Middle Tennessee. BCH provided design and construction management services for the TSMP for Priority I and II restoration on streams that have been highly impacted by cattle grazing and anthropologic activities. The scope for this project included:

- Detailed hydraulic modeling using HEC-RAS
- Full geomorphologic assessment
- Reference Reach data collection and design approach
- Topographic and Boundary Survey
- Conservation Easement survey and legal plat
- Instream stabilization/habitat structures
- Bank stabilization
- Sediment Transport modeling
- Priority I restoration of 4, 1st order tributaries
- Riparian Buffer Design including plantings at 400 stems/acre
- Cattle exclusion fencing with stream crossings
- Construction oversight/management by BCH team

The budget for this project was approximately \$1,400,000 for design and construction. This project is complete with ongoing monitoring until 2014.



*Vertical Eroding Bank - Before*



*Stabilized Bank – After construction*



## *Laurelbrooke Lot 1237 Stream Design Project*

### **Project Name**

Laurelbrooke Lot 1237 Stream  
Design Project

### **Location**

Franklin, Tennessee

### **Client**

Parker Custom Homes  
Andrew Lee – Project Manager  
(615) 973-5022

### **Size**

400 Linear Feet  
Project Budget: \$50,000

### **Status**

Completed in 2008

### **Project Members**

Case Davis, Project Manager  
Brian Belcher, Project Design

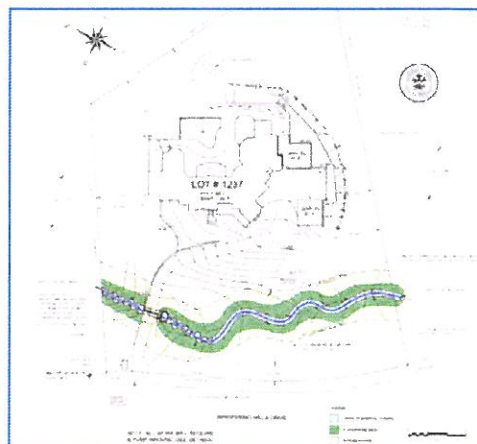
The Laurelbrooke Lot 1237 Project involved designing a natural stream channel for a residence to improve the channel stability of the stream. The existing channel was eroding and entrenched from historic impacts such as logging and development. The stream was reconnected with the floodplain by filling in the original channel to provide stability. In addition, step-pools and rock cross vanes were constructed to improve habitat features in the stream channel. BCH provide site design, erosion control planning, permitting with the State and USACE, and obtained approval by the Williamson County Stormwater Review Board. The budget for this project was approximately \$50,000 for design and construction of 400 l.f. of stream channel. BCH performed construction oversight for this project. This project was completed in 2008.



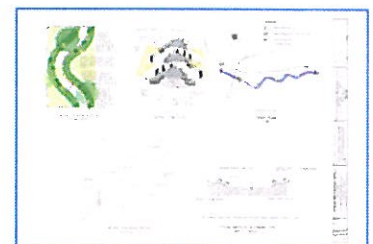
*Aerial Photo of Completed Stream*



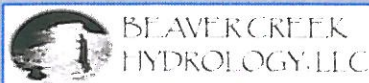
*During Construction*



*Stream Design Plan*



*Stream Details*





## *The Golden Mile – Clear Creek Stream and Fisheries Restoration Project*

### **Project Name**

The Golden Mile – Clear Creek  
Stream and Fisheries  
Restoration Project

### **Location**

Golden, Colorado

### **Client**

Frontier Environmental Services,  
Inc.

Attn: Brent Scarbrough, PE,  
Project Manager  
5350 Vivian Street, Unit B  
Arvada, CO 80002  
Phone: 303-234-9350

### **Size**

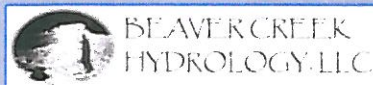
1,800 Linear Feet  
Project Budget \$380,000

### **Status**

Complete

### **Project Members**

Case Davis, Project Manager  
Brian Belcher, Project Design



The Golden Mile is a fisheries and stream restoration project located in Golden, Colorado. Frontier Environmental Services was contracted by the West Denver Chapter of Trout Unlimited to design and construct a restoration project to increase the fish habitat along the creek. Beaver Creek Hydrology performed the design for the project and the construction oversight. A natural channel design methodology was used to determine the placement of boulder structures for improving the habitat and also to provide stability of the reach. The project also involved modeling the reach to provide a "no-rise" certification based on a detailed flood study in the area. The project was done in two phases. Phase One consisted of converting a multithread reach to a single thread C4 streamtype, installing 5 boulder structures and regrading the channel and floodplain. Phase Two consisted of designing 4 additional boulder grade control and fish habitat structures in a reach just upstream of the first phase.

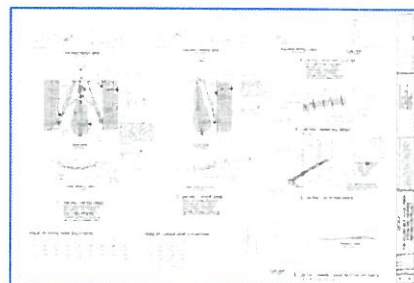
The Golden Mile project had a design and construction budget of approximately \$200,000. The total length restored was approximately 1,800 linear feet. This project has been completed.



*In-Stream Grade Control Structure*



*Restored Reach*





## *Pecan Hills Stream Restoration Project*

### **Project Name**

Pecan Hills Stream Restoration Project

### **Location**

Thompsons Station, Tennessee

### **Owner/Client**

Town of Thompsons Station  
Greg Langeliers  
P.O. Box 100  
Thompson's Station, TN 37179  
Phone: 615-794-4333

### **Size**

500 Linear Feet  
Project Budget: \$45,000

### **Status**

Complete

### **Project Members**

Case Davis, Project Manager  
Brian Belcher, Project Design

The Pecan Hills project involved removing a stagnant farm pond that was located in a residential subdivision and restoring a natural stream channel. The stagnant pond was improperly constructed and was causing poor water quality. The resulting channel was a net benefit for the residents and for overall water quality. BCH designed the project and obtained permits from the USACE and TDEC for the pond removal and restoration.

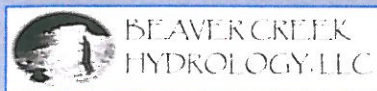
The budget for this project was approximately \$45,000 for design and construction of 500 l.f. of stream channel. BCH performed construction oversight for this project. This project was completed in 2007.



*Stagnant Urban Pond - Before*



*Stable Stream - After*





## *Cranes Nest Branch Restoration Project*

### **Project Name**

Cranes Nest Branch Restoration Project

### **Location**

Knox County, Kentucky

### **Owner/Client**

Kentucky Wetland and Stream Mitigation Program  
Kentucky Division of Fish and Wildlife Resources  
1 Sportsman's Lane  
Frankfort, Kentucky 40601  
Project Manager: Andy Mowrey  
Phone: 502- 564-5262

### **Size**

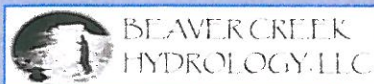
2,200 Linear Feet  
Project Budget \$600,000

### **Status**

Permitted and ready for construction

### **Project Members**

Case Davis, Project Manager  
Brian Belcher, Project Design



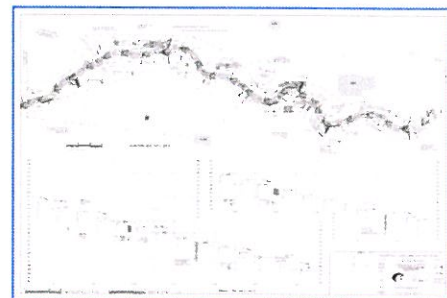
The Cranes Nest project is a mitigation project providing restoration and enhancement of approximately 2,300 linear feet of stream in Knox County, Kentucky. Cranes Nest Branch is a small tributary in the Richland Creek watershed in the Upper Cumberland River basin, which is designated as a conservation area for fish and lamprey species. The current project reach of Cranes Nest Branch is a 2,300-ft headwater stream located on private property. Historical stream impacts include mining, deforestation, channelization, agriculture, channel relocation and riparian zone removal. The existing channel is entrenched and extremely sinuous, having formed in a gully controlled by tree growth and soil inclusions, throughout the majority of the project area. The sharp bends are severely eroding.

This project entails the restoration (Priority I and Priority II) and enhancement of Cranes Nest Branch in order to improve aquatic habitats, primarily for macroinvertebrates, reduce streambank erosion and stabilize the channel bed. Due to the willingness of the landowners, a restored channel will be constructed throughout the majority of the project area. Priority I restoration involves placement of a new channel at a higher elevation than the existing bed in order to connect to an existing floodplain; Priority II restoration involves excavating a new channel and floodplain at the existing channel grade.

The budget for this project is approximately \$600,000. This project has been permitted and is scheduled to be constructed in 2010.



*Impacted Reach – Roadbed in Stream*



*Stream Plan / Profile*



## *Elisha Creek Restoration Project*

### **Project Name**

Elisha Creek Restoration Project

### **Location**

Leslie County, Kentucky

### **Owner/Client**

Kentucky Wetland and Stream  
Mitigation Program

Kentucky Division of Fish and  
Wildlife Resources

1 Sportsman's Lane

Frankfort, Kentucky 40601

Project Manager: Nick Ozburn

Phone: 502- 564-5260

### **Size**

5515 Linear Feet

Budget: \$1.3 Million

### **Status**

Design Complete, Permitting  
Submitted

### **Project Members**

Case Davis, Project Manager

Brian Belcher, Project Design

Tien Mun Yee, Hydraulic

Modeling

The Elisha Creek Project will provide restoration and enhancement of approximately 5,515 linear feet of stream on two sites in the Redbird Wildlife Management Area, part of the Daniel Boone National Forest. The first site consists of approximately 4,050 linear feet of the headwaters of the Left Fork of Elisha Creek. This site will require stream relocation to provide a stable planform and to reconnect it with the floodplain. In addition, headcuts in adjacent ephemeral tributaries will be restored and a wetland habitat will be created in conjunction with the restoration. The second site consists of approximately 1,360 linear feet of Elisha Creek. This site will require a new stream planform to increase stability, decrease slope, provide additional habitat and improve the riparian buffer. This project will require coordination with USFS to move an existing gas pipeline and the existing Forest Service road.

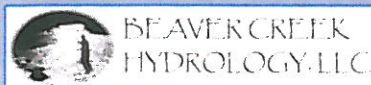
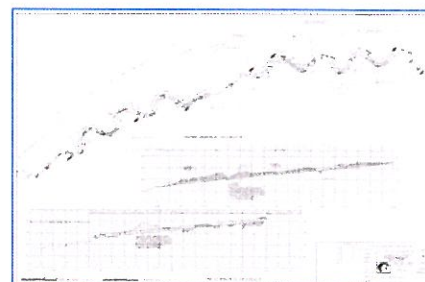
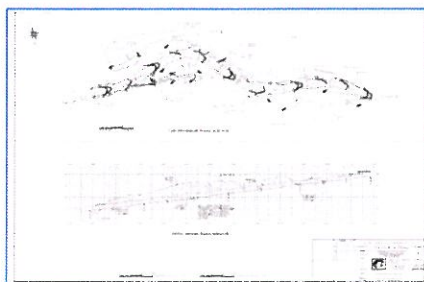
The budget for this project is approximately \$1,300,000. BCH has completed 90 percent design for this project and it is in the permitting phase. This project is scheduled to be constructed in 2011.



*Existing Bedrock Stream*



*Existing Eroding Bank*



## Appendix B – Project Team Resumes

### John Case Davis, P.E.

Project Manager, Civil Engineer

#### Education

- BSCE, University of Kentucky, 1995
- MSCE, North Carolina State University, 1998

#### Professional Development

- TDEC Fundamentals of Erosion Prevention and Sediment Control Workshop
- *TDEC Design Principles* of Erosion Prevention and Sediment Control for Construction Sites Workshop
- RIVERMorph Training
- AutoCAD Land Development Desktop 3 and Civil Design 3 Training
- Construction Managers Association of America (CMAA) conference in Atlanta, GA (2001)
- National Western Mining Conference (2003)
- Tailings and Mine Waste Conference (2000, 2001)
- NCSU Stream Restoration Conference (2008)
- TN AWRA – 20<sup>th</sup> Annual Water Resources Symposium (2010) - Speaker
- TN AWRA – 19<sup>th</sup> Annual Water Resources Symposium (2009)
- TN AWRA – 18<sup>th</sup> Annual Water Resources Symposium (2008)

#### Registration

- Colorado Professional Engineer - License Number 35768
- Tennessee Professional Engineer - License Number 109924

#### Fields of Competence

- Project Management
- Civil Engineering
- Hydrologic/Hydraulic Design
- Natural Stream Channel Design
- Geomorphic Assessments
- Design-Construct Implementation and Oversight
- Mined Land Reclamation/Remediation
- Storm Water Management
- Groundwater Modeling
- Mine Closures
- Extensive Field/Laboratory Experience

#### Employment History

*Beaver Creek Hydrology, LLC.*; December 2006 to present, President, Principle Engineer, Project Manager. A company which specializes in hydrology, river, stream and wetland restoration design and construction services.



*FMSM Engineers, Inc.; 2005 to 2006; Senior Project Engineer. A geotechnical engineering and water resources engineering design firm.*

*Frontier Environmental Services, Inc.; April 2002 to December 2004, Project Manager and Project Engineer. A full service design, engineering, construction, and construction management company serving government, industry and the environmental regulated community.*

*Tetra Tech, MFG.; June 1999 to April 2002, Senior Project Engineer. An environmental engineering company specializing in environmental contamination, mined land reclamation and restoration.*

### Experience Summary

Extensive experience in many facets of civil engineering with an emphasis on water resources, stream restoration projects and mined land reclamation. Experience includes several stormwater design projects, large stream restoration projects involving surveying, mapping, hydraulic modeling, design, permitting, FEMA no-rise certifications, and construction oversight and project management.

### Key Projects

Project manager and civil engineer for a low head dam removal, stream stabilization and fisheries enhancement project in Franklin, Tennessee. This project received federal funding through the USFW fish passage and fish habitat grant programs. This project has been funded and is in the conceptual design phase.

Project manager for a stream restoration project on Cranes Nest Branch in Knox County, Kentucky. The project included design of 2,200 linear feet of new stream channel, two low water ford crossings, hydraulic grade control structures and fish habitat improvement structures. The reach was also designed to reconnect the entrenched stream to the floodplain and to restore a 50-foot riparian buffer. This project is ongoing with Kentucky Division of Fish and Wildlife Resources and the Kentucky Finance Cabinet.

Project manager for a stream restoration project on Elisha Creek in Leslie County, Kentucky. This project includes full project design and construction oversight for over 6,000 linear feet of stream channel restoration in the Daniel Boone National Forest. The design includes bank stabilization, hydraulic grade control features, and interaction with ATV and horse trails within the Forest. Project coordination for this project includes KDFWR and USFS.

Project manager and civil engineer for a stream and fisheries restoration project on Mill Creek in Nolensville, Tennessee. Project included a reference reach analysis, hydraulic design and modeling using HEC-RAS and RIVERMorph and multiple agency permitting with full design submittals. The final design provided a restoration plan in a bedrock and gravel-bed channel with construction of grade control features and aquatic habitat structures including floodplain reconnection to increase water quality benefits.

Project manager and civil engineer for a stream and fisheries restoration project on Murfrees Fork of the West Harpeth River, Tennessee. Project included a reference reach analysis, hydraulic design and modeling using HEC-RAS and RIVERMorph and multiple agency permitting with full design submittals.



The final design provided a restoration plan in a bedrock and gravel-bed channel with construction of grade control features and aquatic habitat structures including floodplain reconnection to increase water quality benefits. This project also included cattle exclusion fencing and livestock management planning.

Senior Project Engineer for the design of an NRCS dam near Hyden, Kentucky. The project consisted of dam location, geotechnical exploration of the proposed dam location, all grading and design calculations, stage-storage calculations, and hydraulic modeling of the spillway structure and design alternatives for spillway design.

Project Engineer/Construction Manager for a voluntary mined land cleanup in an effort to manage the Kerber Creek Watershed. The project included enhancement of several miles of Kerber Creek, removing mine tailings and waste ore from many areas in the Mining District, constructing several lined ponds to contain and treat acid mine drainage, construction of lined channels to convey water around leaching waste piles, and an underground concrete mine plug to limit water flowing from a large drainage tunnel. The Kerber Creek Watershed has experienced a dramatic increase in aquatic life due to this project.

Project Manager for a stormwater system design for a neighborhood in Leadville, Colorado. This project involved designing the stormwater system for the EPA under CERCLA action to improve the system and retrofit the neighborhood to handle additional runoff generated from upstream activities.

Project Manager for the investigation of a spent Oil Shale Pile at the Anvil Points Facility located on the U.S. Naval Oil Shale Reserve near Rifle, Colorado. This project included geotechnical drilling for soil stability analysis, environmental characterization of the spent shale pile and several small lagoons, installation of monitoring wells, geophysical analysis of the pile and the area surrounding the pile, and topographic survey and volume calculations of the pile and surrounding lagoons.

Project Manager for the investigation and design of remedial alternatives at the Dinero Waste Pile Complex in Lake County, Colorado. Investigation included geotechnical drilling of waste piles to obtain samples of soil and water for geotechnical and environmental properties. Investigation also included drilling in repository locations for determination of cover soil properties and volume calculations. Design included developing a repository location for two waste piles totaling 38,000 cubic yards and determining slope stability of the repository design. Stormwater management was crucial on the site. The plans were used as a basis for a remedial action implemented by the Colorado Division of Minerals and Geology under funding from the USDA Bureau of Land Management.

## Brian Belcher, Ph.D., P.E.

Lead Designer, Hydraulic Engineer

### Education

- PhD, University of Kentucky, 2009, Raymond Fellowship
- MSCE, University of Kentucky, 1997, KY-TN Water Pollution Control Scholarship,
- BSCE, University of Kentucky, 1994, University Scholar

### Professional Development

- Fluvial Geomorphology for Engineers, Wildland Hydrology, 1999
- River Morphology and Applications, Wildland Hydrology, 2000
- River Assessment and Monitoring, Wildland Hydrology, 2000
- Natural Channel Design and River Restoration, Wildland Hydrology, 2000
- Project Manager Bootcamp, PSMJ, 2000
- Advanced Hydraulic Modeling, Dr. Art Parola, University of Louisville, 2003
- Advanced Fluvial Processes, Dr. Garry Parker, University of Minnesota, 2003

### Registration

- Kentucky Professional Engineer - License Number 21501
- Ohio Professional Engineer – License Number 70545

### Fields of Competence

- Computational Fluid Dynamics
- Natural Channel Design / Construction
- Ecohydraulic Modeling
- Sediment Transport Modeling
- Stormwater Infrastructure Design
- Particle Image Velocimetry (PIV)
- Acoustic Doppler Velocimetry (ADV)
- Hydraulic Structure Design / Construction
- Water Chemistry / Sampling
- Water Distribution Systems Design
- Water Resources Optimization and Design
- Commercial and Academic Software Development
- Mined Lands Reclamation and Restoration
- Topographic and Hydrographic Survey
- Remote Sensing Technology

### Employment History

*Beaver Creek Hydrology, LLC.*; December 2006 to present, Vice President, Project Manager and Lead Designer, a company which specializes in river, stream and wetland restoration design and construction services.

*Department of Civil Engineering, University of Kentucky, Lexington, Kentucky.* January 2005 to January 2008, Performed state-of-the-art research at the University of Kentucky, supported by the Raymond Fellowship and additional research grants from USGS, in the areas of fluid mechanics and sediment transport in gravel-bed river systems. Instructor for the Civil Engineering Department, including courses in design, sediment transport and hydro-systems laboratory.

*Biohabitats, Inc., Timonium, Maryland;* Water Resources Engineer, Project Manager and Lead Designer. Designed stream restoration projects in Virginia, Pennsylvania and Maryland. Developed a native plant species database application for restoration specialists and lead a team of scientists who helped develop field technology for data acquisition, management and mapping in Fairfax County, Virginia, for the establishment of resource protection areas based on stream geomorphic and biologic criteria.

*FMSM Engineers, Inc., Lexington, Kentucky;* Senior Project Engineer. Stream restoration projects in Kentucky, Tennessee, Ohio, West Virginia and North Carolina. Involved with all aspects of stream restoration, including project management, channel assessments, habitat assessments, data collection and processing, hydraulic and sediment transport modeling, watershed modeling, natural channel design, construction monitoring and supervision and post-construction monitoring.

*RIVERMorph, LLC., Louisville, Kentucky;* Program Designer. Inventor and author of natural channel design software RIVERMorph. Worked closely with Dave Rosgen PhD, PH to streamline the “Rosgen Method” taught in Wildland Hydrology’s courses on natural channel design. Developed new theories in natural channel design applications, such as geomorphic optimization routines and a sediment transport models implemented in the software.

### Experience Summary

Extensive knowledge and varied experience in the fields of civil engineering, hydrology, natural stream channel design and restoration, fluid mechanics and sediment transport.

### Key Projects

Designer of many challenging stream restoration projects in the United States:

- Polo Fields Dam Breach Analysis (with FMSM Engineers)
- Harpeth River Dam Removal and Stream Restoration Project for the Harpeth River Watershed Association. This project received federal funding through the USFW fish passage and fish habitat grant programs.
- Murfrees Fork Stream Restoration Project for the Tennessee Stream Mitigation Program.
- Mill Creek Stream Restoration Project for the Tennessee Stream Mitigation Program.
- Cranes Nest Branch Stream Restoration Project for the Kentucky Dept. of Fish and Wildlife
- Elisha Creek Stream Restoration Project for the Kentucky Dept. of Fish and Wildlife
- Little Storms Creek Stream Restoration Project for the Ohio DNR
- Upper Coldwater Fork Stream Restoration Project for EPA
- The Lincoln County Wetland Mitigation Site for the Kentucky Transportation Cabinet
- The Wayne County Wetland Mitigation Site for the Kentucky Transportation Cabinet

- The Stillwater River Dam Removal and River Restoration Project for the 5-Rivers Metro Parks Department near Dayton, Ohio.
- The Wolf Run Stream Restoration Project for the Lexington-Fayette Urban County Government
- The Lower Mud River Sediment Transport Study and River Restoration Design for the USACE – Huntington District
- The Northern Ditch River Restoration and Flood Reduction Project for the USACE – Louisville District
- The Fort Campbell – Jordan Creek Watershed Restoration Project for the USACE – Nashville District
- The Pond Creek Restoration and Flood Reduction Project for the USACE – Louisville District
- The Pleasant Run Bed Grade Control Project for the City of Fairfield, Ohio
- The Fairway Stream Day-Lighting Project for the City of Mason, Ohio



## Tien Mun Yee, Ph.D., E.I.T.

Hydraulic Engineer

### Education

- PhD, University of Kentucky, 2009, Raymond Fellowship
- MSCE, University of Kentucky, 2002
- BSCE, University of Kentucky, 1999

### Registration

- Kentucky Engineer-In-Training

### Awards and Affiliations

- Recipient of Kentucky Water Resources Research Institute (KWRI) funding (2007)
- Awarded the Raymond Fellowship (2004-2005)
- Teaching Assistant, University of Kentucky (1999-2005)
- Research Assistant, University of Kentucky (1999-2007)
- Member of Golden Key International Honor Society (2007)
- Member of Delta Epsilon Iota Academic Honor Society (2007)
- Member of Chi Epsilon Civil Engineering Honor Society (2001)
- Graduate Student Congress representative for department of Civil Engineering (2006-2007)
- President of Graduate Forum group (2003-2004)
- President of Kentucky Society of Professional Engineers (KSPE) University of Kentucky Chapter (2002-2003)
- Member of Coasts, Oceans, Ports, and Rivers Institute (COPRI) (2002-2009)
- Member of American Society of Civil Engineers (ASCE) (1998-2009)

### Fields of Competence

- 1D, 2D and 3D Hydraulic Modeling and Computational Hydrodynamics
- Gas and Sediment Transport Modeling
- Acoustic Doppler Velocimetry (ADV)
- Water Distribution Systems Analysis
- Water Resources Optimization and Analysis
- Remote Sensing Technology

### Employment History

*Beaver Creek Hydrology, LLC.*; January 2010 to present, Hydraulic Engineer, a company which specializes in river, stream and wetland restoration design and construction services.

*Department of Civil Engineering, University of Kentucky, Lexington, Kentucky*; Mitigating the formation of vortices in pumping stations using scaled model studies and numerous pumping station modeling projects around Kentucky.

### *Experience Summary*

Dr. Yee is an experienced Computational Fluid Dynamics scientist. He received his doctorate degree in Civil Engineering at the University of Kentucky in May 2009 specializing in numerical modeling of fluid dynamical problems. He is currently part of Beaver Creek Hydrology's engineering team and is still actively involved in practical and theoretical aspect of computer modeling in fluids.

### *Key Projects*

Staff Engineer for a stream restoration project on Elisha Creek in Leslie County, Kentucky. This project includes full project design and construction oversight for over 6,000 linear feet of stream channel restoration in the Daniel Boone National Forest. The design includes bank stabilization, hydraulic grade control features, and interaction with ATV and horse trails within the Forest. Hydraulic modeling on this site including assessing initial conditions on the existing reach and determining bankfull and 100 year flood flows for the proposed design.

Staff Engineer on the Harpeth River Restoration Project. This project involves hydraulic modeling of existing and proposed conditions to remove a 6-foot high low head dam on the Harpeth River in Franklin, Tennessee and restore approximately 1800 feet of the river. The reach will be restored using a Priority Two restoration by excavating a floodplain bench and installing grade control structures through the reach. The floodplain bench will be used as a parking area and recreational access will be improved on the site.

Staff Engineer on the restoration of Hinton Branch in Estill County, Kentucky. This project is in the initial phase. The project will require hydraulic modeling of existing and proposed bankfull conditions and flood flows. This project will be a Priority 1 restoration of approximately 5,000 feet of Hinton Branch.