Daniels Park Stream Restoration Planning

CHAGRIN RIVER WATERSHED PARTNERS

Biohabitats

East Branch Restoration Plan

- Prevent 274.7 tons/yr. sediment & 329.6 lbs./ yr. phosphorous from entering Chagrin River

Alternative 1:

- Restore 700 ft. of East Branch
- Restore 1 acre of oxbow wetland
- $842,050

Alternative 2:

- Restore 720 ft. of East Branch
- Restore 0.6 acres of oxbow wetland
- $1,105,100

Mainstem Restoration Plan

- Stabilize 685 feet of eroding streambank
- Restore 1.5 acres of riparian buffer
- Prevent 140.2 tons/yr. sediment & 168.3 lbs./ yr. phosphorous from entering Chagrin River
- $485,000 - $511,000

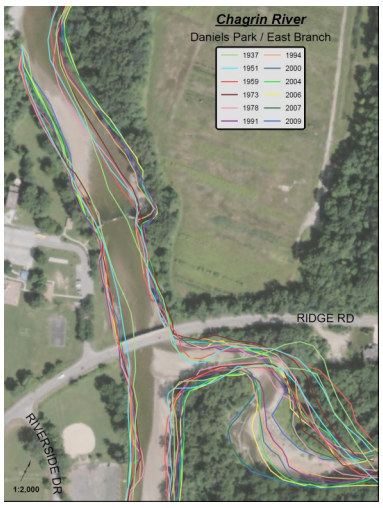
Current Conditions

At the City of Willoughby's Daniels Park, both the Chagrin River south of State Route 84 and the East Branch of the Chagrin River near the confluence with the Chagrin River have been experiencing substantial erosion for several years. Both streams have 10.5 feet bank heights. In June 2018 both streams scored as having High erosion using Rosgen's Bank Erosion Hazard Index. The East Branch had Very High Near Bank Stress and the Chagrin River had High Near Bank Stress. About 685 feet of streambank on the western bank of the Chagrin River and 475 feet on each bank of the East Branch are eroding.

A remnant wooden dam and concrete intake structure and associated pipes and rubble from the City of Willoughby's former water supply intake are having a large impact on the hydraulics of the East Branch of the Chagrin River near its confluence with the Chagrin River. These structures have resulted in unnatural and variable deposition and erosion patterns. This reach is an extremely dynamic, unstable meander S-curve. The instability and hydromodification is negatively impacting the channel morphology and bank erosion and riparian zone components of the Qualitative Habitat Evaluation Index. The nearest assessment point on the East Branch was in non-attainment of its coldwater habitat aquatic life use when last assessed by Ohio EPA in 2004.

Factors causing erosion on the western bank of the Chagrin River between State Route 84 and I-90 include: collapse of the downstream dam which lowered the base level, lack of adequate riparian buffer, and accumulation of sediment along the eastern bank. The erosion and migration of the western bank has resulted in deposition and aggradation of the eastern bank. The point bar on the eastern bank and associated transverse riffle are forcing flow into the western bank. Despite this ongoing erosion problem, the Chagrin River near this location has been able to maintain healthy fish and macroinvertebrate communities, and overall habitat quality is good. These erosion problems should be addressed to ensure that the Chagrin River in this area continues to support healthy aquatic communities.

Eroding streambanks on East Branch near remnants of City of Willoughby's former water supply intake.



The East Branch at Daniels Park has been unstable for a long time.

Eroding streambank on Chagrin River south of State Route 84 at Daniels Park.

The restored oxbow wetland will provide nursery areas for native fish.

After restoration, the East Branch at Daniels Park will look more like this stable reach upstream.

Restoration Plan for the East Branch

The conceptual plan restores the East Branch by realigning the channel to a more stable configuration and removing the influence of the former water intake structures on the flow hydraulics. In both alternatives, most or part of the old channel will become an oxbow wetland. Oxbow wetlands provide nursery areas for young fish and can be good waterfowl habitat. Fish habitat in the channel will also be improved by improving channel morphology and addressing bank erosion. Implementing the restoration plan for the East Branch would prevent 274.7 tons of sediment and 329.6 pounds of phosphorous per year from entering the Chagrin River.

The preferred alternative (Alternative 1) is a new channel alignment with one meander located in the low area in the floodplain between the East Branch and the mainstem of the Chagrin River. Toe wood will help stabilize the meander. Alternative 1 would restore 700 feet of the East Branch and 1 acre of oxbow wetland at an estimated implementation cost of $842,050.

Alternative 2 is a channel configuration with two meanders with a smoother, more stable curve than is currently present. Alternative 2 would require more excavation and fill than Alternative 1. Alternative 2 would restore 720 feet of the East Branch and 0.6 acres of oxbow wetland at an estimated implementation cost of $1,105,100

Bendway weirs would help stabilize the western bank of the Chagrin River south of SR 84.

Bendway weirs need to be keyed into the bank to prevent the river from cutting behind them.

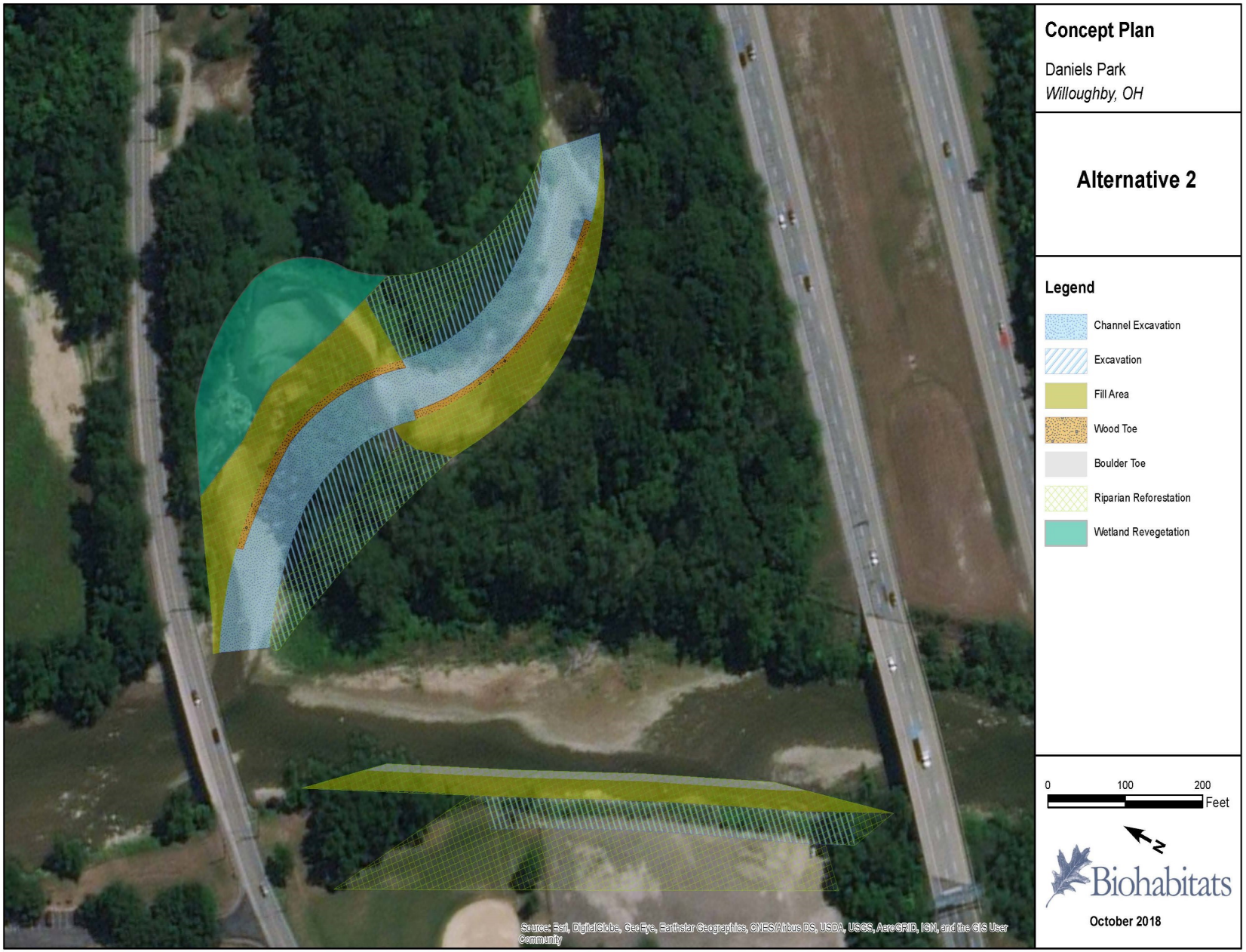
Bank Stabilization & Riparian Restoration Plan for the Chagrin River

The restoration plan stabilizes 685 feet of the eroding western bank of the Chagrin River south of State Route 84 using bioengineering methods and restores 1.5 acres of riparian vegetation. The native tree and shrub species will help stabilize the banks with their roots and help filter runoff before it reaches the river. Implementing the bank stabilization and riparian restoration plan for the Chagrin River at Daniels Parks would prevent 140.2 tons of sediment and 168.3 pounds of phosphorous per year from entering the river.

The preferred restoration alternative (Alternative 1) combines bendway weirs, a bankfull bench, and riparian restoration along the western bank with removal of the point bar on the eastern bank and realigning the transverse riffle. Bendway weirs are rock structures that direct flow into the center of the channel. A bankfull bench is a floodplain area that water overtops in common high flow events which allows for flood storage and velocity dissipation. The estimated implementation cost for Alternative 1 is $485,000.

Alternative 2 would replace the bendway weirs with a boulder toe (boulders at the bottom of the streambank near the water) while retaining the other components of the bioengineered streambank stabilization plan. The estimated implementation cost for Alternative 2 is $511,000


Concept Plan
Daniels Park
Willoughby, OH
Alternative 1
Legend
Channel Excavation
Excavation
Fill Area
Bendway Weir
Wood Toe
Riparian Reforestation
Wetland Revegetation
0
100
200
Feet
N
Biohabitats
October 2018
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community


Concept Plan
Daniels Park
Willoughby, OH
Alternative 2
Legend
Channel Excavation
Excavation
Fill Area
Wood Toe
Boulder Toe
Riparian Reforestation
Wetland Revegetation
0
100
200
Feet
N
Biohabitats
October 2018
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

P.O. Box 229
Willoughby, OH 44096-229

Phone: 440-975-3870
Email: contact@crwp.org

www.crwp.org

About Chagrin River Watershed Partners (CRWP)

Chagrin River Watershed Partners (CRWP) has been helping the communities that drain to the Chagrin River with flooding and erosion problems since 1996. We assist local governments with adopting and implementing regulations to protect natural resources and promote balanced growth, secure and manage grants to help fund restoration projects, and provide advice to landowners to address erosion and flooding problems. Through the Central Lake Erie Basin Collaborative, we assist other watershed groups and communities across the Central Lake Erie Basin from Sandusky to Conneaut.

Daniels Park Stream Restoration Planning Process

The City of Willoughby has been concerned about erosion occurring on the Chagrin River and its East Branch at Daniels Park for several years. The City shared these concerns with CRWP, and CRWP began applying for grants to assist with stream restoration planning for the park. In 2017, CRWP received a $15,000 Great Lakes Restoration Initiative grant from the Ohio Environmental Protection Agency and the United States Environmental Protection Agency to develop conceptual stream restoration plans. Through a competitive request for proposals process, CRWP hired Biohabitats in 2018 to assist with conceptual plan development. CRWP has consulted with the City of Willoughby, Lake County Stormwater Management Department, Lake Soil and Water Conservation District, Western Reserve Land Conservancy, Ohio Environmental Protection Agency, and Ohio Department of Natural Resources to facilitate plan development. Stakeholder outreach will continue to gain support for the stream restoration plan and cultivate partnerships to assist with project implementation. CRWP will incorporate components of the stream restoration plan for Daniels Park into Nonpoint Source Implementation Strategy (NPS-IS) Plans for Chagrin River subwatersheds, so that they will be eligible for implementation funding from Ohio Environmental Protection Agency and the United States Environmental Protection Agency. After securing approval from project stakeholders, CRWP will seek grants to help fund project implementation.

Biohabitats and CRWP assessing current conditions.

Funding Acknowledgement

This product or publication was financed in part or totally through a grant from the Ohio Environmental Protection Agency and the United States Environmental Protection Agency with the following funds: Great Lakes Restoration Initiative. The contents and views, including any opinions, findings, or conclusions or recommendations, contained in this product or publication are those of the authors and have not been subject to any Ohio Environmental Protection Agency or United States Environmental Protection Agency peer or administrative review and may not necessarily reflect the view of the Ohio Environmental Protection Agency or United States Environmental Protection Agency and no official endorsement should be inferred.