

UNIONIDAE (FRESHWATER MUSSELS) OF THE LITTLE MIAMI RIVER AT  
NEWTOWN ROAD

By  
Michael Hoggarth, Ph.D.  
Department of Life and Earth Sciences  
Otterbein College  
Westerville, Ohio 43081

For  
Hamilton County Park District  
10245 Winton Road  
Cincinnati, Ohio 45231

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## Table of Contents

Summary.....	3
Introduction.....	4
Materials and Methods.....	4
Results and Discussion.....	5
Impacts.....	6
Endangered Species.....	6
Literature Cited.....	7
Table 1. Unionidae of the Little Miami River near the Newtown Road Bridge	8
Table 2. Unionidae relocated during this study.....	9
Figure 1. Map of study area.....	10
Figure 2. Plan sheet showing the primary impact zone (Phase 1).....	11
Figure 3. Plan sheet showing the primary impact zone (Phase 2).....	12

## Summary

This document describes the community of unionids (freshwater mussels) in the Little Miami River at the Newtown Road Bridge. Furthermore, this document describes the activities that were undertaken to mitigate for any potential impact on the unionid community at this site due to the proposed instream construction.

The study was designed in three parts. First, it was necessary to determine what species of mussels occur in the river at this site. During this portion of the study, the location of a suitable relocation site, upstream of the primary impact area, was established. Second, an intensive search for mussels in the primary impact area was carried out. The primary impact area was defined as that area where instream work will be performed including any substrate that will be buried or moved during the construction of the bridge. All mussels found in this portion of the stream were moved upstream, away from the impact zone. The third part of the study was to search for mussels in the secondary impact zone where increased siltation during fill activities would impact mussels. Any state significant species found in this reach (1000 meters downstream of the primary impact zone) were relocated upstream. No individuals of state significant species were found within the secondary impact zone and therefore no mussels were moved upstream from this reach of stream.

The distribution of the Unionidae of the Little Miami River system recently was examined (Hoggarth 1992). A total of 36 species of Unionidae have been recorded from this river system (Clark 1987, Hoggarth 1992). Of these, 35 species have been recorded for the Little Miami River alone and 21 species have been reported for this reach of stream. As no survey work had been performed in the impact area and because two state endangered species, two species listed as threatened in Ohio, and two species listed as special concern, were recorded for this reach of the Little Miami River, this study was performed. The endangered species listed for this reach are the wartyback (*Quadrula nodulata*) and the snuffbox (*Epioblasma triquetra*). The threatened species found in the previous study were the threehorned wartyback (*Obliquaria reflexa*) and the fawnfoot (*Truncilla donaciformis*). Two species listed as special concern for this reach are the round floater (*Anodonta suborbiculata*) and the deertoe (*Truncilla truncata*).

A total of 14 species of mussels was located in the Little Miami River in the vicinity of this project. The Asiatic clam (*Corbicula fluminea*) also was taken. Specimens of the common floater (*Pyganodon grandis grandis*), the white heelsplitter (*Lasmigona complanata complanata*), the flute-shell (*Lasmigona costata*), the threeridge (*Amblema plicata plicata*), the maple leaf (*Quadrula quadrula*), the pistlegrip (*Tritogonia verrucosa*), the pink papershell (*Leptodea fragilis*) and the pink heelsplitter (*Potamilus alatus*) were found in the primary impact zone. These specimens were relocated upstream of the existing bridge. Living mussels also were found in the secondary impact zone (including *P. grandis grandis*, *L. complanata*, *P. alatus*, and *L. fragilis*) but since these species are not listed by Ohio, they were not relocated.

State significant species were found in the vicinity of this project. Freshly dead specimens of the fawnfoot (*T. donaciformis*) and the deertoe (*T. truncata*) were found in the primary impact zone. No federal or Ohio endangered species of unionid mollusks were found during this study.

## Introduction

The Unionidae or freshwater mussels (hereafter referred to as mussels) comprise an important part of the benthic community of the Little Miami River. Not only are these animals the largest members of the benthic community in this river, but they are a species rich component of that community. Hoggarth (1992) noted that this community has changed dramatically from the earliest surveys of this stream. Since the early 1900's this stream has lost nearly one third of its original fauna, and an additional third of this fauna is listed by Ohio as endangered, threatened or of special concern. This fauna is at a crucial juncture in this river with the loss of more species at stake. This study was performed to identify what species occur in this reach and to reduce the impacts associated with the construction of a new bikeway bridge downstream of the existing Newtown Road Bridge.

A total of 36 species of mussels have been recorded from the Little Miami River and its tributaries (Clark 1987, Hoggarth 1992) with 35 of these species collected from the Little Miami River alone. Included in this fauna is one species listed as endangered by the U.S. Fish and Wildlife Service and the Ohio Department Of Natural Resources, the clubshell (*Pleurobema clava*). Furthermore, the Little Miami River has populations of five additional species listed as endangered by the Ohio Department of Natural Resources. These species are the wartyback (*Q. nodulata*), the purple lilliput (*Toxolasma lividus*), the rayed-bean shell (*Villosa fabalis*), the little spectaclecse (*Villosa lienosa*), and the snuffbox (*Epioblasma triquetra*). Species designated as threatened in Ohio for this system are the threehorned wartyback (*O. reflexa*), the fawnfoot (*T. donaciformis*), and the balck sandshell (*Ligumia recta*). Species designated as special concern in Ohio for this system are the round floater (*Anodonta suborbiculata*), the salamander mussel (*Simpsonaias ambigua*), the purple pimpleback (*Cyclonaias tuberculata*), the round pigtoe (*Pleurobema sintoxia*), the deertoe (*T. truncata*), and the wavy-rayed lampmussel (*Lampsilis fasciola*).

The current report describes the mussel community in the Little Miami River near the existing Newtown Road Bridge. Instream work during the construction of the bikeway bridge would impact the mussel community at this site. These impacts would be expected to be of two types; 1) by causing direct mortality due to being buried, and 2) by causing increased siltation downstream. Silt has a negative impact on many species of mussels (Marking and Bill 1980). Fine particulate matter in the water clogs the gills of these animals, reducing feeding efficiency and transport of gasses across the gill surface. Deep deposits of silt have been shown to smother some mussels while having little effect on others.

## Materials and Methods

A study of the mussels of the Little Miami River at the Newtown Road Bridge was performed on 29-30 August 1998 (Figure 1). The river at this site was composed of a combination of fast, deep riffles and slow, deep pools. Upstream of the bridge, the river was slow moving and fairly deep. There was a fast riffle, with cobble and gravel substrate, approximately 1000 meters upstream of the bridge. At the bridge, the river was

shallow along the northern edge of the river and deeper (to three feet) near the southern edge of the river. A small sand and gravel island was located downstream of the northern abutment of the existing Newtown Road Bridge. To the north of this island was a side channel, approximately ten feet in width, where most of the living mussels taken during this study were found. Downstream of the bridge, the river was composed on fast riffles and slower run habitats. The substrate through most of this reach was composed of larger cobble and gravel. Very little habitat, suitable for mussels was found in this reach.

The study was designed in three parts. First it was necessary to determine what species of mussels occur in the vicinity of the proposed bridge. To make this determination, a general survey of the mussels of the Little Miami River in the vicinity of this bridge was conducted. Living mussels and freshly dead shells were collected from a reach of stream centered on the primary impact zone and extending both upstream and downstream approximately 1000 meters. During this portion of the study, the location of a suitable relocation site was determined. This site was determined on the basis of species composition and habitat characteristics when comparing the impact zone with the reach upstream.

Following the determination of the mussel community, an intensive search from mussels in the primary impact zone was done. The primary impact zone was defined as that area of the stream which will experience instream work during the construction of the bikeway bridge. Mussels in this reach would be buried by rip rap or crushed under the weight of the sediments. Mussels found in this area of the stream were relocated upstream. The limits of this search were determined by the limits of instream work as defined in the proposed project site plan (Figures 2 and 3). Mussels were collected from this area by nodding (by touch) and by sight.

Following this portion of the study, a less intensive search was made for a distance of approximately 1000 meters downstream of the primary impact zone. This reach of stream will experience increased siltation during bridge construction. The distance of 1000 meters was established in the field. This reach included all of the slack water habitats immediately downstream of the primary impact zone as well as the single fast riffle found downstream of this zone. Common species found in this reach were not relocated. Furthermore, no species listed as endangered, threatened, or of special concern were found alive in this reach. Had they been found they would have been relocated upstream.

## Results and Discussion

A total of 14 species was collected from the study area (Table 1). Most of these mussels were taken from the shallow, side channel habitat along the northern edge of the river. All of these mussels were relocated upstream (Table 2). No state or federal endangered species were found in this reach of stream. However, state significant species of mussels were collected from this area. Seven dead shells of the state special concern species, *T. truncata*, and two dead shells of the state threatened species, *T. donaciformis*, were taken. No living specimens of these two species were found, but it is thought that these species do occur within this reach, even though they were not found in the impact zone of this proposed construction project.

Living mussels found in the primary impact zone included eight species (Table 2). The most common species encountered was the pink heelsplitter (*P. alatus*). Other species found in decreasing order of occurrence were *L. complanata complanata*, *P. grandis grandis*, *Q. quadrula*, *L. fragilis*, *L. costata*, *T. verrucosa*, and *A. plicata plicata*. These mussels were relocated upstream.

A suitable relocation site was found upstream of the impact zone. This site was located along the southern border of the river downstream of the riffle habitat located approximately 1000 meters upstream of this bridge site. This site was dominated by fine sediments along a depositional bank. We found living specimens of all relocated species at this site.

## Impacts

Freshwater mussels are essentially immobile. Most species, once they detach from their fish host, remain in the same place throughout the remainder of their life. Construction projects, with instream work, impact these mussels if they are found in the path of the construction. These impacts are of two types; direct impacts (burying and crushing) and indirect impacts (siltation). Marking and Bill (1980) have reported that the downstream relocation of sediments tend to bury some mussels, while they tend to clog the gills of others, reducing gas exchange and interfering with feeding.

The project as it is currently designed will have neither direct or indirect impacts on the mussel community of the Little Miami River in the vicinity of the Newtown Road Bridge. All mussels that may have been impacted have been relocated. These mussels were relocated to suitable habitat upstream.

The mussel species found in the primary impact zone were the common floater (*P. grandis grandis*), the white heelsplitter (*L. complanata complanata*), the fluted shell (*L. costata*), the threeridge (*A. plicata*), the mapleleaf (*Q. quadrula*), the pistolgrip (*T. verrucosa*), the pink heelsplitter (*P. alatus*), and the fragile papershell (*L. fragilis*). None of these species are Ohio listed species.

## Endangered Species

No federal or state significant species of mussels will be impacted by the proposed bridge construction. Although state significant species were found to occur in the vicinity of the proposed project, none were found alive during this study. The clubshell (*P. clava*) is the only federally listed endangered species of mussel recorded from this reach of the river (Whiteaves 1863, Walter 1972, Hoggarth 1992). This species was not collected either as a living mussel or as a dead shell and it not considered to have a population at this site. Two state endangered species, the wartyback (*Q. nodulata*) and the snuffbox (*E. triquetra*) have been recorded from this reach of the river (Stein 1974, Hoggarth 1992), however neither was taken during this study. Neither species is thought to have an extant population in this reach of the Little Miami River.

## Literature Cited

- Clark, C.F. 1987. The freshwater naiads of Ohio, Part IV. The Little Miami River drainage. Issued by the author, 55 pp.
- Hoggarth, M.A. 1992. The Unionidae and Corbiculidae of the Little Miami River system in southwestern Ohio. *Walkerana*, 6(16):247-293.
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- Stein, C.B. 1974. In: Corps of Engineers, Louisville District, Final update environmental impact statement, East Fork Lake Project. U.S. Army Corps of Engineers, Louisville District, Kentucky, Volume 1. 99 pp.
- Walter, H.J. 1972. Some occurrences and assemblages of aquatic Ohio Mollusca. The American Malacological Union, Inc., Bulletin for 1971, 38:40-41.
- Whiteaves, J.F. 1863. Trans-Atlantic sketches. No. 1. On the Little Miami River, Waynesville, Warren County, Ohio. *Zoologist*, February. Pages 8119-8124.

Table 1. Unionidae of the Little Miami River in the vicinity of the Newtown Road.

Species <sup>a</sup>	Hamilton/Clermont <sup>b</sup>	Newtown Road <sup>c</sup>
<i>Utterbackia imbecillis</i>	X	
<i>Anodonta suborbiculata</i> <sup>g</sup>	X	
<i>Pyganodon grandis grandis</i>	X	6 live, 3 dead
<i>Anodontoides ferussacianus</i>		
<i>Strophitus undulatus undulatus</i>		
<i>Alasmidonta viridis</i>		
<i>Alasmidonta marginata</i>	X	2 dead
<i>Lasmigona complanata complanata</i>	X	22 live, 5 dead
<i>Lasmigona costata</i>	X	1 live
<i>Lasmigona compressa</i>		
<i>Tritogonia verrucosa</i>	X	1 live
<i>Quadrula pustulosa pustulosa</i>	X	
<i>Quadrula nodulata</i> <sup>c</sup>	X	
<i>Quadrula quadrula</i>	X	2 live, 2 dead
<i>Amblema plicata plicata</i>	X	1 live, 1 dead
<i>Cyclonaias tuberculata</i> <sup>g</sup>		
<i>Fusconaia flava</i>	X	
<i>Pleurobema clava</i> <sup>de</sup>		
<i>Elliptio dilatata</i>		
<i>Ptychobranchus fasciolaris</i>		
<i>Obliquaria reflexa</i> <sup>f</sup>	X	
<i>Obovaria subrotunda</i>		
<i>Truncilla truncata</i> <sup>g</sup>	X	7 dead
<i>Truncilla donaciformis</i> <sup>f</sup>	X	2 dead
<i>Leptodea fragilis</i>	X	3 live, 10 dead
<i>Potamilus alatus</i>	X	32 live, 16 dead
<i>Potamilus ohioensis</i>	X	7 dead
<i>Toxolasma parvus</i>		
<i>Toxolasma lividus</i> <sup>c</sup>		
<i>Ligumia recta</i> <sup>f</sup>		
<i>Villosa fabalis</i> <sup>c</sup>		
<i>Villosa iris iris</i>		
<i>Lampsilis radiata luteola</i>	X	1 dead
<i>Lampsilis ventricosa</i>	X	2 dead
<i>Lampsilis fasciola</i> <sup>g</sup>		
<i>Epioblasma triquetra</i> <sup>c</sup>	X	

a-Occurs in the Little Miami River (Hoggarth, 1992), b-found in Hamilton and/or Clermont county (Hoggarth, 1992), c-found during this study, d-federal endangered, e-Ohio endangered, f-Ohio threatened, g-Ohio special interest



Table 2. Unionidae collected within the primary impact zone, within the secondary impact zone, and relocated at Newtown Road Bridge.

Species	primary	secondary	relocated
<i>Pyganodon grandis grandis</i>	3	3	1
<i>Lasmigona complanata complanata</i>	13	9	10
<i>Lasmigona costata</i>	1	0	1
<i>Tritogonia verrucosa</i>	1	0	1
<i>Quadrula quadrula</i>	2	0	2
<i>Amblema plicata plicata</i>	1	0	1
<i>Leptodea fragilis</i>	1	2	1
<i>Potamilus alatus</i>	24	8	24

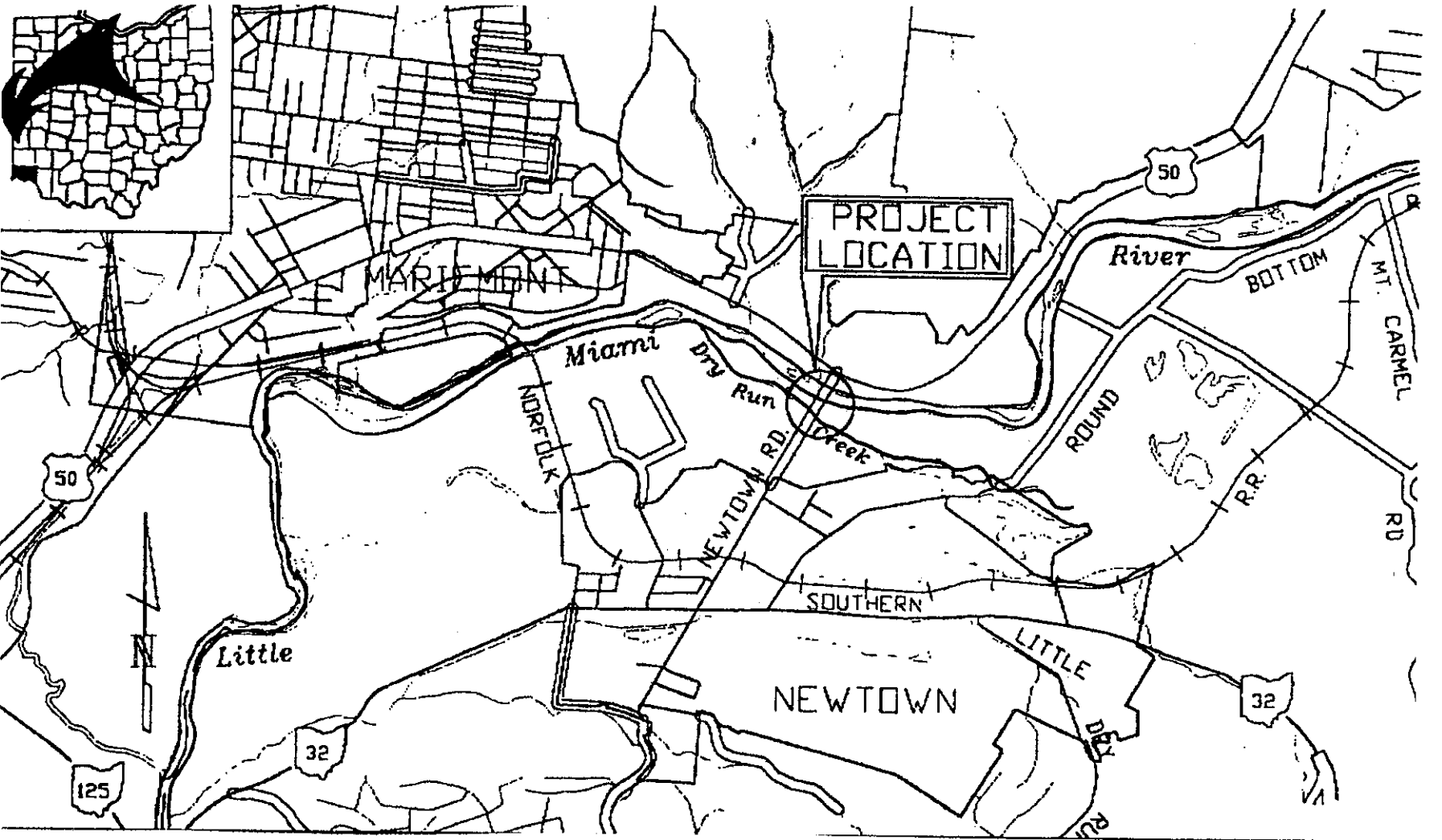
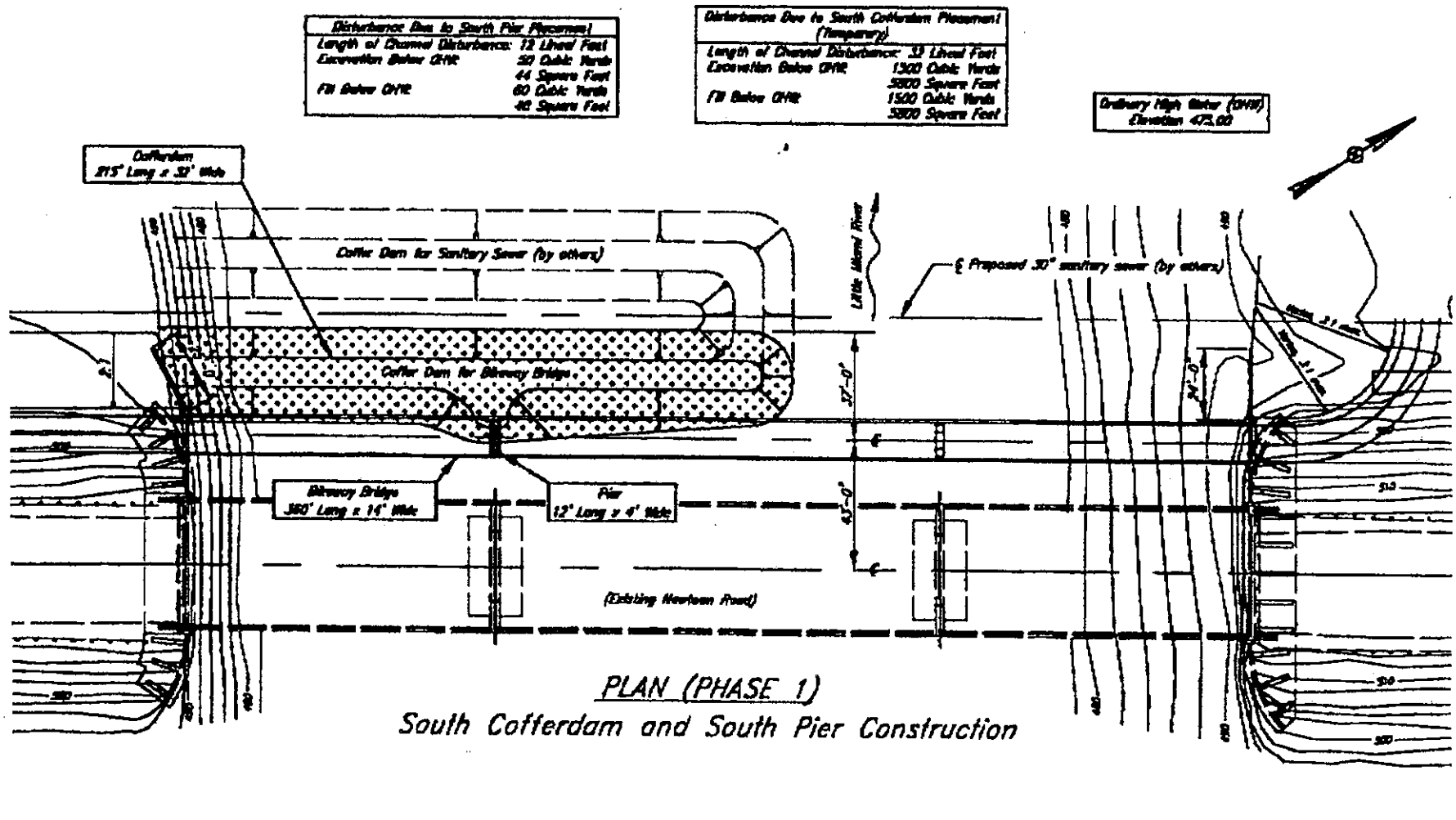


Figure 1. Map of the study area.

Figure 2. Plan sheet showing the primary impact zone (Phase 1).



Disturbance Due to North Pier Placement	
Length of Channel Disturbance:	17 Linear Feet
Excavation Below DWR:	50 Cubic Yards
FB Below DWR:	44 Square Feet
FB Below DWR:	60 Cubic Yards
FB Below DWR:	48 Square Feet

Disturbance Due to North Cofferdam Placement (Temporary)	
Length of Channel Disturbance:	33 Linear Feet
Excavation Below DWR:	970 Cubic Yards
FB Below DWR:	4,350 Square Feet
FB Below DWR:	970 Cubic Yards
FB Below DWR:	4,350 Square Feet

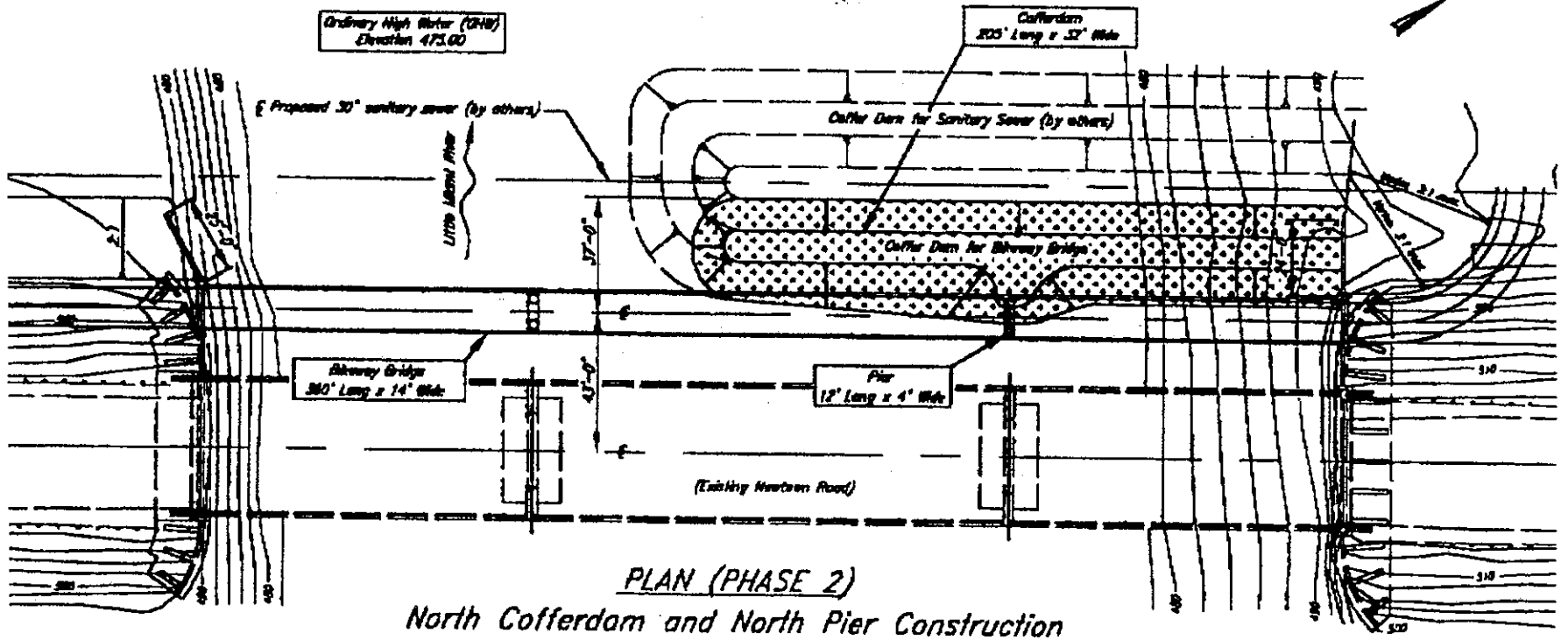


Figure 3. Plan sheet showing the primary impact zone (Phase 2).

Invoice # 00141

Dr. Michael A. Hoggarth  
1045 Hepplewhite Street  
Westerville, Ohio 43081

23 September 1998

Mr. Bob Mason  
Hamilton County Park District  
10245 Winton Rd.  
Cincinnati, Ohio 45231

Attention: Financial Officer; Hamilton County Park District

This is an invoice for a study, and relocation as needed, of freshwater mussels in the Little Miami River at the Newtown Road Bridge (bikeway project).

Date	Description	Cost
29-30 August	Mussel study - Field Work	\$ 1,440.00
12 September	Document Preparation	\$600.00
Total		\$ 2,040.00

Please send remittance to the address above (net in 30 days). Thank you.

Sincerely,

*Michael A. Hoggarth*

Michael A. Hoggarth, Ph.D.  
Department of Life and Earth Sciences  
Otterbein College  
Westerville, Ohio 43081

23 September 1998

Bob Mason  
Hamilton County Park District  
10245 Winton Road  
Cincinnati, Ohio 45231

Dear Mr. Mason:

Enclosed are four copies of the report, "Unionidae (Freshwater Mussels) of the Little Miami River at Newtown Road" and two copies of an invoice for the work performed. In the past I had been asked to reference a Hamilton Park District Purchase Order Number, but I do not have a PO for this project. If this was an oversight on my part, please send the PO and I will resubmit the invoice.

It was my pleasure to work for the park district again on the Little Miami River. Numerous mussels were relocated as a result of this work and I am confident that these mussels were salvaged as a result of this work. As always, it was my pleasure to work with Bret Henninger. I would be happy to work with him on other projects, including the design and construction of a display on the Unionidae as indicated in a recent e-mail from Bret. Thank you for the work.

Sincerely,

*Michael A. Hoggarth*  
Dr. Michael A. Hoggarth

(614) 823-1667 (Office)

(614) 823-3042 (FAX)

[mhogarth@otterbein.edu](mailto:mhogarth@otterbein.edu)

RECEIVED

SEP 23 1998

HAMILTON COUNTY  
PARK DISTRICT