

Summary

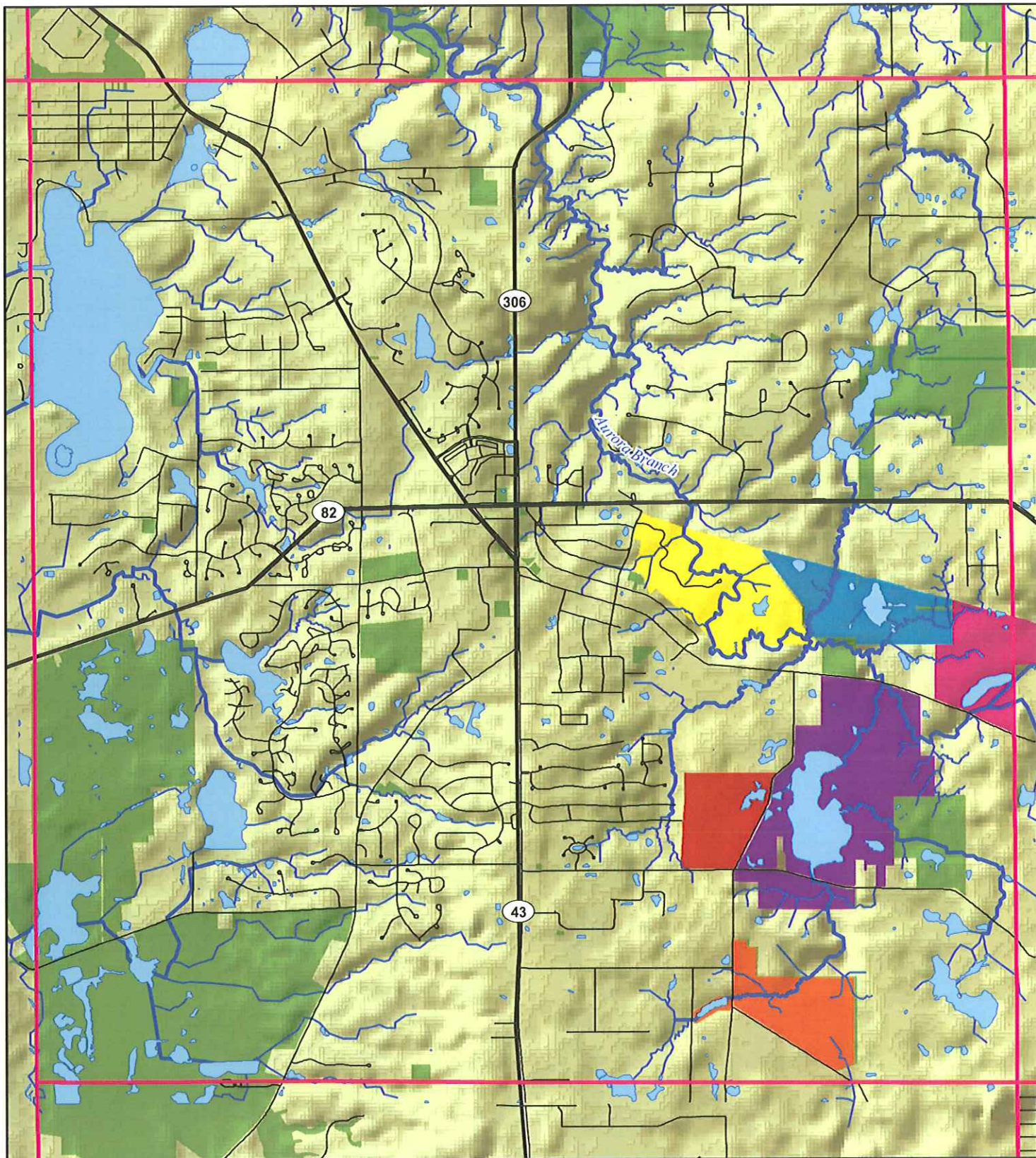
Aurora Branch Chagrin River Restoration

Water Resource Restoration Sponsorship (WRRSP) Project




The Aurora Branch Chagrin River Restoration project involves acquisition by the Trust for Public Land of approximately 196-acres of the existing Aurora Golf Club, and its conveyance to the City of Aurora, to be funded by the Ohio EPA WRRSP program. Following acquisition, restoration of streams and wetlands on the property will be coordinated and managed by Chagrin River Watershed Partners. The site lies within the Upper Aurora Branch of the Chagrin River watershed and offers a tremendous opportunity to enhance water quality, reduce flooding, and alleviate siltation and erosion of streambanks. Additionally, the property will be open to the public for use of its existing trails as multi-use paths for hiking, biking, and outdoor recreation.

The project includes preservation of over 8,000 linear feet of the Aurora Branch of the Chagrin River and over 6,800 linear feet of headwater streams, removal of one dam, and restoration of 3,600 linear feet of the Aurora Branch of the Chagrin River and 900 linear feet of headwater stream. Finally this project will restore nearly 33 acres of existing mowed and manicured golf course to a forest riparian corridor and floodplain. This project will implement action items included in the Chagrin River Watershed Action Plan (2006, revised, 2010). The plan lists restoration of the river through the Aurora Country Club as an action item and specifically calls for removal of the golf course infrastructure and restoration of the riparian corridor. The property also includes approximately 15 acres of Category 2-3 wetlands that will be preserved and enhanced.

Due to the significance of the resource to be acquired, and results of the restoration project, the Ohio EPA WRRSP program has approved the City of Aurora to receive \$4,521,000.00 to complete the project.



Protected Lands within the City of Aurora

-  Other Parks, Conserved Land, & City-Owned Vacant Properties
-  Audubon Aurora Sanctuary
-  Audubon Molnar Sanctuary

-  Spring Hill Wetlands
-  Harmon Homestead
-  Sunny Lake

 Aurora Country Club



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Restoration Concepts and Narrative for Aurora Country Club

Current Conditions

The Chagrin River Watershed Action Plan (WAP) includes an extensive inventory of the water quality data for the Chagrin River and its tributaries. Based on the data from the inventory, the WAP details implementation measures to preserve, restore, and retrofit areas of the watershed to ensure the health and integrity of the Chagrin River. The Aurora Branch of the Chagrin River upstream of McFarland Creek (HUC 04110003-020-030) has been identified as being in partial and non attainment of WWH. Within this subwatershed, numerous pollution sources and problems have been attributed to wastewater treatment sources, point source discharges, stream bank modification, upstream impoundments, habitat alteration, drainage and filling of wetlands, and storm water runoff due to changing land use. Ohio EPA's Technical Support Document, "Biological and Water Quality Study of the Chagrin River and Selected Tributaries 2003-04" sampling noted "excess nutrients, sedimentation, and organic enrichment with possible periodic toxicity occurred in Aurora Branch due to impacts from small sewer treatment plants, Sunny Lake, or nonpoint source inputs (urban runoff from storm sewers or septic tanks. This study further noted that 42% of sites in the Aurora Branch were impaired which was a slight improvement compared to 60% during 1995 survey. Page 86 of this report states "Most of the problems facing the Chagrin basin are found within the hydrologic unit comprising the watershed upstream from and including the Aurora Branch. Channelization of the Chagrin River headwaters, organic enrichment of the Aurora Branch, and toxicity from algal blooms in Sunny Lake are the main problems."

Since the 2003-2004 sampling, the City of Aurora has completed several projects to improve water quality in the Aurora Branch, including preservation of the Spring Hill Wetlands Property (2010 WRRSP), Harmon Homestead Restoration Project (2011 319 Project, construction slated for summer 2012), implementation of recommendations from the Save Sunny Lake Committee final report from June 2007

(<http://www.auroraoh.com/combds/savesunnylake/Save%20Sunny%20Lake%20Committee%20Minutes/2007%20Minutes/Final%20Report%20-%20Save%20Sunny%20Lake%20Park%20Committee.pdf>). Recommendations from this report that have been implemented include:

- Stabilize Sunny Lake Shoreline.
- Drain lake and remove carp, grass carp, and bluegill from the lake.
- Restore the southern tributary to Sunny Lake. Funding received to restore upstream segments on the Harmon Property.
- Evaluate the restroom facilities at Sunny Lake Park. Sanitary sewer was extended to serve this facility.

On the Aurora Country Club property, the Aurora Branch of the Chagrin River has been identified as being in partial and non attainment. This portion of stream is approximately 8,300 linear feet and confined within the Aurora Country Club property. The City of Aurora and the Trust for Public Land are investigating the purchase of this property (approximately 186 acres) to restore forest connectivity, reduce non-point source stormwater pollution, and to remove impoundments within the Aurora Branch of the Chagrin River.

The total project area for this restoration and protection project is approximately 186 acres. Currently there are 15 acres of category 2 and 3 wetlands, 5,800 linear feet of headwater stream and 8,300 linear feet of the Aurora Branch of the Chagrin River.

Proposed Restoration

This project will restore an additional 900 linear feet of headwater stream, remove one dam, restore 3,500 linear feet of the Aurora Branch of the Chagrin River, and 33 acres of forested riparian corridor and floodplain. The conceptual restoration plan is attached in Exhibit B.

Restoration efforts will focus on restoring a natural stream corridor through bioengineering on streambanks, removal of tile, current structures, and steel sheet pile, . Restoring the riparian area to native woodland will help shade the Aurora Branch, stabilize the banks, prevent erosion, control runoff, and significantly reduce the amounts of nutrients and other chemicals from entering the stream.

The conceptual restoration plan focuses on four specific tasks detailed below: planning and design; ; dam removal and headwater stream restoration, Aurora Branch of Chagrin River restoration; and riparian restoration. The objectives for this restoration project include:

- Convert 33 acres of existing golf course turf to forest floodplain and riparian corridor.
- Restore 350 linear feet of headwater stream by removing fill and tile drainage in existing fairway.
- Remove 1 dam and restore 550 linear feet of headwater stream in area of existing upland impoundment.
- Stabilize stream banks and restore floodplain connectivity on over 3,500 linear feet of the mainstem of the Aurora Branch of the Chagrin River.

Task 1: Planning, Design, Engineering, Permitting, Monitoring and Project Oversight

For planning and design purposes, the project site will be carefully studied. Natural resources currently existing on the site will be inventoried and evaluated in an effort to preserve and enhance high quality wetlands, identify non-desirable

vegetation, locate in-stream impairments and obstructions, and develop a detailed restoration and management plan. Coordination with federal, state, and local governing agencies will be necessary to prepare the restoration and management plan, and the appropriate level and type of permits will be identified and secured as part of Task 1. Detailed surveys, wetland delineation, geomorphic survey, hydrological studies, post construction monitoring, and the involvement of a professional engineer are all accounted for in this figure. The City of Aurora will also contract with the Chagrin River Watershed Partners, Inc. (CRWP) to assist with project oversight, review of final Restoration and Management Plan, and implementation of the restoration activities (\$5,000 subcontract). CRWP has provided project management and oversight for other stream restoration projects in the Chagrin River watershed.

Task 2: Dam Removal and Headwater Stream Restoration using Natural Channel Design Concepts

As noted in Exhibit B, two headwater streams are proposed for restoration. One stream is in the location of the existing pond. For this area, the dam is proposed to be breached and replaced with a restored stream channel using natural channel design concepts. The second stream restoration is proposed where the existing headwater stream is headcutting towards the fairway where several tile drains are discharging into the ravine. Removal of this impoundment and restoration of a natural stream channels will address the causes and sources of impairment including impoundments, hydromodification, nutrients, dissolved oxygen, and thermal modification.

Task 3: Aurora Branch Restoration – Estimated Cost

Approximately 8,300 linear feet of the Aurora Branch of the Chagrin River flows through the Aurora Country Club property. This reach of stream contains 13 structures ranging from bridges for the cart path to a section of steel sheet pile, a flood overflow structure, and several rock check dams that impede natural channel morphology. This portion of the stream contains limited riparian buffer and is in partial and non attainment of its WWH stream designation.

The restoration plan includes removal of structures that impede natural stream morphology, removal of seven bridges and the flood overflow structure, and installation of rock riffle habitat structures. These structures will consist of natural stone appropriately sized for stream size and flow rates. These structures will provide in-stream habitat diversity, habitat for macroinvertebrates and fish, and aeration to the stream. In addition, these structures will prevent down-cutting and/or head-cutting that has occurred due to existing stream impoundments or that may occur during the removal of the impoundments. Approximately 3,500 linear feet of the Aurora Branch have direct channel modifications, modified stream banks on one or both sides of the stream, or are entrenched with little to no floodplain access. A detailed design will evaluate the stream channel morphology and stream bank treatments. Stream banks will be evaluated for erosion and stream bank height and may be lowered to facilitate floodplain connection or stabilized with bioengineering techniques such as root wads, branch layering, or willow posting. By connecting the stream to a vegetated floodplain and stabilizing stream banks, the water quality of the Aurora Branch will improve by addressing sources of impairment including hydromodification, siltation and thermal modification.

Task 4: Turf and Riparian Restoration – Estimated Cost

Approximately 87 acres of turf exists on the Aurora Country Club property. This turf has been maintained through mowing and fertilization, thus providing no water quality benefits to the Aurora Branch of the Chagrin River. Through restoration of a forested floodplain and riparian corridor and allowing upland area to go through a natural meadow succession, this turf area will be transformed to provide riparian habitat and floodplain benefits that are currently lacking.

As shown on the conceptual plan, approximately 33 acres of riparian corridor will be planted with native trees and shrubs. This area includes the entirety of the 100 year floodplain along the Aurora Branch of 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*)

Restoring the forested floodplain and riparian corridor will assist with exclusion of geese, eliminate fertilizer and herbicide runoff, and reduce sediment loads, all of which contribute to increased bacteria levels and algal blooms within the Aurora Branch of the Chagrin River.

Project Timeline

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

1. **Contract with qualified stream restoration consultant to develop a full restoration and planting plan:** The City of Aurora 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, NEORSD, City of Aurora, and CRWP. Aurora will contract with consultant in April 2012 and submit draft plans to partners for review and comment in August 2012.
2. **Permit Coordination:** October 2012
The City of Aurora and selected contractor will coordinate with agencies during the restoration and planting plan and obtain any necessary permits.
3. **Stream and riparian restoration activities:** May 2013 – October 2013
 - Restoration activities to be completed.
4. **Monitoring:** First Annual Report submitted January 2014 with yearly reporting as required
 - Complete full biological monitoring

Proposed Restoration Budget

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

Design	1 Design	Lump Sum	\$80,000	Design Subcontractor
Project Management and Technical Assistance	150 hours	\$33.33/hour	\$5,000	Subcontract with CRWP to assist with grant management, development and review of restoration and planting plan, and education materials.
Dam Removal	1 Dam	\$75,000	\$75,000	Removal of Dam impoundment
Headwater Stream Restoration through Natural Channel Design	900 Linear feet	\$180/linear foot	\$162,000	Restore of 900 LF of natural Stream channel design through existing pond and fairway.
Stream bank restoration	6,300 linear feet	\$40/linear foot	\$252,000	Removal of non-natural materials from stream bank and stream bank restoration and stabilization activities.
In Channel Restoration: Flood overflow structure and bridge and footer demollition	8 structures	\$1,500/structure	\$12,000	Removal of 7 bridges and 1 overflow structure
In Channel Restoration: Rock Riffle Construction	12 structures	\$2,000/structure	\$24,000	Installation of in stream rock riffle structures to provide grade control and habitat features
Riparian and floodplain restoration	33 acres	\$5,000/acre	\$165,000	Riparian and floodplain planting with native trees and shrubs.
		<u>TOTAL</u>	<u>\$ 775,000</u>	

Summary

Each of the components of this proposed restoration plan in concert with the work already completed or proposed by the City of Aurora will address the causes and sources of impairment and the WWH stream designation has a high probability of being attained. The restoration of a natural stream channel, removal of channel obstructions and impoundment, 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:



Photographs of Existing Site Conditions (cont.):



Photographs of Existing Site Conditions (cont.):



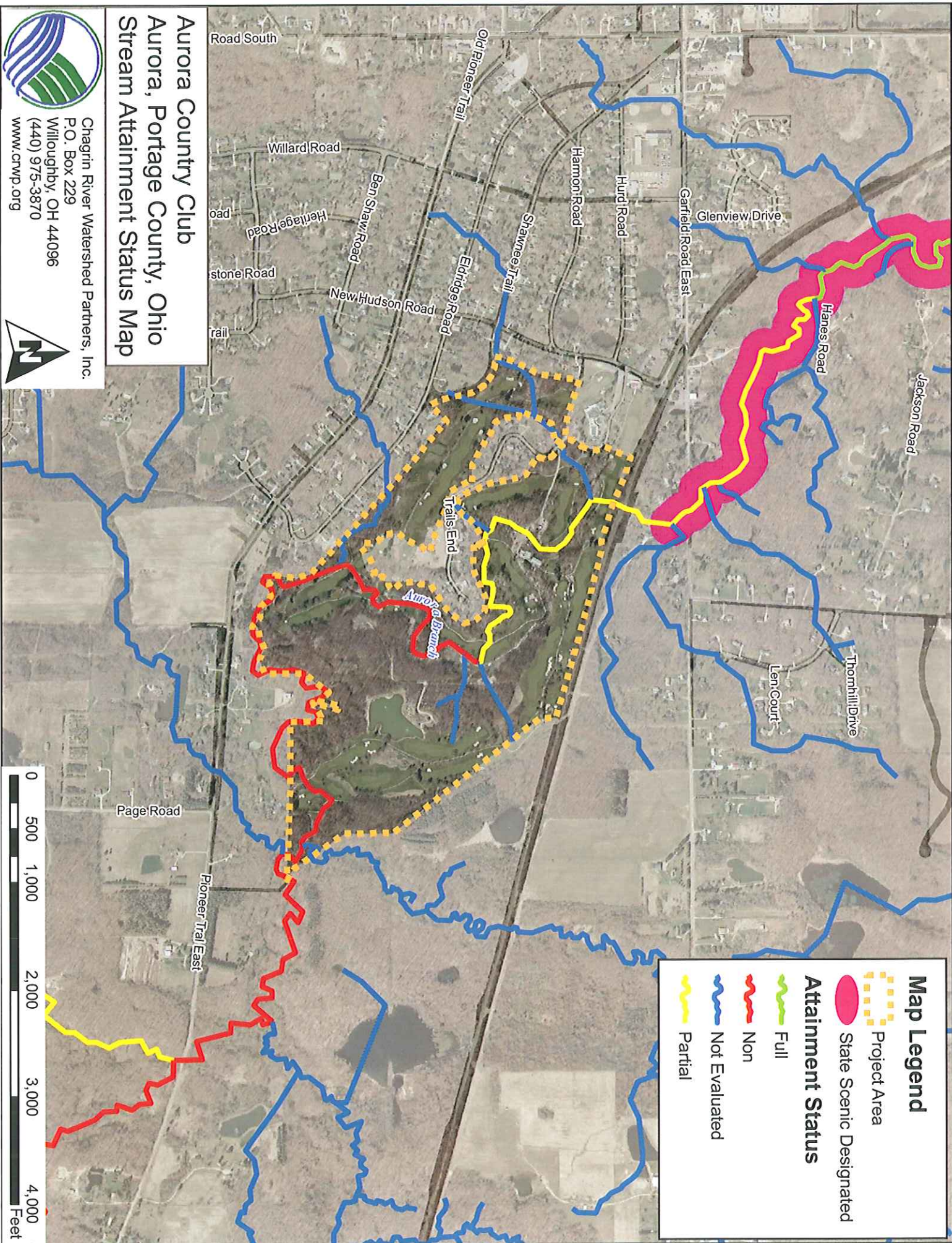
Photographs of Existing Site Conditions (cont.):





Aurora Country Club Aurora, Portage County, Ohio Stream Attainment Status Map

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Map Legend

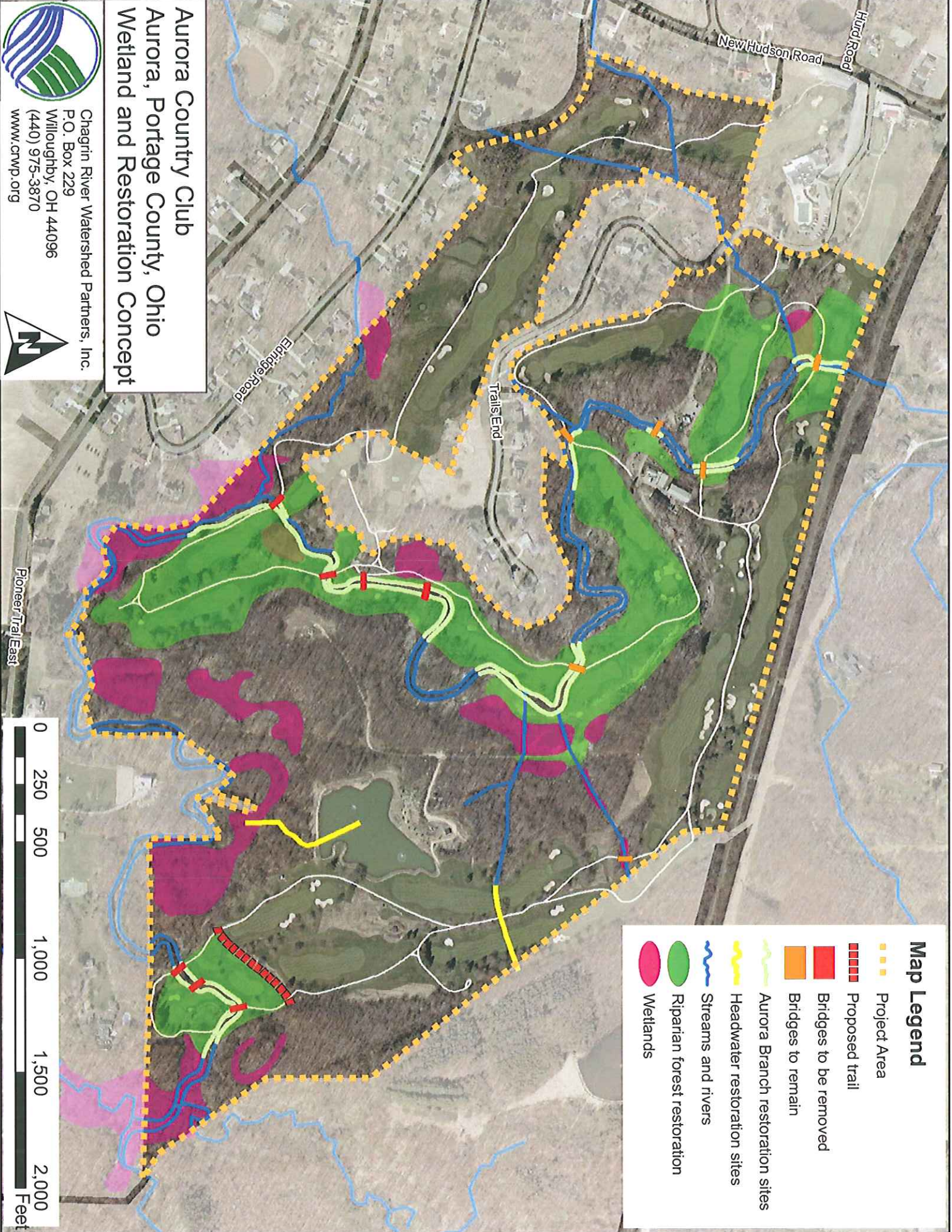
- Project Area
- State Scenic Designated
- Attainment Status**
 - Full
 - Non
 - Not Evaluated
 - Partial



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Aurora Country Club Aurora, Portage County, Ohio Wetland and Restoration Concept



Map Legend

- Project Area
- Proposed trail
- Bridges to be removed
- Bridges to remain
- Aurora Branch restoration sites
- Headwater restoration sites
- Streams and rivers
- Riparian forest restoration
- Wetlands

