

Rouge AOC Habitat Restoration Implementation: LTU Wetland Implementation Project Final Report

GLRI Grant Number: GL00E03268

December 2025



Working together, restoring the river

**Rouge AOC Habitat Restoration Implementation: LTU Wetland Habitat
U.S. Environmental Protection Agency (EPA)/Great Lakes Restoration Initiative (GLRI)
Grant Final Report
GLRI Grant Number: GL00E03268**



Project Funding: Original Grant Amount \$810,000
Supplemental Request \$0
Revised Grant Amount \$810,000

Grantee: Alliance of Rouge Communities

Contact Name: Brandy Siedlaczek, CSM
46036 Michigan Avenue, Suite 126
Canton, MI 48188
(734) 272-0291
bsiedlaczek@cityofsouthfield.com

Project Location: City of Southfield, Michigan 48075
Oakland County
Congressional District

Project Duration: October 1, 2022 – December 31, 2025

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Summary

Implementation of the Lawrence Technological University (LTU) Wetland Habitat restoration project in the Rouge River Area of Concern (AOC) is complete. This project was funded under a grant from EPA GLRI to the Alliance of Rouge Communities (ARC), in partnership with City of Southfield and LTU. The project included wetland creation and floodplain restoration next to the Rouge River, coupled with a unique educational experience facilitated by LTU faculty for students on campus.

A general timeline of grant milestones is as follows:

- Grant issued – September 9, 2022, for \$810,000.00 with end date of December 31, 2025
- Construction began – June 1, 2023
- Construction concluded – August 2023
- Substantial completion – September 2023
- Project close out – December 2023

The implementation of this project has resulted in the following Measures of Progress (MoPs) as defined by GLRI Action Plan III.

MoP		Grant Goal	LTU Wetland	Grant Total	Percent of Goal Completed
4.1.1	Acres of Habitat	1.0	1.9	1.9	190%

Figure 1. Summary of MoPs

Successfully completing this MoP supports the removal of the Rouge River Area of Concern Beneficial Use Impairments (BUIs) relating to Degraded Fish and Wildlife Populations, Degradation of Benthos, and Loss of Fish and Wildlife Habitat. Restoration activities included the installation of various habitat structures, native terrestrial and aquatic vegetation, and invasive species treatments.

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 and the meandering channel 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 surfaces leading to frequent flooding within downstream local communities.

Fortunately, water quality has improved since 1992 thanks to the federally funded Rouge River National Wet Weather Demonstration Project, or “Rouge Project.” As a result, 89 of the 127 miles of 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 required to sustain fish and aquatic life. Increased populations and diversity of benthos, fish, and wildlife have been measured along the river since 1999. The U.S. EPA Office of Inspector General declared the Rouge Project “a blueprint for success” (EPA OIG report number 2002-P-00012).

The ARC is a voluntary public watershed entity currently comprised of municipal governments and educational institutions. The goals of the ARC are to encourage watershed-wide cooperation and provide support for restoring beneficial uses of the Rouge River to area residents while meeting water quality permit requirements. The ARC serves as a fiduciary and coordinating organization to the Rouge River Advisory Council (RRAC), which works on the fulfillment of goals established by the Remedial Action Plan for the Rouge River Watershed and evaluation of restoration progress toward delisting the AOC.

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. The EPA, EGLE, MDNR, RRAC, ARC and local members 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, EGLE and EPA in 2018. On that list was the LTU Wetland Habitat Restoration project discussed in this report.

Environmental Consulting & Technology, Inc. (ECT) was hired by the ARC for the design and construction phases of the LTU Wetland Habitat Restoration project and is the technical contractor. As such, ECT was responsible for construction oversight and oversight of subcontractors hired to achieve project success.

2. Project Background

LTU Wetland Restoration

The LTU Wetland project is located on Lawrence Technological University's (LTU) campus in Southfield, Michigan. The watershed area upstream of the project location is defined as Evan's Creek, which becomes the Rouge River on the LTU campus after exiting a box culvert under Northwestern Highway. The stormwater discharge from the drain has high velocity rates that carries fine particulates from upstream impervious surfaces leading to excessive sedimentation. The Rouge River floodplain had been severely affected by sediment accretion over time, which disconnected the floodplain from the river and created perched wetland areas. Invasive species had overtaken the site, suppressed floodplain functionality, and severely degraded the aquatic and terrestrial habitats. Restoring wetland habitats along this portion of the Rouge River was necessary to help repair wetland hydrology, manage invasive species, and diversify the flora.

Floodplain excavation was proposed to help provide hydraulic connectivity to the river. Several wetlands were constructed and designed to be planted with a diversity of emergent wetland plants. The goals were to provide habitat for wading birds, waterfowl, amphibians, reptiles, and aquatic insects. Small mammals and birds would also benefit from increased habitat diversity and cover provided by woody debris and other habitat structures. The proposed floodplain habitat design included several site-specific considerations, such as:



Figure 1: Site conditions prior to construction.

- Excavation and Grading: Floodplain areas were excavated down to near the bankfull elevation to improve lateral connectivity to the creek.
- Topsoil and wood materials were stockpiled and re-used as habitat structures
- Topsoil with brush or phragmites roots was removed
- Structurally diverse planform and varying soil depths created various ponding areas to 1-ft depths.
- Habitat areas were over-excavated, where some of the topsoil was worked into the newly exposed subsoil and graded.
- Woody Material: A mixture of coarse and fine woody material and root wads was placed within the floodplain habitat areas to create basking areas and shelter brush piles.
- Storm Outfalls: An 18" concrete storm sewer outfall to the creek was partially removed and replaced with an improved outlet. A flared end section was installed to help spread the runoff to the two habitat areas.

- Imported Stone and Sand: A mixture of fieldstone, angular rock, and flagstone was placed along the north (south-facing) slopes to provide cover and habitat. Small sand mounds with fine wood were used for turtle nesting areas.
- Hyporheic Aquifer: A buried area of coarse sand and wood chips was created to allow flows to slowly seep into the creek at an existing glide (i.e., where a lateral scour pool transitions into a riffle). The goal was to enhance groundwater interflow and increase the potential for nutrient removal from urban runoff through de-nitrification.

2.1 Design

The design phase of the project was completed with funding from a separate GLRI grant, GL00E02976. This included data collection, design, permit application submittal, contract document preparation, a competitive bidding process, and contractor selection.

Data collection began in July 2021 and was completed in fall 2021. Data collection consisted of the following activities: topographic survey, wetland delineation, vegetative mapping, Threatened & Endangered Species (T&E) review, geotechnical investigation and soil/sediment analysis, and hydrologic/hydraulic analysis.

The next step was restoration design, including project permitting by the State of Michigan Department of Environment, Great Lakes, and Energy (EGLE). This task included development of construction design plan drawings and details, technical specifications, construction cost estimate, and draft contract front end documents (Appendices F-H). Methods for restoring wetland hydrology and function were also developed, which included excavation, grading, habitat features, and planting selections and layout. EGLE permit was received October 26, 2022.



Figure 2: Classifying soils during data collection.

Contract documents were prepared, and the bidding process initiated via MITN. ARC staff worked with LTU and the City of Southfield staff to finalize the contract documents, including front-end specifications, technical specifications, and construction drawings.

The low bidder, Anglin Civil (AC), was selected to be the contractor.

3.0 Project Implementation

An EPA GLRI grant was awarded to the ARC on 10/01/2022 for project implementation at the LTU site. Implementation would include grant administration, public outreach, contractor selection, and construction oversight.

Ultimately, the implementation of the LTU Habitat Restoration project resulted in 0.21 acres of wetland habitat created, and about 1.7 acres of habitat restored (excluding wetlands). The following sections summarize grant activities by task:

3.1 Grant Reporting and Administration

The ARC completed status and financial reports and other documentation required by the agency throughout the project duration. This document represents the final report completed under this task.

3.2 QAPP and HASP Development

At the start of project implementation, a Quality Assurance Project Plan (QAPP) was developed for the LTU site as required by the EPA to ensure environmental data collection and construction oversight activities were conducted under a formal management protocol. A Health and Safety Plan (HASP) was also developed to identify potential hazards and outline steps to reduce risk to employees and visitors at the project site. The HASP also detailed steps for emergency response, including directions and maps to the nearest emergency room/urgent care. Throughout project implementation, semiannual status reports were submitted to the EPA to ensure adherence to the QAPP, HASP, and other requirements.

3.3 Coordination with Partners

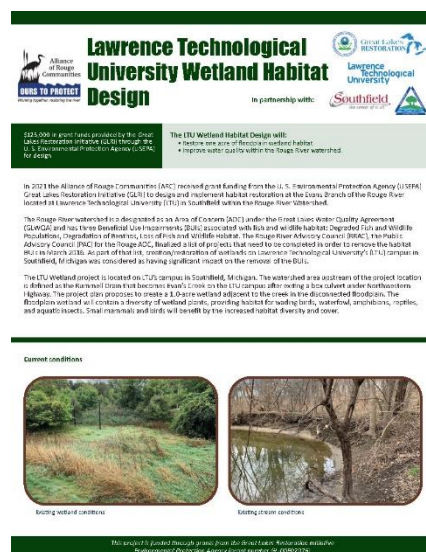
Over the course of project construction, weekly site meetings were held with the main project partners (Anglin Civil Engineering, LTU, and ECT) to review construction activities and progress. The goals were to ensure the project was completed according to specifications and to discuss issues and how to make necessary adjustments, if needed.

3.4 Public Outreach

The Alliance of Rouge Communities began public education activities for this grant as soon as the notice of the award was announced and are summarized below.

Project partners reached out to the public to inform them of the proposed activities and to obtain input. ARC posted information related to the project on the ARC website and an informational flyer was distributed to interested organizations and the public at large.

ARC and City of Southfield worked through the duration of the project to keep community members engaged and aware of project activities during construction. The following articles and media releases were provided during the LTU Wetland Restoration Project.



Social media was used to communicate information to the public about project progress at the Tamarack Creek site, as shown in the table below.

Date	Post text	Photo
10/5/21	U.S.EPA has awarded a \$125,000 Great Lakes Restoration Initiative grant to the Alliance of Rouge Communities (ARC) to design 1 acre of wildlife habitat improvements and wetland creation on a portion of the Rouge River that runs through Lawrence Technological University's (LTU) campus in City of Southfield, Michigan USA - Government. Once implemented, these wetlands and habitat will contribute towards reaching the watershed and regional goals for improving fish and wildlife habitat in the Rouge River.	
7/1/22	The design is complete and permits submitted for wildlife habitat improvements and wetland creation on a portion of the Rouge River that runs through the @Lawrence Technological University (LTU) campus in the @City of Southfield, Michigan USA - Government. This work has been funded by a U.S. EPA Region 5 (Great Lakes Region) Great Lakes Restoration Initiative (GLRI) grant (GL-00E02976) to the Alliance of Rouge Communities (ARC). For more information visit: https://www.allianceofrougecommunities.com/PDFs/general/LTU%20public%20ed%20piece.pdf	
10/17/25	The Alliance of Rouge Communities wetland restoration project on the campus of Lawrence Technological University in the City of Southfield, Michigan USA - Government has just completed its second growing season. This site originally received 2,400 native grass and flower species, 250 shrubs, and 45 trees in the fall of 2023. Since then, all these native grasses and flowers have really filled in. Thank you to U.S. EPA Great Lakes Region Great Lakes Restoration Initiative for funding this project (Grant #GL-00E03268) and allowing this project to thrive. This image shows some black-eyed susan (yellow) and wild bergamot (lavender color)	

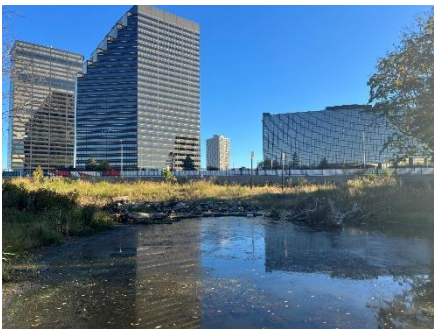
Date	Post text	Photo
	next to a wetland. For more information visit https://www.allianceofrougecommunities.com/ltu.html	
10/31/25	Happy Halloween from the LTU wetland restoration site! Did you know – There are two bat boxes installed along the fringes of the restored wetland to help support bat populations. Can you find them in this picture? The bat boxes provide shelter while the restored wetland ecosystem provides habitat for insects, which help feed the bats. A great example of how connected ecosystems help species thrive in urbanized environments. This project was funded by a U.S. EPA Region 5 (Great Lakes Region) Great Lakes Restoration Initiative (GLRI) grant. For more information visit https://www.allianceofrougecommunities.com/ltu.html	

Figure 3. Social Media Engagement

3.5 Construction

Construction Narrative

Project implementation commenced on June 8, 2023, with a pre-construction meeting. Anglin Civil began construction the week of June 12, 2023, with mobilization, site preparation and staging, clearing, grubbing, and tree removal. Topsoil with brush or phragmites roots was removed for off-site disposal, while other topsoil and wood materials were stockpiled for reuse in grading and habitat structures. Grading, soil removal, and off-site disposal continued through July on the north section of the site. Grading and wetland creation on the south side was completed, and erosion blankets were installed. New materials (compost, sand, rock) were brought on site in preparation for placement with woody habitat in the newly excavated wetlands on the south side of the site.

Trees were removed from the active disturbance area. A subset of the removed trees was set aside for use as woody habitat. The selected trees were then placed into each excavated wetland area to provide woody habitat. Cover logs and other coarse woody debris were placed below and above bankfull elevations to provide underwater shelter and basking spaces for wildlife. In total, 10 habitat structures were installed that were a mixture of woody debris and boulder material complexes with root wad revetments.

By the end of July, the entire site was graded, seeded, and erosion control blankets installed. Invasive species management began in August 2023. Natural Community Services (NCS) performed soil, hydrology, vegetation and wildlife/pests impact monitoring, in addition to natural areas maintenance. The maintenance activities consisted of weed cutting, overseeding, and invasive species spot spray treatments.

After all earthwork was complete and areas were stabilized, vegetation was installed around both wetlands, on floodplain terraces and adjacent slopes, and in disturbed upland locations such as staging and access areas. Native trees and shrubs were delivered to the site in October 2023 and were installed over four days. In total, 35 different native species were represented across 3172 herbaceous plugs, 436 shrubs, and 60 trees. Fifteen of the 60 trees were planted offsite across the LTU campus.



The as-built conditions were surveyed, and results were sent to ECT on August 10, 2023. The as-built elevations and structure matched well with proposed conditions. There were 11 spot elevations that were approximately 0.5 feet of the proposed grade – all within acceptable tolerance per the contract specifications.

Maintenance of vegetation occurred between April and November (spring, summer, and fall) from 2023 to 2025.

Photo Summary

June 13, 2023

Clearing and grubbing of staging area



June 17, 2023

All vegetation removed from Wetland 1



June 13, 2021

Clearing/grubbing proposed floodplain



July 17, 2023

Grading of southern wetland area channel



July 13, 2021

Vegetation removal in wetland area



June 21, 2023

Hyporheic aquifer excavation



June 21, 2023
Wetland cell excavation



July 5, 2023
Habitat structure installation



June 5, 2023
Habitat structures - north area



July 9, 2023
Flooding after storm event



July 21, 2023
Site graded with erosion control in place



August 15, 2023
Cover crop surrounding wetland cell



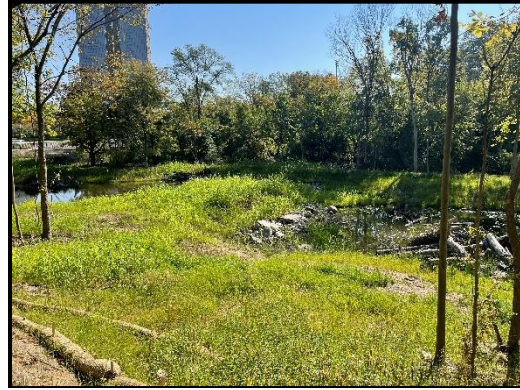
September 21,2023

Invasive species undergoing treatment



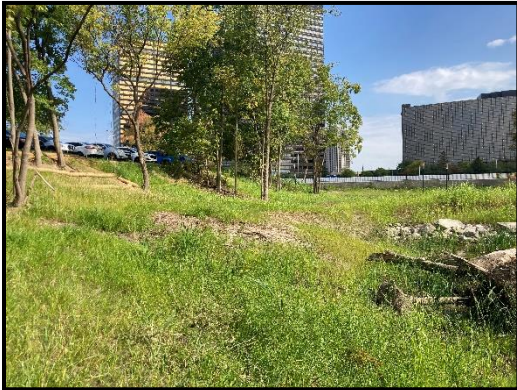
October 4, 2023

Looking east; wetland cells & ECB on slope.



September 21, 2023

West bank vegetation cover.



October 10, 2023

Additional wetland planting.



October 4, 2023

Treated invasive species in cover crops.



October 10, 2023

Tree planting



October 10, 2023
Tree installation



May 4, 2024
Looking west. First growing season



November 22, 2023
Looking east at ECB and planted trees.



June 3, 2024
Extra wetland planting



March 19, 2024
Runoff from outlet structure to wetland



June 21, 2024
Overall condition - north side.



November 13, 2024
Looking south – overall conditions.



July 17, 2025
Native vegetation established



November 13, 2024
Wetland edge with new vegetation



October 13, 2025
Looking North - native cover and wetland



May 14, 2025
Wetland vegetation



October 21, 2025
RRAC Meeting. Looking east at top of slope.



3.6 Construction Oversight

ECT performed on-site construction oversight over the construction period. This included providing oversight inspections, contractor coordination, contract document clarification, review of submittals, field notes, field meeting minutes, and updated plans/specifications as needed. The owners, ECT, and AC worked together to adjust to field changes and allow for a smooth construction schedule.

Field Changes

Field Change 1 included removal of a log jam from the stream adjacent to the wetland restoration area, approved 7/31/2023. The woody debris was large enough to alter flow through the channel and potentially scour the bank after restoration activities. Removing the woody debris was the best option to protect the stream bank and surround restoration work near that location.

Slope repair and protection on the western slope along the parking lot adjacent to the wetland restoration was also included in Field Change 1. This area was highly eroded and contained trash and other landscaping debris. Invasive species treatments were also applied in this area, which eliminated most of the vegetation. Subsequently, bare soil was exposed and there was a threat of additional erosion to the slope by stormwater runoff from the parking lot. It was decided to remove the debris that was exposed and lightly grade the slope to eliminate erosion gullies and mounds of landscape debris.

The last item in Field Change 1 focused on installation of two bat boxes installed by the City of Southfield. The bat houses were elevated on metal posts and secured with concrete footings. The habitats were removed when restoration activities commenced. The City of Southfield requested that the bat boxes be reinstalled.

Field Change 2 was for additional double net straw blanket (Bionet). After construction and initial seeding, the site continued to be inundated by stormwater runoff, impacting the northern half of the site within vegetation Zone B. Additional erosion control blankets were proposed to help stabilize this area, decrease soil erosion, and help vegetation establish. A total of 3400 square yards of additional blanket was required to cover the impacted area.

Field Change 3 was for supplemental wetland planting, approved on 5/24/2024. After construction and initial seeding, the site was inundated by flood waters causing the wetland areas to hold water during key seed development time. Seed was unable to germinate in deep-water areas of the wetland; therefore, the deep-after wetland areas were supplemented with 798 plugs to further establish vegetation in planting Zone A.

Field Change 4 was for additional maintenance of the wetland restoration area, approved on 12/11/2025, to address invasive species, low-density vegetation areas, slope erosion, and tree mortality. A stabilizing seeding mix will be used on the western slope coupled with erosion control. The floodplain zone of the site has pockets of low-density vegetation and will receive additional seed mix to promote growth. Fifteen (15) 5-7' trees will be planted across the site to replace dead trees east of the parking area.

Punch List

On July 28, 2023, AC, ECT, and LTU walked the site to create a punch list. Follow-up walk through was conducted on August 9, 2024, to verify punch list items were completed, and project close-out was

December 2023. Punchlist items included removing a dead snag near the MDOT outfall to be taken down during inactive winter bat timeframe (October 1 – April 14). The snag was removed and placed into the nearest wetland area for use as additional habitat. Erosion control at parking lot slope was addressed using wattles and coir. Continuing invasive species was emphasized and monitored during the growing season.

Future Monitoring and Maintenance

This grant provided funds for two growing seasons of vegetation maintenance and invasive species control. Continued efforts are needed to ensure the success of the native vegetation established on site. A monitoring and maintenance plan was developed prescribing efforts necessary for 3-5 years after installation, 5-10 years after installation, and 10+ years after installation. This monitoring and maintenance report is included in Appendix C.

4.0 Project Results

4.1 Project Objectives

The primary objective of this project was to implement the following Measures of Progress (MoPs) from the Great Lakes Restoration Initiative Action Plan III:

- 4.1.1-Acres of coastal wetland, nearshore, and other habitats restored, protected, and enhanced: 1.0 acres restored
 - **Exceeded: 1.9 acres**

Specifically, these objectives were met as follows:

- LTU Wetland Habitat
 - One (1) acre of habitat was projected under the grant. A total of 1.9 acres of habitat were restored, created, or enhanced to date.
 - 0.9 acres of improvements.



4.2 Additional Accomplishments

This project was unique in that an educational institution (Lawrence Technological University) was a close partner and contributor to the overall design of the project. The added benefit was the opportunities to host field trips for students and participates at the Regional Stormwater Summit, hosted annually by LTU.

Appendix A: As-built

ROUGE RIVER AOC HABITAT RESTORATION LTU WETLAND

21000 WEST TEN MILE ROAD, SOUTHFIELD,
OAKLAND COUNTY, MICHIGAN

FOR BIDDING - FEBRUARY, 2023

FUNDED BY: GREAT LAKES RESTORATION INITIATIVE
ECT PROJECT NUMBER 210416

AS-BUILT DRAWINGS
AUGUST 2023



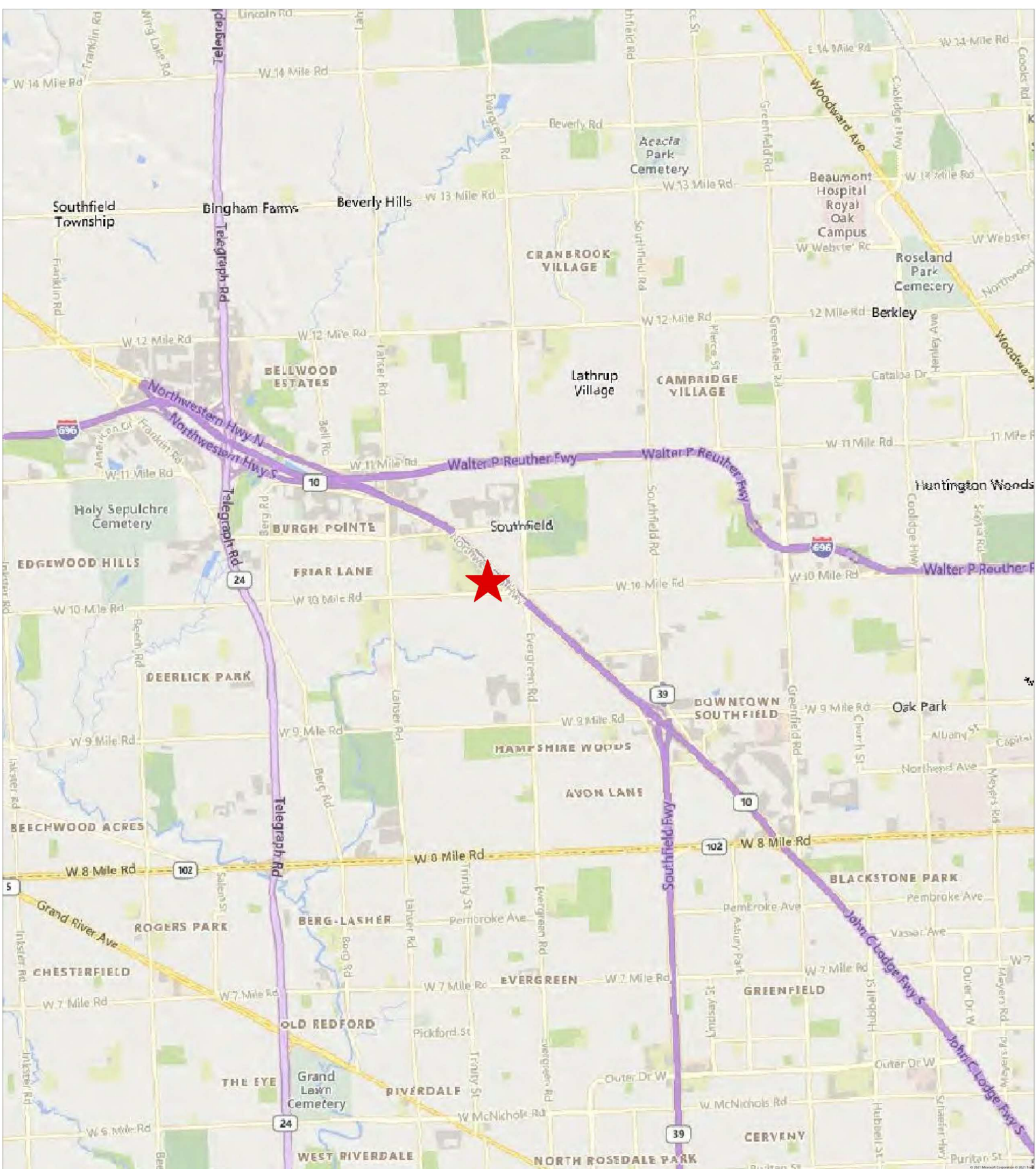
PREPARED BY:

ECT Environmental Consulting & Technology, Inc.
2001 Commonwealth Blvd, Suite 300
Ann Arbor, Michigan 48105
734.769.3004
734.769.3164 fax
www.ectinc.com

IN PARTNERSHIP WITH:



OAKLAND COUNTY, MI
NOT TO SCALE



PROJECT LOCATION MAP
NOT TO SCALE

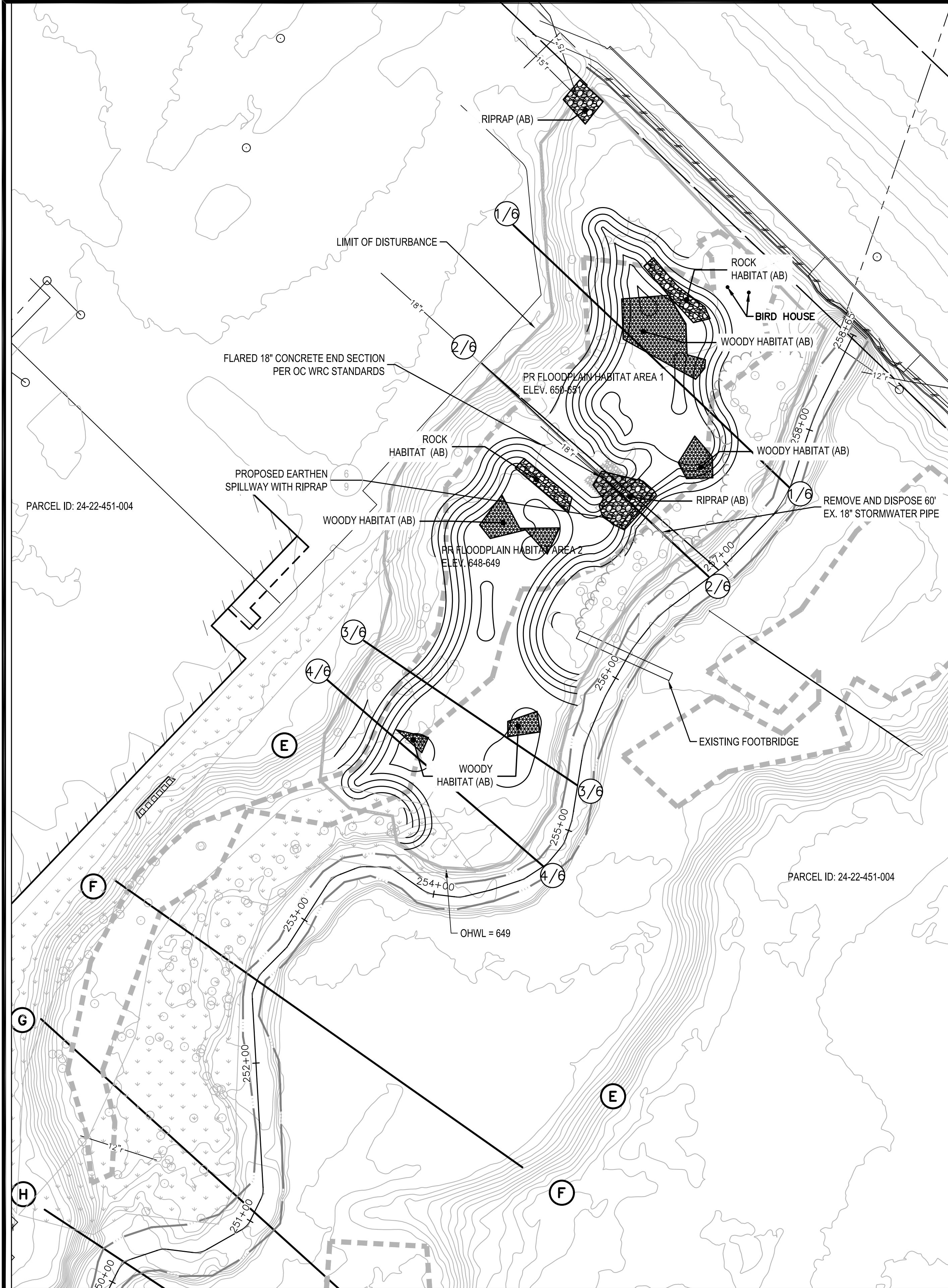


PROJECT VICINITY MAP
NOT TO SCALE

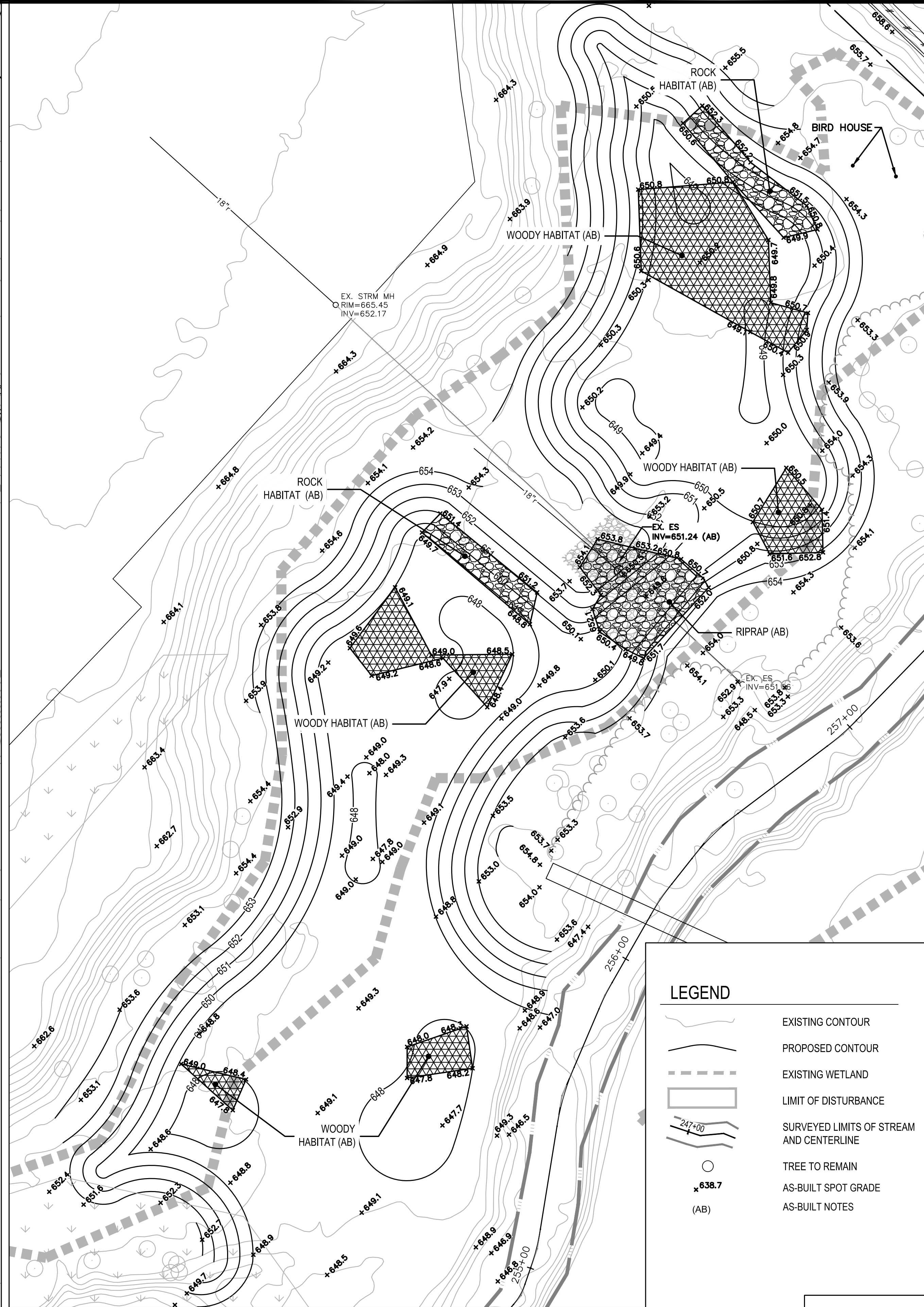


DRAWING INDEX

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10.	DETAILS 2
11.	OC WRC REFERENCE DETAILS 1
12.	OC WRC REFERENCE DETAILS 2



1 PROPOSED PLAN
SCALE: 1" = 40'



2 GRADING PLAN
SCALE: 1" = 20'



2001 Commonwealth Blvd, Ste. 300
Ann Arbor, MI 48105
Phone: (734) 769-3004
www.ectinc.com

.. \epa_logo.jpg

.. \GLRI_logo.jpg

GLRI GRANT No.:
GL-00E02976



ROUGE RIVER AOC HABITAT RESTORATION

LTU WETLAND

ECT PROJECT No.:	210416
DESIGNED BY:	RM
DRAWN BY:	AK/SD
CHECKED BY:	RM
APPROVED BY:	RM
PRELIMINARY DESIGN	07-28-2021
50% DESIGN DRAWINGS	11-01-2021
PERMIT DRAWINGS	05-13-2022
90% DESIGN DRAWINGS	09-12-2022
FOR CONSTRUCTION	02-15-2023
AS-BUILT	08-08-2023

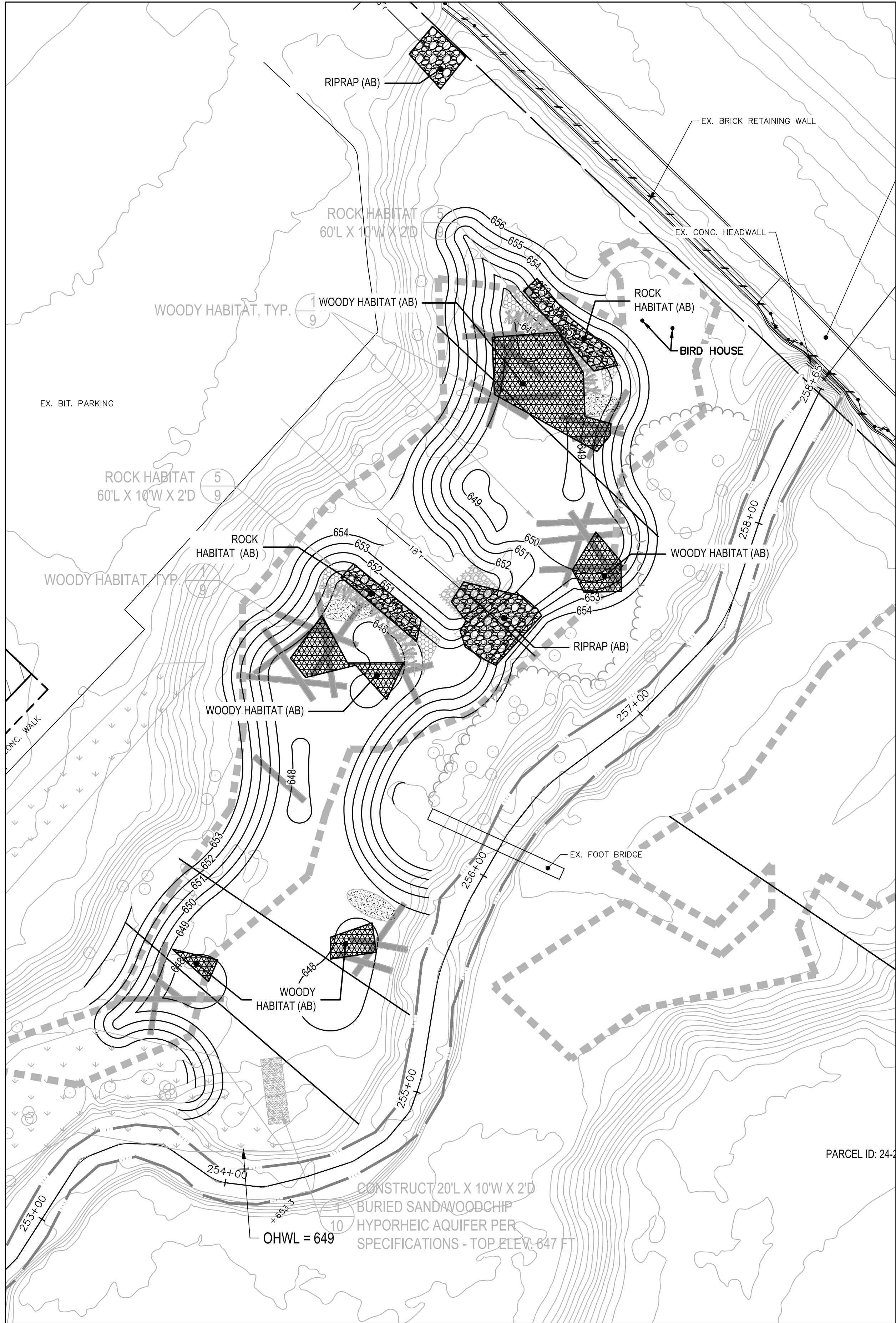
PROPOSED PLAN



SCALE: "VARIES"

4

CALL BEFORE YOU DIG
1-800-482-7171



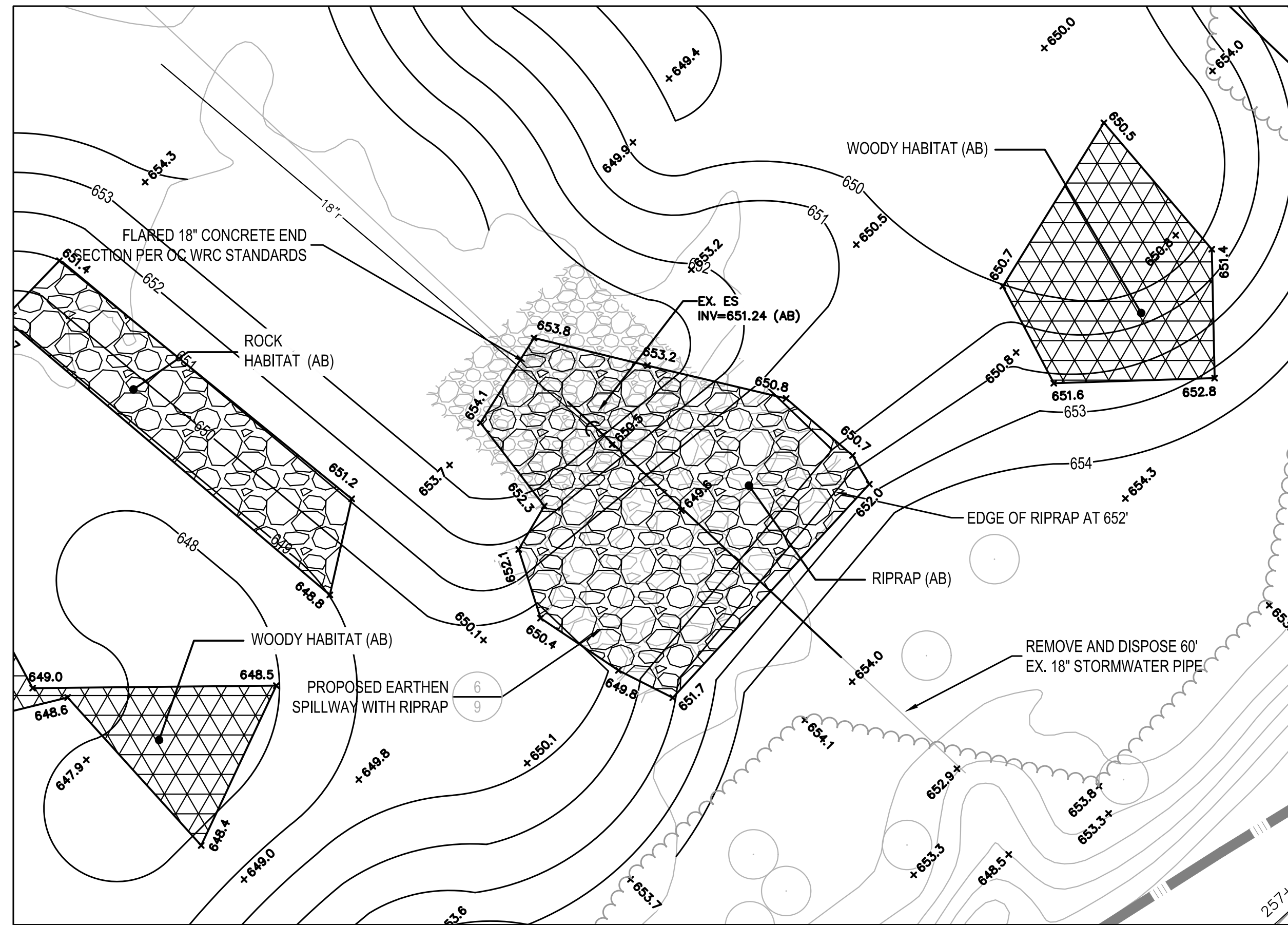
1 HABITAT PLAN
5 SCALE: 1" = 30'

NOTES

1. COMPLETE GRADING, SEEDING, AND MULCHING OF FLOODPLAIN HABITAT AREAS. SEE SPECIFICATIONS FOR SEED AND MULCH INFORMATION.
2. SEE SPECIFICATION SECTION 0213 - HABITAT FEATURES FOR DETAILED MATERIALS AND INSTALLATION OF ALL HABITAT WORK. THE CONTRACTOR SHALL COORDINATE WITH THE ENGINEER'S REPRESENTATIVE ON THE LOCATION AND INSTALLATION OF A REPRESENTATIVE AREA OF EACH OF THE FEATURES.
3. PLACE BRUSH ALONG THE TOE OF NORTH (SOUTH-FACING) SLOPES AND ANCHOR WITH 18"-20" THICK LAYER OF ROCK HABITAT MATERIALS.
4. LARGE WOODY MATERIAL CONSISTS OF 6"-18" DIAMETER, 18'-25' LONG COMPLEX MAPLE OR BOX ELDER LOGS. WOODY HABITAT COMPLEXES SHALL CONSIST OF 2-3 CYDS OF TOPS AND BRUSH AND 6-8 LOGS AT SIX LOCATIONS AS STAKED IN THE FIELD. THE UNCUT LARGE WOODY MATERIALS (I.E., WITH BRANCHES) SHALL BE CRISS-CROSSED AND ANCHORED WITH WOOD PILINGS. PILINGS CONSIST OF 6"-8" DIAMETER, 6'-8' LONG HARDWOOD LOGS DRIVEN VERTICALLY TO LEAVE 2 FT EXPOSED ABOVE THE PROPOSED FLOODPLAIN SURFACE.
5. TURTLE MOUNDS CONSIST OF 4-6 CYDS OF SAND OVER 1-2 CYDS OF BRANCHES AND BRUSH PER SPECIFICATIONS IN THREE LOCATIONS AS STAKED IN THE FIELD.
6. FLOODPLAIN HABITAT AREAS 1 AND 2 SHALL HAVE 1 CYD OF BRUSH AND 2-3 BASKING LOGS PLACED CRISS-CROSSED WITH ONE END BURIED INTO THE BOTTOM OF THE DEPRESSION AND THE OTHER ANGLED ONTO THE UPPER BANK.
7. CONSTRUCT HYPORHEIC AQUIFER PER DETAIL 1/10 BY BURYING A MIXTURE OF SAND AND WOOD CHIPS PER SPECIFICATIONS TO A SURFACE ELEVATION OF 647 (LOW WATER ELEVATION). COVER WITH TOPSOIL AND GRADE TO ELEVATION 649,

LEGEND

- SEED, AND MULCH: LOCATION TO BE STAKED IN THE FIELD.
- EXISTING CONTOUR
- PROPOSED CONTOUR
- EXISTING WETLAND
- SURVEYED LIMITS OF STREAM AND CENTERLINE
- TREE TO REMAIN
- ROCK HABITAT
- BRUSH HABITAT
- WOODY HABITAT
- TURTLE NESTING MOUND
- BASKING LOG
- AS-BUILT SPOT GRADE (AB)
- AS-BUILT NOTES



2 WETLAND GRADING
5 SCALE: 1" = 10'

CALL BEFORE YOU DIG
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.. \GLRI_logo.jpg

GLRI GRANT No.:
GL-00E02976



ROUGE RIVER AOC HABITAT RESTORATION

LTU WETLAND

ECT PROJECT No.:	210416
DESIGNED BY:	RM
DRAWN BY:	AK/SD
CHECKED BY:	RM
APPROVED BY:	RM
PRELIMINARY DESIGN	07-28-2021
50% DESIGN DRAWINGS	11-01-2021
PERMIT DRAWINGS	05-13-2022
90% DESIGN DRAWINGS	09-12-2022
FOR CONSTRUCTION	02-15-2023
AS-BUILT	08-08-2023

HABITAT PLAN



SCALE: "VARIES"

5

Appendix B: Public Education Handout



Lawrence Technological University Wetland Habitat Design



In partnership with:



\$125,000 in grant funds provided by the Great Lakes Restoration Initiative (GLRI) through the U. S. Environmental Protection Agency (USEPA) for design

The LTU Wetland Habitat Design will:

- Restore one acre of floodplain wetland habitat.
- Improve water quality within the Rouge River watershed.

In 2021 the Alliance of Rouge Communities (ARC) received grant funding from the U. S. Environmental Protection Agency (USEPA) Great Lakes Restoration Initiative (GLRI) to design and implement habitat restoration at the Evans Branch of the Rouge River located at Lawrence Technological University (LTU) in Southfield within the Rouge River Watershed.

The Rouge River watershed is designated as an Area of Concern (AOC) under the Great Lakes Water Quality Agreement (GLWQA) and has three Beneficial Use Impairments (BUIs) associated with fish and wildlife habitat: Degraded Fish and Wildlife Populations, Degradation of Benthos, Loss of Fish and Wildlife Habitat. The Rouge River Advisory Council (RRAC), the Public Advisory Council (PAC) for the Rouge AOC, finalized a list of projects that need to be completed in order to remove the habitat BUIs in March 2016. As part of that list, creation/restoration of wetlands on Lawrence Technological University's (LTU) campus in Southfield, Michigan was considered as having significant impact on the removal of the BUIs.

The LTU Wetland project is located on LTU's campus in Southfield, Michigan. The watershed area upstream of the project location is defined as the Rummell Drain that becomes Evan's Creek on the LTU campus after exiting a box culvert under Northwestern Highway. The project plan proposes to create a 1.0-acre wetland adjacent to the creek in the disconnected floodplain. The floodplain wetland will contain a diversity of wetland plants, providing habitat for wading birds, waterfowl, amphibians, reptiles, and aquatic insects. Small mammals and birds will benefit by the increased habitat diversity and cover.

Current conditions



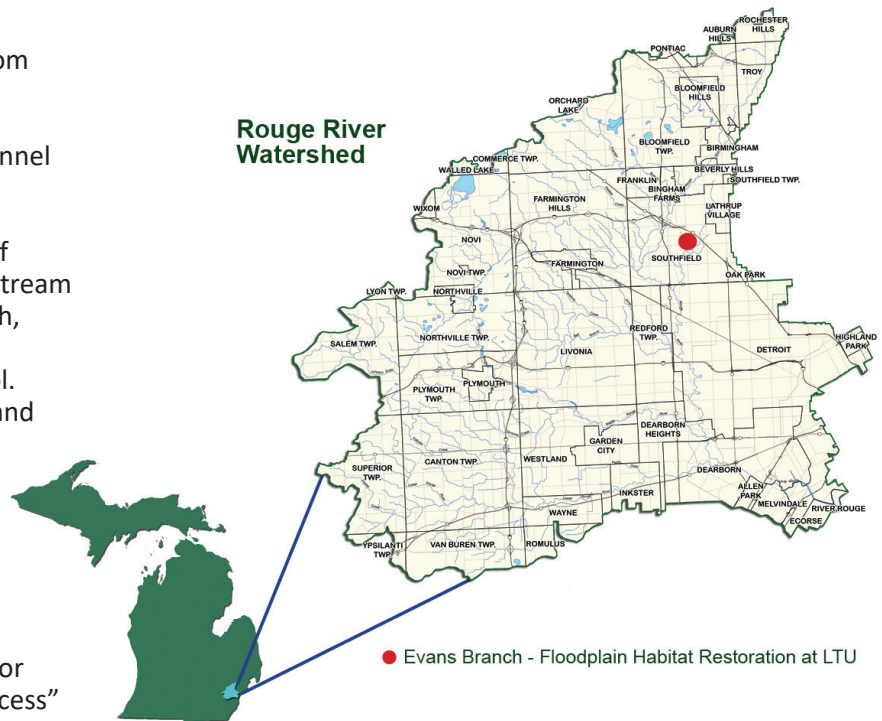
Existing wetland conditions



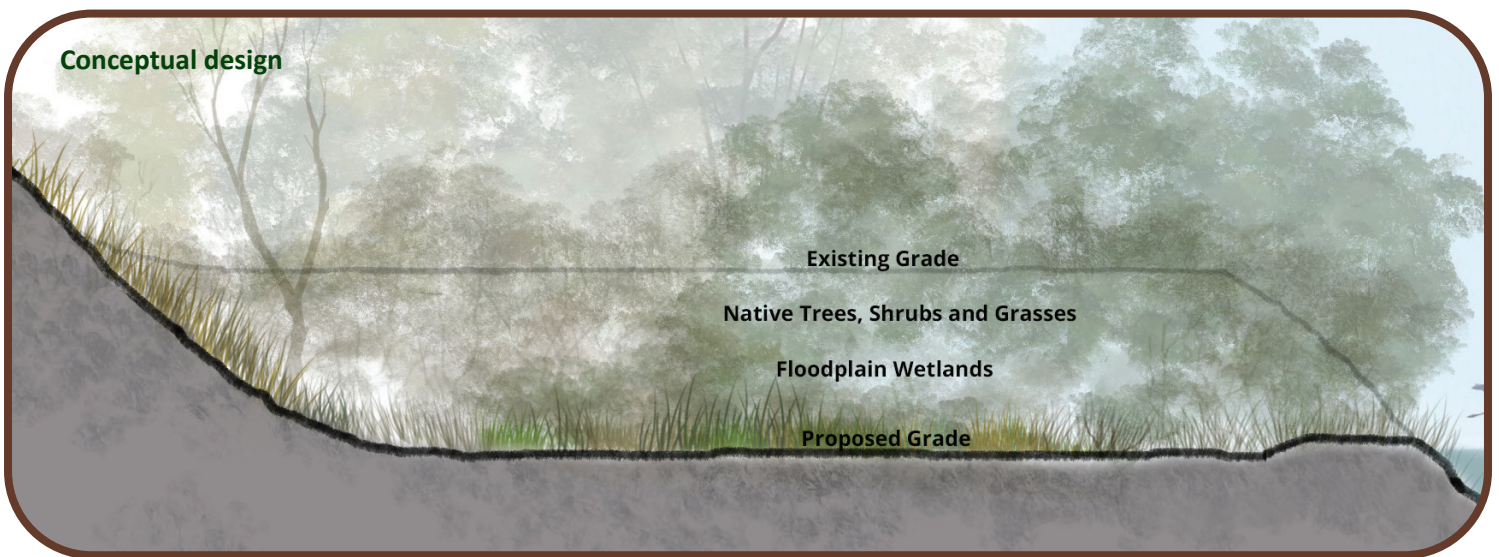
Existing stream conditions

History of the project

During the last century, the Rouge River has suffered from declining water quality and increased flood conditions, primarily due to increasing urbanization within the watershed. The flat river slope and the meandering channel could not pass the large flows associated with major precipitation events. Upstream urbanization continued to exacerbate this problem due to increased amounts of impervious surfaces culminating in floods within downstream local communities. Water quality in recent years, though, has improved since 1992 thanks to the federally funded Rouge Project and post construction stormwater control. 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. Also, the U.S. EPA Office of Inspector General declared the Rouge Project “a blueprint for success” (EPA OIG report number 2002-P-00012).



Conceptual design



About the Alliance of Rouge Communities

The ARC is a 501(c)(3) non-profit organization consisting of local municipalities, counties, educational institutions and stewardship groups working together to improve the Rouge River. Founded in 2005, the ARC is funded by membership dues from local governments and supported by grants. The ARC and its partners work cooperatively to meet water quality requirements mandated by the state's stormwater permit and to restore beneficial uses, such as canoeing, fishing and other recreational activities, to the Rouge River. That means better water quality for less cost to its members!

For more information about this project and other ARC activities visit our website at: www.allianceofrougecommunities.com

This project is funded through a grant from the Great Lakes Restoration Initiative Environmental Protection Agency (grant number GL-00E02976)



Appendix C: Monitoring & Maintenance Plan

LTU Restoration Project **Monitoring/Maintenance plan**

Year of Project Installation: 2023 Fall/2024 Summer

Prepared by: ECT

Date : October 2025

Estimated Annual Monitoring/Maintenance Cost

Pricing will vary dramatically from site to site and year to year as no two sites are alike. In 2023, the typical price range falls between \$100 and \$1,000 per acre per visit. For estimating purposes, we use an average rate of \$500 per acre per visit for upland areas at LTU, with a total of 1.2 acres of upland area. For emergent planting areas, we use an average rate of \$1000 per acre per visit, with a total of 0.5 acres. Therefore, the estimated annual cost for monitoring and maintenance at this site averages around \$3,300, accounting for 3 visits during a year, subject to factors such as weed infestation, erosion, woody plant encroachment, etc. Over time, time requirements and associated pricing for management also generally decreases to a point but then tends to plateau since weeds will always migrate into a site through water, wind, and animal dispersal (in addition to possible neighbor encroachment, erosion, etc.)

Seasonal Monitoring/Maintenance Schedule

Year 3-5 after installation

*Plan for 3 site visits each year for monitoring and schedule physical maintenance activities as needed.

SPRING	Focus	Description	Maintenance Actions
Erosion	Erosion?	Walk the site to ensure there are no erosion gullies forming, particularly on steeper slopes or below water inflow pipes.	• Repair with additional soil, cover crop, erosion control blanket, and/or stone as needed.
Native herbaceous Plant	Establishment?	Consider using prescribed fire in sites to reduce thatch layer, stimulate native herbaceous plants, and kill or weaken invasive species. For most sites, fire is an important management tool that should be applied to a site every 2-4 years.	• Prescribe burn • Mowing
Turf Invasion	Outcompeting natives?	Target turf grasses that may be outcompeting native species.	• Target turf grasses that may be outcompeting native species.

Year 3-5 after installation - continued

SUMMER	Focus	Description	Maintenance Actions
Weeds	Aggressive biennials presence?	In June, biennials such as sweet-clover, bull or nodding thistles, and teasel should be cut near the ground when buds are forming or plants have been flowering for up to three days. Cut material can be left where it falls unless it's so dense that it will smother adjacent native vegetation. Visit https://www.canr.msu.edu/pestid/resources/plant-and-weed-identification/index for common Michigan weeds identification resources.	• Timed cutting @ base
	Other perennial weed?	Other aggressive perennial weeds such as spotted knapweed, crown-vetch, bird's foot-trefoil, and Canada thistle should be spot-treated with the appropriate herbicide.	• Spot treat
Invasive Species	Reed canary grass & cattail presence?	Reed canary grass and cattail patches should be sprayed or hand-swiped.	• Spray/hand-swipe
	Woody Invasive	Woody invasives should be cut and stump-treated or foliar sprayed, based on the size.	• Cut stump-treated • Foliar spray

FALL	Focus	Description	Maintenance Actions
Invasive species	Reed canary grass & cattail presence?	Retreat reed canary grass and cattail as needed	• Spray • Hand-swipe
	Phragmites presence?	Continue treating Phragmites	• Continue treating Phragmites
	Woody Invasive	Continue spot-treatments of other aggressive perennial and woody invasives as needed.	• Spot treat

Year 5-10 after installation

*Plan for 3 site visits typically June through September in a year every 2 to 3 years. During site visits, conduct monitoring and schedule physical maintenance activities as needed.

SPRING/ SUMMER	Focus	Description	Maintenance Actions
Weeds	Aggressive biennials presence?	In June, biennials such as sweet-clover, bull or nodding thistles, and teasel should be cut near the ground when buds are forming or plants have been flowering for up to three days. Cut material can be left where it falls unless it's so dense that it will smother adjacent native vegetation. Visit https://www.canr.msu.edu/pestid/resources/plant-and-weed-identification/index for common Michigan weeds identification resources.	• Timed cutting @ base
	Other perennial weed?	Other aggressive perennial weeds such as spotted knapweed, crown-vetch, bird's foot-trefoil, and Canada thistle should be spot-treated with the appropriate herbicide.	• Spot treat
Invasive species	Reed canary grass & cattail presence?	Reed canary grass and cattail patches should be sprayed or hand-swiped.	• Spray • Hand-swipe
	Woody Invasive?	Woody invasives should be cut and stump-treated or foliar sprayed, based on the size.	• Cut stump-treated • Foliar spray

FALL	Focus	Description	Maintenance Actions
Invasive species	Reed canary grass & cattail presence?	Retreat reed canary grass and cattail as needed	• Spray • Hand-swipe
	Phragmites presence?	Continue treating Phragmites	• Continue treating Phragmites
	Woody Invasive	Continue spot-treatments of other aggressive perennial and woody invasives as needed.	• Spot treat

Year 10+ after installation

*Plan for 2 site visits typically June through September in a year every 2 to 3 years. During site visits, conduct monitoring and schedule physical maintenance activities as needed.

SUMMER	Focus	Description	Maintenance Actions
Weeds	Aggressive biennials presence?	In June, biennials such as sweet-clover, bull or nodding thistles, and teasel should be cut near the ground when buds are forming or plants have been flowering for up to three days. Cut material can be left where it falls unless it's so dense that it will smother adjacent native vegetation. Visit https://www.canr.msu.edu/pestid/resources/plant-and-weed-identification/index for common Michigan weeds identification resources.	• Timed cutting @ base
	Other perennial weed?	Other aggressive perennial weeds such as spotted knapweed, crown-vetch, bird's foot-trefoil, and Canada thistle should be spot-treated with the appropriate herbicide.	• Spot treat
Invasive species	Reed canary grass & cattail presence?	Reed canary grass and cattail patches should be sprayed or hand-swiped.	• Spray • Hand-swipe
	Woody Invasive	Woody invasives should be cut and stump-treated or foliar sprayed, based on the size.	• Cut stump-treated • Foliar spray

FALL	Focus	Description	Maintenance Actions
Invasive species	Reed canary grass & cattail presence?	Retreat reed canary grass and cattail as needed	• Spray • Hand-swipe
	Phragmites presence?	Continue treating Phragmites	• Continue treating Phragmites
	Woody Invasive	Continue spot-treatments of other aggressive perennial and woody invasives as needed.	• Spot treat

Management Tool & Timing

** Pick your management need from the column on the left and learn the timing of the appropriate technique listed in columns.

Management Tools		Winter		Spring			Summer			Fall		Winter	Notes	
Month		1	2	3	4	5	6	7	8	9	10	11	12	
General management							June, July/August, and September are ideal times.							Most newly establishing sites need three or more site visits during the first 1-10 years of establishment, and then typically 2-3 after that.
Invasives & Weeds	Reed canary grass control						Foliar Spray(Rodeo)							
	Phragmites control								Foliar Spray (Rodeo)					
	Cattail control						Foliar Spray(Rodeo)							
	Garlic mustard and dame's rocket						Hand pull							Easiest to pull when the plants bolt. Remove pulled material from site
	Crown vetch, bird's foot-trefoil						Foliar Spray(Milestone)							
	Canada thistle, spotted knapweed, other pernicious broad-leaved weeds						Foliar Spray(GLY)							Plants are most susceptible when forming buds and early flower stage
	Woody invasives	Foliar spray: stem<pencil size; Cut stump: stem>= pencil size												Cut-stump: Use Garlon 3a at 54% active ingredient. Stump should be "painted" with herbicide within 5 minutes of cutting and anytime from 6/1 to 3/1.

Mowing/ Cutting	Annuals control						High mowing (4")		High mowing (4")					
	Sweet-clover control						Timed cutting @ base							
	Biennial thistles						Timed cutting @ base							Each time plants develop buds and during early flowering stage
	Early establishment--young natives/many annuals						High mowing (4")		High mowing (4")					

Management Tools		Winter		Spring			Summer			Fall			Winter	Notes
Month		1	2	3	4	5	6	7	8	9	10	11	12	
Reseeding/ Replanting	Bare soil				Re-seeding (for sea- sonally saturated soil)						Re-seeding (for unsatu- rated soil)			Typical rate is 8 lbs per acre. 1/2 this rate when overseeding zones with some native vegetation.
	Erosion		Erosion control blanket + Re-seed											Replace lost soil with clean fill, sow cover crop of annual oats, lay ECB on sloped areas
Herbivore damage	Deer damage; Tree/ shrub dieback	Non-oak <i>spp.</i>	1. Prune 2. Replace/install caging/tree tubes as needed											
	Deer damage; Tree/ shrub dieback	Oak <i>spp.</i>										1. Prune only when dormant 2. Replace/install caging/tree tubes as needed		
	Goose/turkey browse				Fencing									Consider erecting stakes with lines at 1', 2', and 3' heights and mylar flagging tied on lines

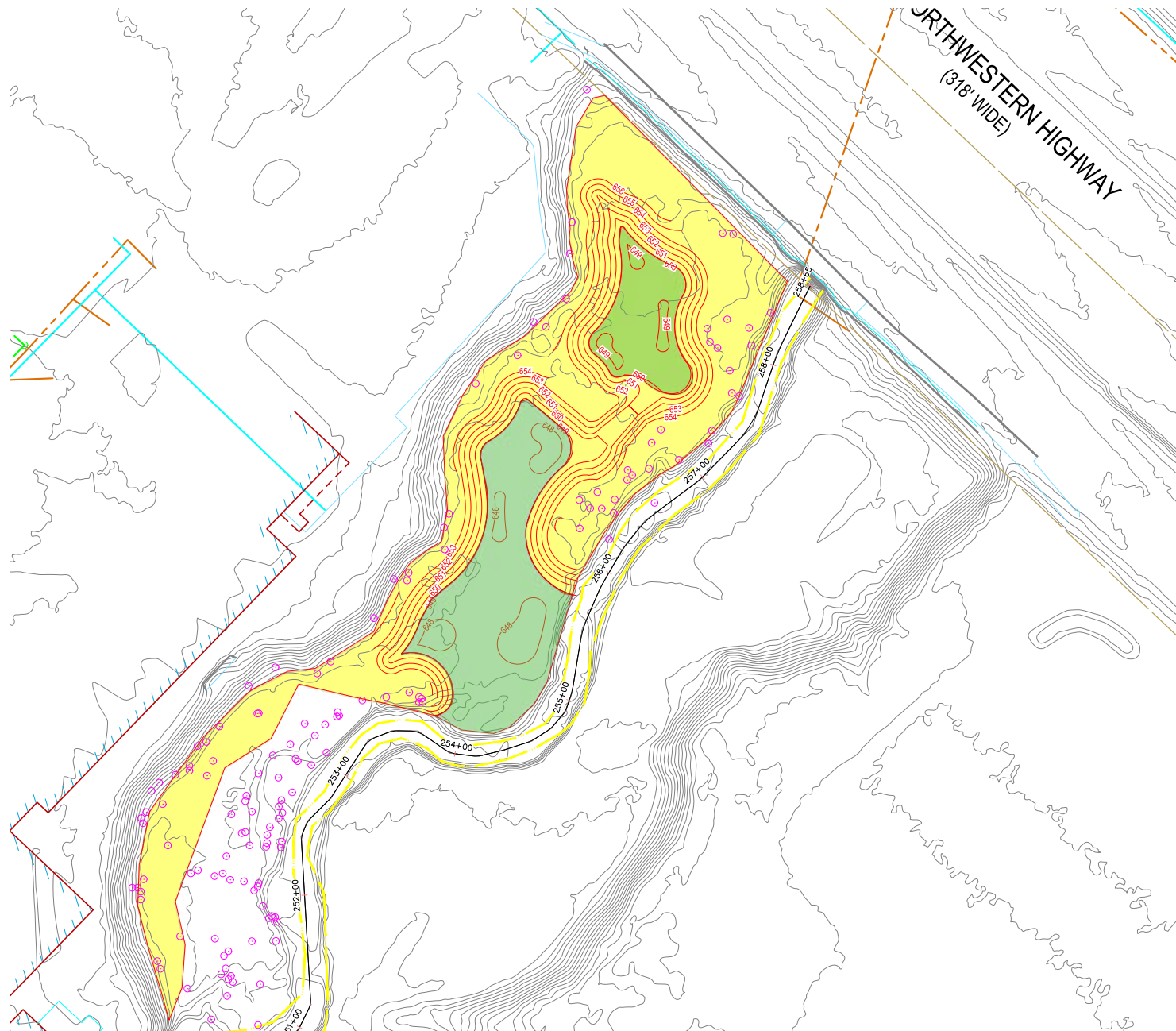
Herbicide applicator qualification

Regarding herbicide applications: The Michigan Department of Agriculture requires applicators who are applying herbicide as part of their work to be licensed applicators. All applicators must take the core exam and categories 4 (right-of-way) and 5 (aquatics) cover all aspects of natural area management.

Maintenance intro

During fall 2023, the woody invasive shrubs were removed and the wetland basins were constructed and revegetated as part of the construction process. During 2024 and 2025, the site was maintained monthly by NCS as part of the post-construction maintenance. The maintenance visits focused on spot-treating weeds such as Phragmites, Reed canary grass, hybrid cattail, canada thistle, and teasels in the wetlands and adjacent areas. In the wooded areas, resprouts of buckthorn, honeysuckle, and garlic mustard from the seed bank were the primary focus of weed control.

Site Map (Total area: 1.7 acres)



LEGEND

	UPLAND MAINTENANCE AREA: 1.2 AC
	EMERGENT WETLAND MAINTENANCE AREA: 0.5 AC
— —	SURVEYED LIMITS OF STREAM AND CENTERLINE
—	EXISTING CONTOUR
—	CONSTRUCTED WETLAND GRADES
●	TREES

Maintenance Notes

The project was constructed and seeded in the summer of 2023. Native plantings were installed subsequently in the same fall and the following spring, which includes wetland fringe plugs, aquatic plugs, shrubs and trees. The bare root shrub plugs did not do well and soon disappeared. But during the two years of maintenance in 2024 and 2025, native aquatic plantings seemed to have do well and expanded along the pools. Nuisance species that we have dealt with during the past two seasons include Canada thistle(big patches, Phragmites(singular stems), Reed Canary grass(small patches), and the re-emergence of garlic mustard after the initial treatment since fall 2023. Deers are not a concern here.