

Fowler's Mill Chagrin River Restoration Plan

Revised September 2, 2010

The Fowler's Mill Golf Course is located at 13095 Rockhaven Road, in Munson Township, Geauga County. This draft restoration plan was developed by Amy Brennan, Chagrin River Watershed Partners, Inc. (CRWP) based on observed site conditions, existing and proposed stream conditions, and planned restoration activities. Existing and proposed stream quality is based on field observations of CRWP, Geauga Park District, and Ohio EPA (data from 2003 Technical Support Document (TSD)). Fowler's Mill Golf Course, LLC (FMGC) proposes to restore and stabilize 3,859 linear feet of the Chagrin River and approximately 24 acres of associated riparian buffer at the Fowler's Mill Golf Course property. To support the restoration and long term protection of the Chagrin River, 335 acres of the golf course will be placed under a conservation easement or environmental covenant with Munson Township and Ohio EPA. The 335 acres will include the entire 40 acre riparian corridor, encompassing the restored stream corridor and the existing natural forested stream corridor. The conservation easement would restrict the property to use as a golf course, and should golf course operation cease on the property, the property could only be managed as a nature preserve or parkland with ownership reverting to Munson Township. The conservation easement would prohibit any future development of the property.

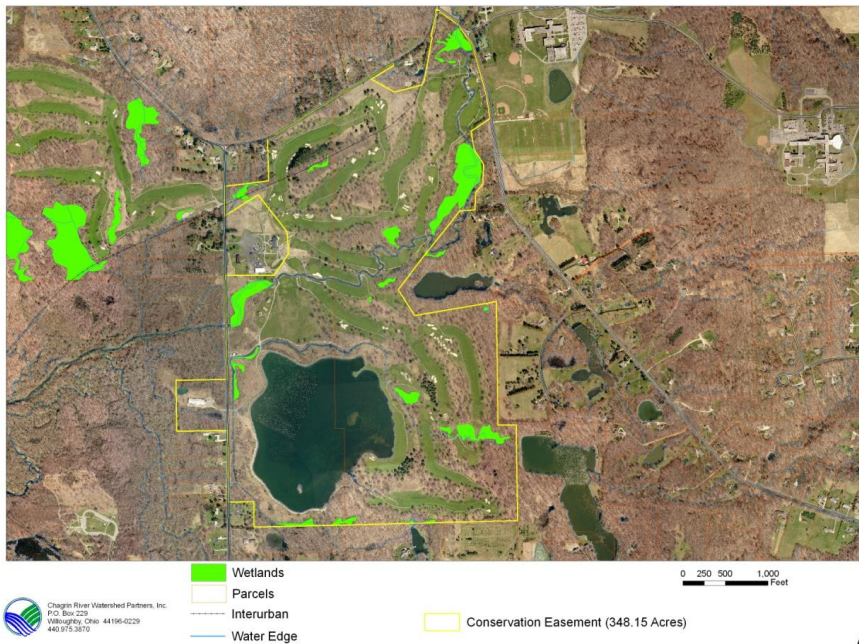
Current Conditions

The Upper Main Branch of the Chagrin River flows through the site. The Chagrin River is designated as warmwater habitat in this section and is in partial attainment. This segment of the Upper Chagrin River from Bass Lake to Rockhaven Road is the most heavily impacted due to significant channel clearing and stream bank modifications that occurred during golf course development. The Chagrin River crossing at Rockhaven Road is the downstream point of this proposed restoration project. Ohio EPA has identified habitat and flow alterations as the causes of impairment to this section of the Chagrin River. The Fowler's Mill Restoration Project will directly address these impairments by restoring forest and other native vegetation within the riparian corridor, removing railroad ties and other non-natural materials along the stream bank, removal or crushing of drain tile within the riparian corridor, and stabilizing stream banks through the creation of floodplain benches and vegetation. Photos of existing conditions are attached below.

The Fowler's Mill Restoration Project is located on a 458 acre site currently operated by a private property owner as the FMGC. The site is bordered to the southwest by the 603 acre Rookery Reserve owned and managed by the Geauga Park District as a public park and preserve. Undeveloped land, institutional, and low density residential properties border the property to the north and west. Munson Township has applied for funding under the Ohio Water Pollution Control Loan Fund's Water Resource Restoration and Sponsor Program (WRRSP) to restore the Upper Main Branch of the Chagrin River and permanently protect the restored riparian corridor and 335 acres of the property as shown in figure below. This project will protect over 4 miles of stream including 1.3 miles of the Upper Main Branch of the Chagrin River

which is designated State Scenic River and 1.88 miles of headwater streams. In addition to high quality stream resources, the property also contains approximately 15.2 acres of wetlands, some of which are Category 3 riparian wetlands.

Fowler's Mill WRRSP Project



The habitat of the existing main channel of the Chagrin River was evaluated by Amy Brennan with a QHEI score of 47 (scoring sheet attached) indicating a fair narrative rating. This value is similar to previous scoring by Ohio EPA and Geauga Park District staff. The attributes that have the most influence on stream habitat quality include no cover, embedded substrates, shallow pools, and lack of instream cover. The restoration plan proposed below will directly address these negative influences and proposed a restored stream reach that has the potential QHEI score of 70.5 (scoring sheet attached), exceeding a QHEI score of 60 which is the minimum score for WWH status. This restoration has a high degree of success due to the nature of the impairments, the proposed restoration activities, and the high quality reaches upstream and downstream which scored an 82.5 and 82 respectively in the Ohio EPA 2003-2004 TSD. Further, the naturalized stream corridor within the Fowler's Mill golf course was scored by Geauga Park District staff as a 75.0. This high scoring segment is located between the two impacted stream segments on the property.

Proposed Restoration

The restoration efforts of the Fowler's Mill Stream and Riparian Restoration Project will focus on the Upper Main Branch of the Chagrin River flowing through the property which has been impacted by mowing and golf course infrastructure in the riparian corridor, removal of floodplain vegetation, eroding stream banks, and channelization where timbers and railroad ties have

been placed along the banks. Restoration plans may include the following components or alternative proposals as developed by a qualified stream restoration contractor and approved by Ohio EPA, CRWP, and NEORS. Restoration will require the redesign or relocation of several of the holes at the golf course as detailed below:

- **Hole 1:** Reconfigure hole to move tee box to south out of riparian corridor.
- **Hole 11:** Slightly narrow the restored riparian corridor width to allow upper tee boxes to remain on south side of the riparian corridor.
- **Holes 9, 10, 12 and 13:** Redesign to alternative location as hole is entirely within the riparian corridor restoration area.

HOLE	1	2	3	4	5	6	7	8	9	TOT
L BACK	429	375	211	461	502	455	197	558	388	5606
A MIDDLE	416	357	192	438	483	407	171	556	366	3386
K HANDICAP	3	9	4	1	6	2	7	5	8	
E PAR	4	4	3	4	5	4	3	5	4	36
E FORWARD	389	326	154	393	460	377	135	447	352	3033
E HANDICAP	2	7	9	3	6	1	8	4	5	

HOLE	1	2	3	4	5	6	7	8	9	TOT
R BACK	428	360	350	184	521	429	374	191	550	3376
I MIDDLE	411	349	338	166	505	405	351	168	544	3237
V HANDICAP	2	8	5	6	7	1	9	4	3	
E PAR	4	4	4	3	5	4	4	3	5	36
E FORWARD	329	324	323	152	476	351	287	149	526	2917
R HANDICAP	5	6	3	8	2	4	7	9	1	

HOLE	1	2	3	4	5	6	7	8	9	TOT
M BACK	351	393	516	150	389	358	332	325	175	2589
A MIDDLE	351	393	516	150	389	358	332	325	175	2589
P HANDICAP	5	1	2	8	3	4	9	6	7	
L PAR	4	4	5	3	4	4	4	4	3	35
L FORWARD	311	377	463	145	376	349	317	315	152	2805
E HANDICAP	5	1	2	8	3	4	9	6	7	

COURSE RATINGS
 LAKE / RIVER
 72.8 / 133
 RIVER / MAPLE
 69.5 / 122
 MAPLE / LAKE
 70.6 / 126



Restoration of the stream banks and riparian corridor along 3,859 linear feet throughout the golf course will provide a naturalized stream channel and floodplain, improving habitat and eliminating flow alterations through this segment of the Chagrin River that is in partial attainment of its warmwater habitat designation. This project will remove railroad ties, timbers, and other non-natural materials along approximately 1,200 linear feet of stream and restore the stream banks with vegetation. Along the remaining 2,659 linear feet of the Upper Main Branch of the

Chagrin River this project will repair stream bank erosion and entrenchment by creating floodplain benches and stabilizing the stream banks with non-armored stream bank practices that include planting native stream bank vegetation. A minimum of 1.4 acres of floodplain excavation is proposed in addition to grading to remove railroad ties, drain tile removal or destruction, and planting to stabilize the stream banks.

Current golf course operations have extensively drained this entire stream corridor which was evidenced by numerous drain tiles exiting directly to the stream. There is no reliable mapping of these drain tiles and as observed on site they are of several different materials and were likely installed at different times during the golf course history. As these tiles are encountered during the restoration project they will be removed, cut off, or crushed and areas will be stabilized through heavy planting with wetland (hydrophytic) vegetation. As this property is very large and extensively drained, the field tile will not be removed throughout the entire parcel, however removal or destruction of the tile within the 300 foot riparian corridor will allow these previously directly connected outlets to the stream to discharge to the floodplain and encourage the creation of floodplain wetlands which will filter and slow this water prior to discharge to the Chagrin River. As noted on the existing conditions map, most areas of the stream that are undisturbed are highly vegetated and surrounded by wetlands. It is likely removal of tile, reconnection of floodplain benches, and revegetation of the stream corridor will result in the natural recreation of significant wetland acreage within the riparian corridor.

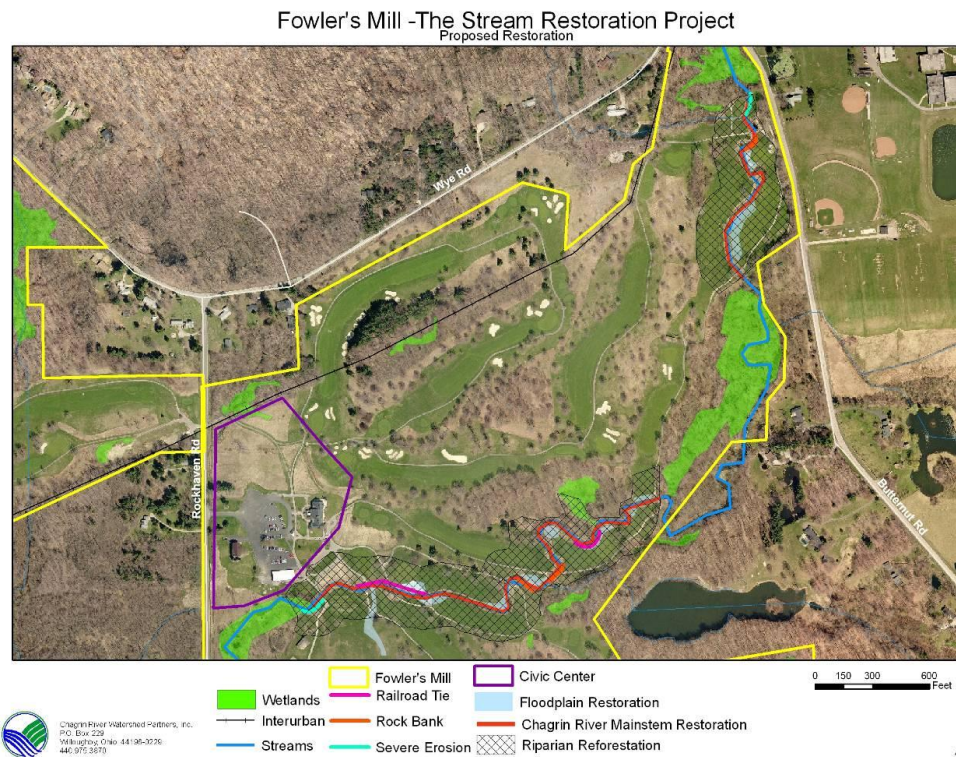
The project will also reestablish approximately 24 acres of riparian and floodplain area with native riparian and floodplain plants. This represents a corridor approximately 300 feet wide along the Chagrin River where existing shrubs and trees are not present. These plants include but are not limited to the following shrubs, and trees:

- Redosier Dogwood (*Cornus stolonifera*)
- Grey Stem Dogwood (*Cornus racemosa*)
- Silky Dogwood (*Cornus amomum*)
- Green Twig Dogwood (*Cornus rugosa*)
- Sandbar Willow (*Salix interior*)
- Dwarf Willow (*Salix x cottetii*)
- Purpleosier Willow (*Salix purpurea*)
- Bottonbush (*Cephalanthus occidentalis*)
- Eastern Cottonwood (*Populus deltoides*)
- Silver Maple (*Acer saccharinum*)
- American sycamore (*Platanus occidentalis*)
- Shagbark Hickory (*Carya ovata*)
- Hackberry (*Celtis occidentalis*)
- Black Willow (*Salix nigra*)

As final design and restoration plans are developed, FMGC will coordinate with US Army Corps of Engineers, Ohio EPA, and Ohio Department of Natural Resources during the development of

the restoration plan to acquire any permits or approvals required to complete the proposed restoration activities.

The following schematic identifies the locations where restoration activities are proposed. Please note tile locations are not noted on this map, but will be mapped and identified at a later time.



Project Timeline

The proposed timeline includes a general description and timeline activities that will need to be completed in order to ensure project success.

- Contract with qualified stream restoration consultant to develop a full restoration and planting plan:** FMGC will hire a contractor assist with the design and permitting of a fully developed riparian corridor and stream restoration plan. Contractor selection and review of developed plans must meet the requirements and expectations of Ohio EPA, NEORS, Munson Township, and CRWP. FMGC will contract with consultant in December 2011 and submit draft plans to partners for review and comment in March - June 2011.

2. **Permit Coordination:** June 2011 – November 2011
FMGC will coordinate with agencies during the restoration and planting plan and obtain any necessary permits.
3. **Stream and riparian restoration activities:** December 2011 – October 2012
 - FMGC will work with environmental consultant on the restoration construction to minimize any impacts to the Chagrin River.

Proposed Restoration Budget

The following budget table details the restoration budget including oversight and coordination completed by CRWP.

Deliverable	Total Est. \$\$ Costs	Description
Oversight and coordination by CRWP	\$5,000	Subcontract with CRWP to assist with development and review of restoration and planting plan, and coordination with Munson Township.
Stream bank restoration	\$265,130	Removal of non-natural materials from stream bank and stream bank restoration and stabilization activities.
Riparian and floodplain restoration	\$120,000	Riparian and floodplain planting with native trees and shrubs.
Total		\$395,130

The stream bank restoration component was averaged as a \$70/linear foot over the entire 3,859 linear feet of stream corridor that will be improved through this restoration project. As the restoration approach will differ based on the channel condition throughout the project area, the following details the stream bank restoration costs based on the proposed restoration plan and existing site conditions. In addition to planting throughout the riparian corridor to reestablish a forested riparian buffer, the restoration plan proposes four primary means of improving the stream and stream corridor.

- Removal of railroad ties and reshape streambank with stable slopes and vegetation.
- Excavation of floodplain to improve floodplain access.
- Removal or crushing of drain tile as encountered throughout riparian corridor.
- Revegetate a 300 foot wide riparian corridor.

Based on aerial photography and site visit notes, the stream banks at Fowler's Mill Golf Course are currently vegetated with herbaceous materials and a few short shrubs in most locations. Numerous areas of the stream bank are more heavily impacted through railroad tie walls (560 feet), rock lined from previous stabilization efforts (325 feet) or area currently experience severe erosion (265 feet). These more intensive restoration activities are projected to cost

approximately \$150/linear foot, while other activities are projected to cost approximately \$35/linear foot, resulting in the \$70/linear foot average cost.

The proposed restoration budget also includes funding for CRWP staff to assist with development and review of restoration and planting plan, and coordination with Munson Township. .

Summary

As the primary causes of non attainment in this reach are attributed to modifications caused by the golf course construction and operation, this restoration project has a high probability of success. The restoration of a natural stream channel, wetlands, and riparian corridor with floodplain excavation and tile removal will improve water quality by recreating natural stream flow, moderating water temperature, increasing aquatic and terrestrial habitat, reducing sedimentation from stream bank erosion, and absorbing nutrient rich runoff. This project also implements recommendations in the State-endorsed *Chagrin River Watershed Action and Chagrin River Watershed Balanced Growth Plans* and the *Total Maximum Daily Loads for the Chagrin River*.

Photographs of Existing Site Conditions:

