

EPA Great Lakes Restoration Initiative Project

Final Report

Firefighters Park Sprague Drain Habitat Improvement Project Design

Grantee and Project Information

Grant Number: 00E03266-0

Applicant Name: Kurt Bovensiepe, Public Works Director, City of Troy

Project Title: Firefighters Park Sprague Drain Habitat Improvement Project Design

Award Amount: \$100,000

Project Location: Firefighters Park, City of Troy, Oakland County

Waterbody: Sprague Established County Drain

Summary

City of Troy, using \$100,000 Great Lakes Restoration Initiative (GLRI) grant from United States Environmental Protection Agency (USEPA), completed the design of habitat improvement at Sprague Drain in Firefighters Park, in City of Troy, Michigan. The purpose of this project is to provide habitat features that will address three of the Beneficial Use Impairments (BUIs) associated with fish and wildlife habitat in the Rouge River, namely Degraded Fish and Wildlife Populations, Degradation of Benthos, and Loss of Fish and Wildlife Habitat. As a result, work towards delisting the Rouge River watershed as an Area of Concern (AOC) as designated by the Great Lakes Water Quality Agreement (GLWQA). The City of Troy contracted with Hubbell, Roth, and Clark Inc. (HRC) as the firm that would complete the design, permitting, and construction documents. The design grant was issued on 10/01/2022 and ended on 12/31/2023.

The Sprague Drain project includes creating bankfull channel on either side of the stream to provide floodplain connectivity. The streambank will be stabilized using bioengineering techniques to provide additional habitat and reduce streambank erosion. Additional riffle structures and pools will be constructed to enhance bed form diversity. Invasive species will be removed both within the lake and in the riparian corridor. This project also converts a grass detention basin to a new wetland/floodplain habitat.

1- Introduction

During the last century, tributaries of the Rouge River have suffered from declining water quality, loss and impairment of aquatic habitat, and increased frequency and magnitude of peak flood flows. The flat river slope could not pass the large flows associated with major precipitation events. Increasing urbanization within the watershed as well as urbanization upstream exacerbated this problem by increasing impervious surface, leading to frequent flooding within downstream local communities.

Fortunately, water quality has improved since 1992 thanks to the federally-funded Rouge project. For example, 89 of the 127 miles of the larger streams and tributaries in the watershed are now free from public health threats associated with uncontrolled combined sewer overflow discharges. Water quality improvement is exhibited by increased dissolved oxygen levels needed to sustain fish and aquatic life.

Increased populations and diversity of benthos, fish, and wildlife have been measured along the river since 1999. The USEPA office of inspector General declared the Rouge Project “ a blueprint for success” (EPA OIG report number 2002-P-00012).

Many of the previously completed reports [EX: Habitat Delisting Targets (2008), Rouge River Delisting Strategy (2012), Upper Rouge Delisting Strategy (2012), and Rouge River BUI Report Card (2013)] listed project types, in addition to specific projects, that needed to be completed in the watershed to remove the Habitat BUIs and delist the AOC have been implemented by ARC and Wayne County. The USEPA, Michigan Department of Environmental, Great Lakes and Energy (EGLE), Michigan Department of Natural Resources (MDNR), Rouge River Advisory Council (RRAC), and ARC began facilitating the development of the formal list for removal of the Habitat BUIs in 2015. This work resulted in the development of a final Rouge AOC Habitat list that was approved by the PAC/RRAC, submitted to EGLE in March 2016 and approved by EPA in June 2018. On that list was the Firefighters Park Sprague Drain Habitat Improvement Project, which was considered by EGLE, MDNR and EPA to be a top priority project.

2- Technical Information and Results

Background and Project Information

Sprague Drain has been channelized, which has resulted in bank erosion and its disconnection from the floodplain. The downstream portion of the drain connects to two online detention basins that are the outlet for stormwater runoff from neighboring residential communities. The overall goal of this project is to rehabilitate Sprague Drain to improve habitat and channel stability as listed below. This project is also designed to incorporate climate resiliency to withstand future climate conditions.

Invasive Species Control: Invasive species will be controlled along the entire 2,450 ft of Sprague Drain, the perimeter of the connecting basin on the north (2 acres) , and throughout the wetlands in Firefighters Park (3 acres). Areas with invasive removal will be reseeded or replanted with native species.

Construct Bankfull Bench: The project will establish bankfull benches on either side of the drain to create floodplain connectivity. Excavating bankfull benches requires significant tree removals; however, to preserve the trees along the stream and minimize tree removal, the drain will be relocated in the north and south sections.

Naturalize the Grass Detention Basin: The existing grass detention basin in the southeast of the park that provides detention for the subdivision stormwater will be naturalized and converted into a floodplain habitat by planting native vegetation. The newly created floodplain habitat can act as the bankfull bench for the Drain and provide significant floodplain storage.

Create Bed Form diversity: The bed form diversity will be improved by increasing pool depth and constructing riffles. improving bedform diversity can help dissipate energy and improve aquatic habitat.

Woody Material: A combination of coarse and fine woody materials will be placed in the bankfull bench in the form of brush piles and toe wood to preserve the bank and provide habitat improvements. The source of woody material is the onsite trees that will be removed as part of the bankfull bench excavation.

Storm Outfalls: There are a few storm outfalls from the parking lot and other areas. A native buffer will be created at the storm outlets to provide water quality before out letting to the Drain.

Native Vegetative Buffer: A native vegetative buffer will be established along 400 feet of the existing swale to provide water quality and habitat before outletting to the Sprague Drain.

Replace the Existing Footbridge with the ADA-Compliant Crossing: There are two non-ADA-compliant footbridges in the park. One will be removed and replaced with a three-side Hy-Span bridge to meet ADA requirements. The access is required for maintenance and emergency vehicles due to the increased use of this part of the park for disc golf and other new activities once the area is improved. To minimize the environmental impact, the proposed crossing width is greater than the bankfull width.

3- Project Scope

Within the grant, the project was divided into the following tasks:

Task 1: QAPP/Grant Reporting/Administration/Public Outreach

Task 2: Preliminary Engineering and Field Investigation

Task 3: Design/Permitting

3-1- QAPP/Grant Reporting/Administration/Public Outreach

Following the grant award, the project began with the development of a Quality Assurance Project Plan (QAPP) as required by the USEPA to ensure environmental data collection was conducted under a formal management protocol. On March 29, 2023, USEPA fully approved the QAPP.

Sprague Drain is the established County Drain. The coordination meetings were held with the partners, including the City of Troy and Oakland County Water Resources Commissioner's Office. Throughout the project, the City completed Semiannual progress reports and other documentation required by USEPA. This document serves as the final project report as required under this task.

Project partners reached out to Frisbee users to inform them of the proposed activities and to obtain input. Additionally, social media was utilized to inform the public about activities proposed at the Firefighters Park and answer questions. The Alliance of Rouge Communities (ARC) posted information related to this project on the ARC website. See Appendix 1 for the flyer and social media post relating to this project.

3-2- Preliminary Engineering and Field Investigation

From January to December 2023, a series of data collection activities were completed. The table below shows when activities were completed.

Items	Timeline
Topography	January 2023
General Site Assessment	January through May 2023
Invasive Species Assessment	August 2023
Soil Sampling	November 2023
Geotechnical	January 2024
Mussel Survey	September 2023
Geomorphology Analysis	January through May 2023
T&E Evaluation	November 2023

A summary of the critical information obtained from data collection efforts is as follows.

Topography Survey and Geomorphology Analysis

HRC Team visited the site to observe and evaluate general site conditions including streambank stability, stream substrate, excessive sediment deposition, channel morphology, the presence of instream structures including riffles and pool, floodplain connectivity, and site restrictions. HRC Team performed site assessments using a combination of field observations, hydraulic measurements, and geomorphic analysis to determine channel size and establish stable channel dimensions. During site assessments, a detailed survey of the stream channel was conducted to determine the bankfull width, depth, stream slope and bed material substrates. Indicators of bankfull stage, such as flat depositional features adjacent to the stream, sediment deposition, or changes in vegetation along the channel bank was identified. Due to highly urbanized watershed, the bankfull indicators were very limited on the site. Therefore, hydraulic measurements, including flow depth and stream cross sections were also collected, then the manning equation was utilized to quantify flow conditions associated with bankfull discharge. Geomorphic analyses involve studying the relationship between flow energy, sediment transport, and channel morphology to determine stable channel dimensions that minimize erosion and maintain equilibrium. By integrating these methods, stream channels can accurately be assessed, bankfull conditions can be identified, and ultimately stable channel dimensions can be established and tailored to the specific characteristics of each site, contributing to effective stream management and restoration efforts. The collected stream survey data was added into the RIVERMorph V.5.2. RIVERMorph is an essential Tool, recommended by Dave Rosgen for stream assessment, monitoring, and natural channel design. RIVERMorph determined the stream parameters. Michigan SQT was utilized to quantify the stream functional lift of the existing conditions and determine how stream functional lift increases with this project. RIVERMorph and MiSQT results are included in Appendix 2.

Riparian Vegetative Evaluation, Invasive Species

HRC Team conducted a field survey of the riparian areas. The evaluation determined the types and quality of riparian vegetation. Habitat assessment included the identification of invasive species and habitat value for the anticipated wildlife species that use the connected corridor from the basins, wetland, swale, and Drain. Among the invasive species common in the area, Garlic mustard was present in all the shaded wooded areas except along the Rouge River. Buckthorn was predominant, trees were present except where the understory was mowed grass. Phragmites were only in specific locations on the edges of the two ponds. A map showing the invasive species list is included in Appendix 3.

Mussel Survey

ASTI Environmental (ASTI) was hired by HRC on behalf of City of Troy to conduct a native mussel survey in the Sprague Drain at the Firefighters Park. The mussel survey was conducted to determine the extent of sensitive mussels within the drain. These were used to prepare the restoration plan design and to estimate mussel relocation requirements. The survey was conducted under Michigan Department of Natural Resources (MDNR) Threatened and Endangered Species Permit No. TE-165 and the MDNR Fisheries Scientific Collectors Permit no. FSCP12302022140048, used for common mussel species. All permits were issued to ASTI. Michigan Freshwater Mussel Survey Protocols and Relocation Procedures (May 2021, v.3, hereafter referred to as Michigan Mussel Protocols) were followed. Prior to the survey, plans were submitted to MDNR's Rouge River biologist John Buszciewicz on July 25 and approved on July 31, 2023.

This native mussel survey was required by the MDNR for permitting stream restoration which will involve modification of the Rouge River and Sprague Drain. The river at this reach is classified as a Group 1, where state special concern species have been found. The special concern creek heelsplitter, *Lasmigona*

compressa, and the paper pondshell, *Utterbackia imbecillis*, were found in the river in a 2010 survey. Summaries of the Mussel Survey are included in Appendix 4.

Threatened and Endangered Species (T&E) Evaluation

HRC utilized the Michigan Natural Features Inventory natural heritage database as well as the Information, Planning, and Consultation tool from the United States Fish and Wildlife Service (USFWS) to complete a desktop review and determine possible T&E species in the project area based on habitat suitability. The tree removal scope of project was conducted in the permittable time frame October 01 through April 14 when bats are not present. Summaries of the T&E evaluation are included in Appendix 5.

Soil boring and Geotechnical Investigation

Interek PSI conducted a geotechnical exploration and engineering report for the proposed 3-sided Hy-Span bridge replacement of the existing pedestrian footbridge over Sprague Drain. A total of one soil testing boring and two hand augers were performed and selected samples were tested in the laboratory. The geotechnical report and borings are included in Appendix 6.

3-3- Design and Permitting

After examining site assessment data, habitat restoration design was completed. A summary of project design and alternatives considered follows.

Alternative 1- No Action

The first alternative was to take no action and maintain the current conditions of the stream. Under this approach, the existing erosion issues, and lack of floodplain connectivity in the stream would persist. Ongoing erosion would impact adjacent lands causing trees to fall and block the drain creating significant erosion. This option would not address environmental degradation or improve the habitat conditions for aquatic life. Impacts on state and federally regulated waters would continue without mitigation, which may lead to continued erosion and negative effects on water quality.

Alternative 2- Constructing Bankfull Bench Adjacent to Existing Stream

The second alternative involved creating a bankfull bench within the existing stream course to provide floodplain connectivity. This approach would have required removing significant vegetation and trees along the stream banks to install the bench. While it would address floodplain connectivity to some extent, the removal of trees could have adverse ecological effects and aesthetic impacts on the park. Impacts to the stream would include potential disturbance of the streambed and habitat due to vegetation removal. This alternative can improve the condition score of the stream from 0.17 to 0.3.

Alternative 3- Relocating Stream, Adding Bankfull Bench, and Replacing Existing Footbridge with 3sided Hy-Span Bridge

The third alternative, which was ultimately chosen, was to relocate parts of the stream while establishing a bankfull bench along the newly proposed stream route and replacing the existing footbridge with a 3-sided Hy-Span bridge. By relocating the stream in areas where it was feasible, adding the bankfull bench, and replacing the footbridge with a ADA complaints crossing, the project aims to strike a balance between stream restoration and environmental preservation. This alternative was chosen to avoid the removal of a large number of trees and achieve a more sustainable stream ecosystem. Impacts on the stream will be minimized by carefully planning the re-routing process, implementing stabilization measures, and enhancing habitat conditions in the newly created stream segments. The span of the proposed crossing is slightly greater than the bankfull width, ensuring that the flow remains unaffected because the cross-

sectional area remains unchanged. This alternative can improve the condition score of the stream from 0.17 to 0.38, which is a higher score than Alternative 2.

Alternative 4- Relocating Stream, Adding Bankfull Bench, and Keeping the Existing Footbridge

Another option for alternative 3 would be to relocate parts of the stream while establishing a bankfull bench along the newly proposed stream route and keeping the existing footbridge. However, it's important to note that the existing footbridge is not ADA compliant. Ensuring ADA compliance is crucial because it guarantees equal access and mobility for all individuals, regardless of their physical abilities. Non-compliant structures can limit accessibility, excluding people with disabilities from enjoying the area and participating in outdoor activities. This was a significant factor in the decision to not keep the existing footbridge, as promoting inclusivity and accessibility is a priority in the design and planning process.

Alternative Summary

In summary, these four alternatives were evaluated against the proposed project to assess their impact on the stream. Alternative 1 (doing nothing) would result in continued negative impacts, Alternative 2 (adding bankfull bench to existing stream) had drawbacks in terms of tree removal, and Alternative 4 (relocating the stream, adding bankfull bench, and keeping the existing footbridge) was not ADA compliant. Alternative 3 (relocating the stream, adding bankfull bench, and replacing existing footbridge with a 3-sided Hy-Span bridge) was chosen for its more balanced approach, aiming to improve the stream condition score while achieving stream restoration and ADA compliance objectives. Overall, Alternative 3 improves the stream function higher than alternative 2, preserves more trees, and is ADA compliant.

This project impacts the stream. This required the issuance of USACE/EGLE Joint Permit. A joint permit application was completed including all necessary exhibits. The application was submitted in November 2023 And the draft permit was received in April 2024. The EGLE permit application and the draft permit are in Appendix 7.

4- Environmental Results, Outputs and Outcomes

The primary goal of this project was to improve the habitat in the Rouge River and support the removal of three BUIs associated with fish and wildlife habitat.

As a result of this Rouge River AOC Habitat Restoration Design Grant, the achieved outputs were:

- EGLE permit (Appendix 7)
- Design Plans (Appendix 8)
- Technical Specifications (Appendix 9)
- Cost Estimates (Appendix 10)

The outputs, outcomes, and measures to be expected after implementation of the project are as follows:

Great Lakes Restoration Initiative Action Plan III, Measures of Progress (MoPs) for the overall project, when implementation is completed, are:

- **Focus Area 2: Invasive Species - Objective 2.2. Control established invasive species.**
2.2.1. Aquatic/terrestrial acreage controlled: 5 acres of invasive species management.
- **Focus Area 3: Nonpoint Source Pollution Impacts on Nearshore Health - Objective 3.2. Reduce untreated stormwater runoff.**

3.2.2. Miles of Great Lakes shoreline and riparian corridors restored or protected: 1,500 linear feet of stream habitat restored.

- **Focus Area 4: Habitats and Species - Objective 4.1. Protecting and restoring communities of native aquatic and terrestrial species is important to the Great Lakes.**

4.1.1. Acres of coastal wetland, nearshore, and other habitats restored, protected, or enhanced: 4 acres of riparian habitats, including additional 1.5 acres of wetland/floodplain shelf habitat in the current grass detention basin with native plantings.

EPA's FY 2022-26 Strategic Plan, Measures of Progress (MoPs) for the overall project, when implementation is completed, are:

- **Goal 5: Ensure Clean and Safe Water for All Communities - Objective 5.2. Protect and Restore Waterbodies and Watersheds**

Project will support the protection and restoration of the Sprague Drain.

4-1- Project Highlights

The commitment and involvement of various partners on the project including USEPA, ARC, OCWRC, MDNR, and City of Troy was a major highlight of the project and facilitated site specific designs that are impactful, practical, and cost effective.

4-2- Obstacles Encountered

There are significant trees on both banks of Sprague Drain stretch in the Firefighters Park. Excavating bankfull benches require significant tree removal; however, to preserve the trees along the stream and minimize tree removal the Sprague Drain will be relocated in the north and south sections.

4-3-Next Steps

The design will be implemented under the future GLRI grant. The grant is titled "Rouge River AOC Habitat Restoration Firefighters Park Sprague Drain Habitat Improvement Construction" (Grant No. GL 00E03520). The scope of implementation grant includes development of final contract bidding documents, public bidding, contractor selection, project construction and oversight.