MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

Bioengineering Story Map and New Shoreline Resources

ERIC CALABRO, WETLANDS, LAKES, AND STREAMS PROGRAM

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517-243-5584

EGLE Shoreline Protection website

HTTPS://WWW.MICHIGAN.GOV/EGLE/ABOUT/ORGANIZATION/WATER-RESOURCES/INLAND-LAKES-AND-STREAMS/SHORELINE-PROTECTION

EGLE SHORELINE PROTECTION

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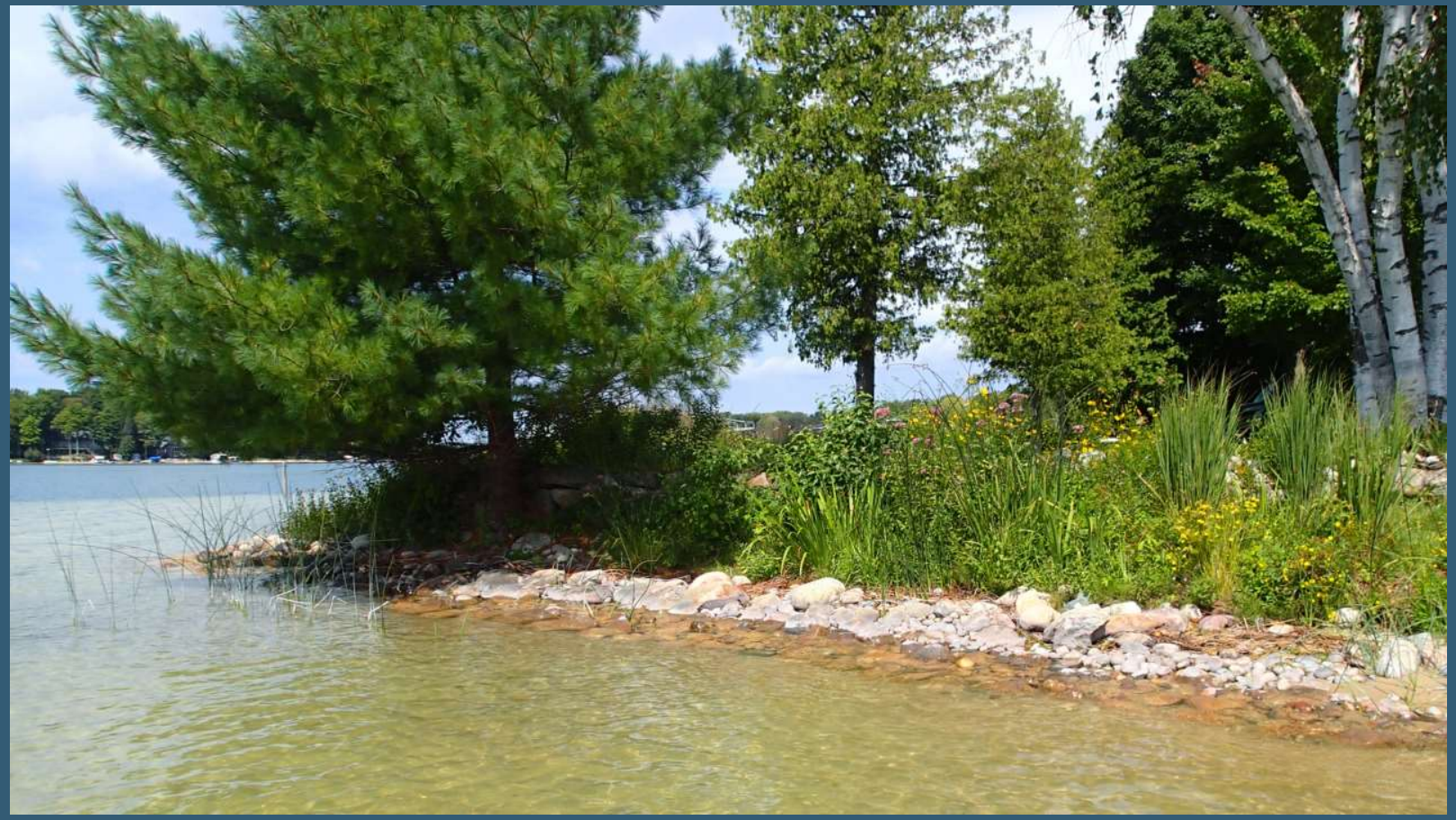


Diamond Lake, Cass County

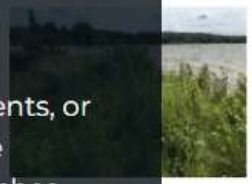
Wing Lake, Oakland County

Intermediate Lake, Antrim County

Brighton Lake, Livingston County

Lake Lansing, Ingham County

Walloon Lake, Charlevoix County



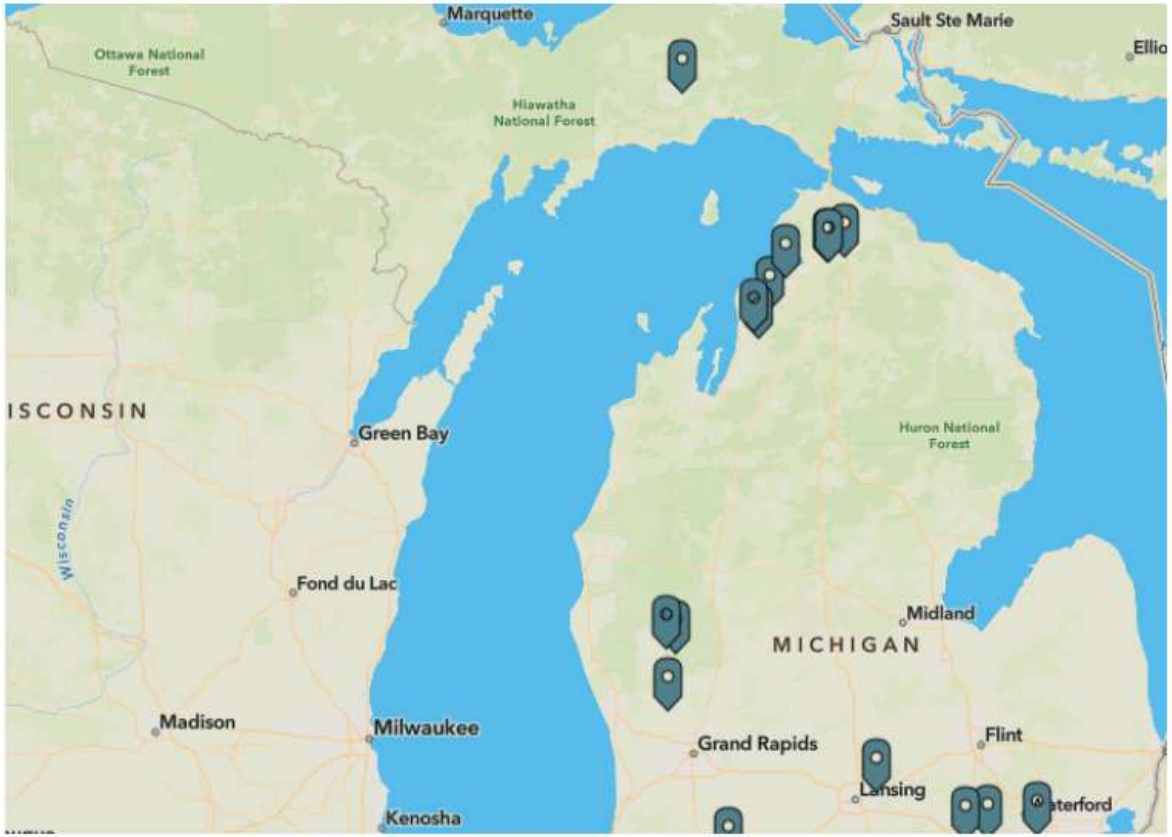
Emmet

Burt Lake, Cheboygan County

Shoreline Protection Story Map

EGLE recommends the use of natural shoreline treatments, or bioengineering, for shoreline protection. New shoreline hardening should be avoided where alternative approaches can be used to protect property from erosion. There are a wide variety of bioengineering designs that can suit a variety of property owner aesthetics while also protecting from shoreline erosion, and providing benefits to the lake.

Launch interactive story map >



Would you like to have your project featured on the Shoreline Protection Story Map? Please use this form to provide information on your inland lake bioengineering project.

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Bioengineered Shoreline Protection on Inland Lakes

Examples of some best management practices for shoreline protection on inland lakes of Michigan


Diamond Lake, Cass County


Wing Lake, Oakland County


Intermediate Lake, Antrim County


Brighton Lake, Livingston County


Lake Lansing, Ingham County


Walloon Lake, Charlevoix County


Ryerson Lake, Newaygo County


Emerald Lake, Newaygo County


Intermediate Lake, Antrim County


Pickerel Lake, Emmet County


Burt Lake, Cheboygan County


Crockery Lake, Ottawa County

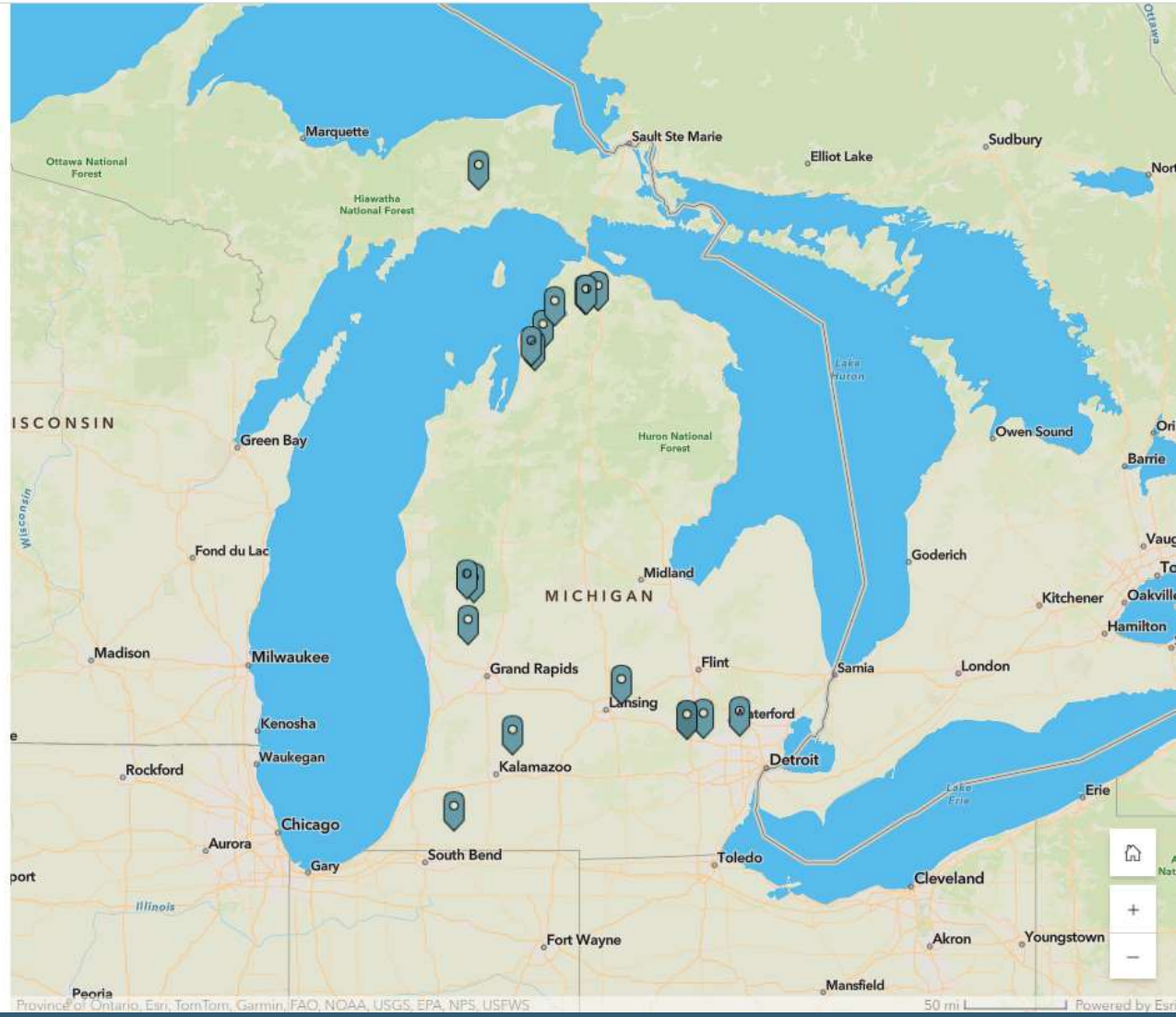

Gull Lake, Kalamazoo County


South Manistique Lake, Mackinac County


Kent Lake, Oakland County


Lake Charlevoix, Charlevoix County


Pickerel Lake, Emmet County



Diamond Lake, Cass County

Picture Description: The first and second pictures show the installed bioengineering project in 2021. The third image is the plans submitted with the permit application. The last picture shows this shoreline in 2017 before bioengineering was installed.

Design: Lower-energy bioengineering

Installation date: 2017

Estimated wave height classification: Lower energy (0 - <1ft.) Link to assessment

Consultant/Contractor: Upstream Waters Landscape, then North Star Landscape Design & Installation

Total cost: ~$277 per linear foot. Included in that cost was the demolition and removal of the existing concrete seawall

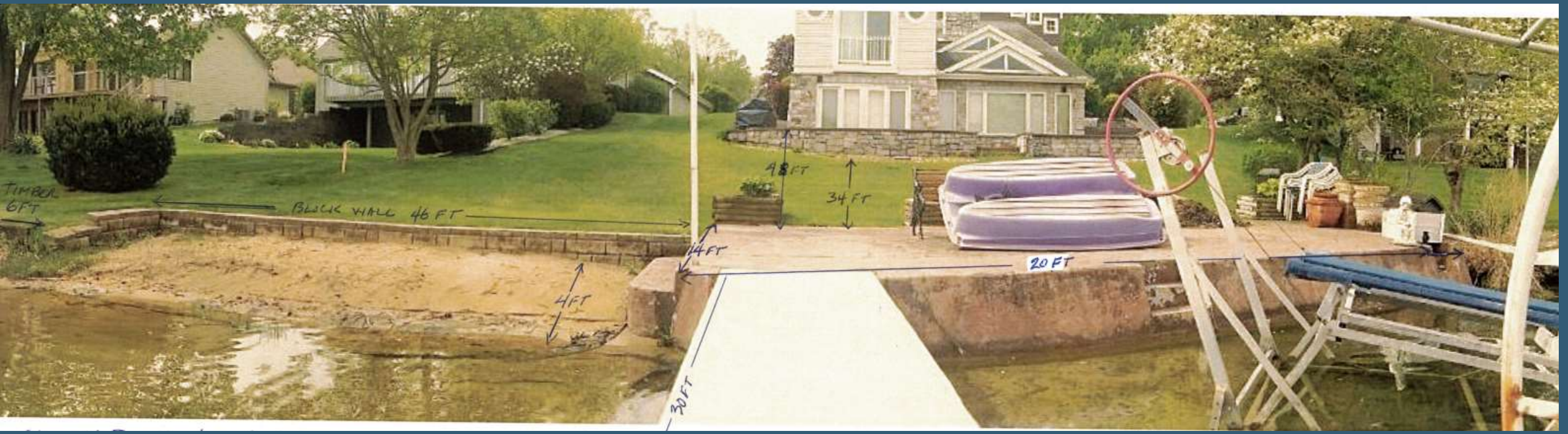
Materials list:

Plant list: *Carex bricknelli*, various sedges, lilies, and vegetated coir mats, in addition to mixed upland plantings of native and hybrid plants.

Yearly maintenance activity: Weeding and plant trimming

Yearly maintenance cost: Approximately $1,500

More information:


TIMBER
6FT
BLOCK WALL 46 FT
4FT
48FT
34 FT
14FT
20 FT
30FT


Native planting area
Mixed plantings of native and hybrid plants
Property Line
Wall and upland of wall planted with Carex bicknelli
Open Faced Wall with sedg
Native plantings betwee and OHWM
35'
25'
Beach
Native Vegetated Coir Mats (3'wx15'L)
Place from OHWM into the water
Upstream Waters Landscape, Inc.
DESIGN • INSTALL • MAINTAIN

Ryerson Lake, Newaygo County

Picture Description: The first and second pictures show the installed bioengineering project in 2021. The third picture is the plans submitted with the permit application. The last picture shows this shoreline in 2019 before bioengineering was installed.

Design: Bioengineering

Installation date: 2020

Estimated wave height classification: Lower energy (0 - <1ft.)

Consultant/Contractor: Homeowner installed

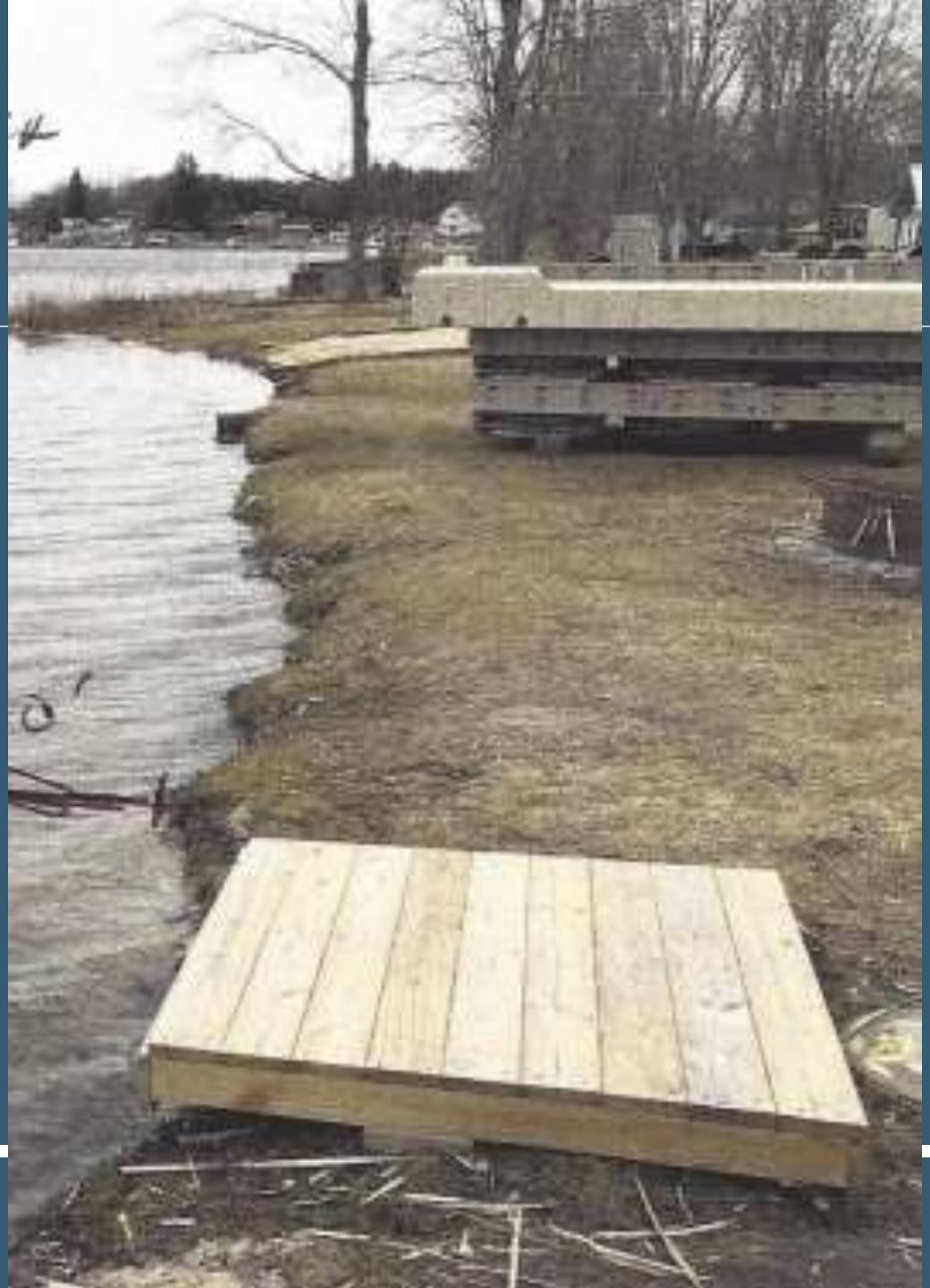
Total cost: $19 per linear foot. $600 for the coir log, $150 for the plants total for the 40 feet of shoreline.

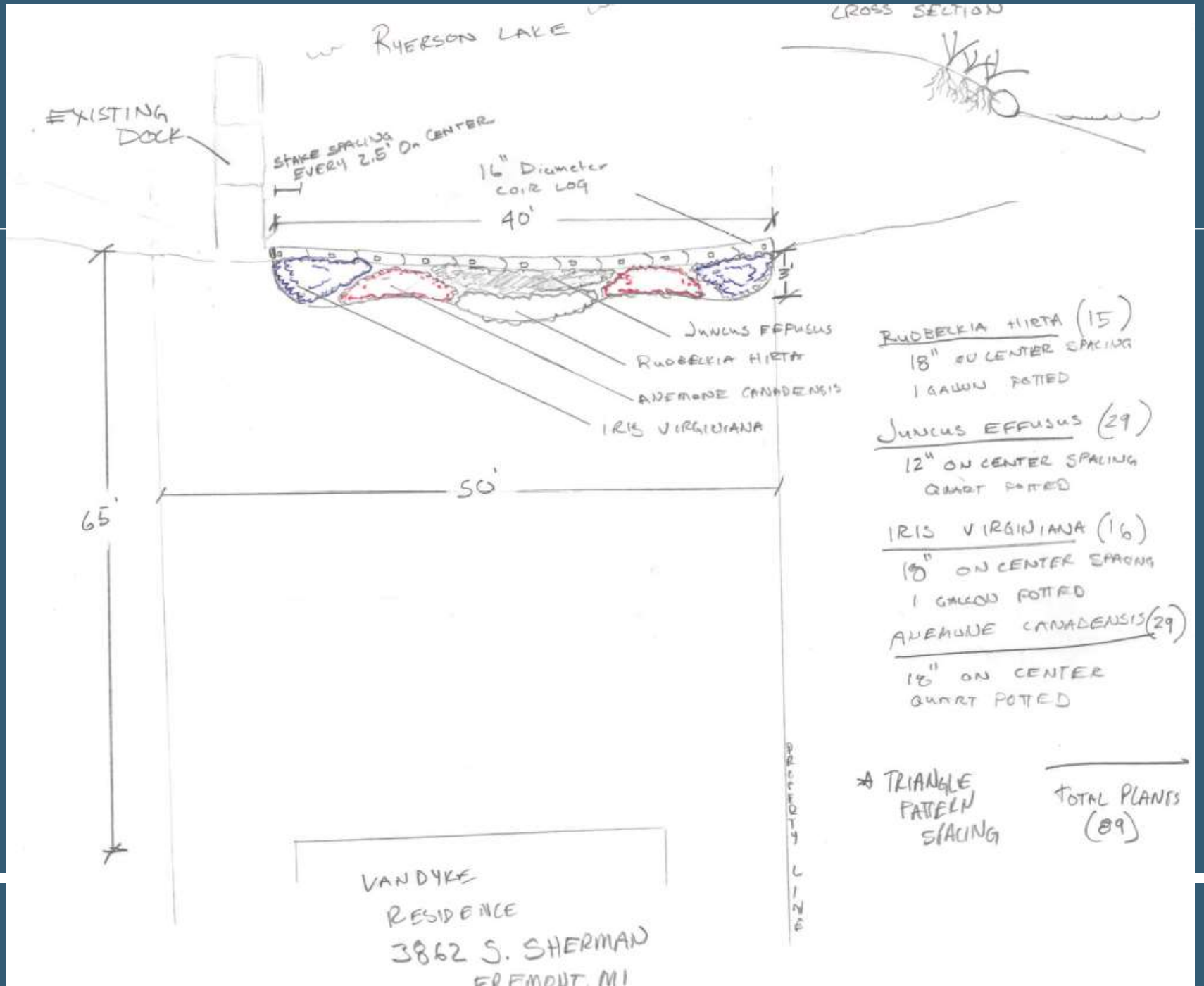
Materials List:

Plant list: *Rudbeckia hirta, Juncus effusus, Iris virginiana, Anemone canadensis*

Yearly maintenance activity: Small amount of weeding

Yearly maintenance cost: No maintenance




RYERSON LAKE
CROSS SECTION
EXISTING DOCK
STAKE SPACING EVERY 2.5' ON CENTER
16" Diameter COIR LOG
40'
3'
JUNCUS EFFUSUS
RUDBECKIA HIRTA
ANEMONE CANADENSIS
IRIS VIRGINIANA
65'
50'
PROPERTY LINE
VAN DYKE
RESIDENCE
3862 S. SHERMAN
FREMONT, MI
RUDBECKIA HIRTA (15)
18" ON CENTER SPACING
1 GALLON POTTED
JUNCUS EFFUSUS (29)
12" ON CENTER SPACING
QUART POTTED
IRIS VIRGINIANA (16)
18" ON CENTER SPACING
1 GALLON POTTED
ANEMONE CANADENSIS (29)
18" ON CENTER
QUART POTTED
* TRIANGLE PATTERN SPACING
TOTAL PLANTS (89)

Intermediate Lake, Antrim County

Picture Description: The first and second pictures show the installed bioengineering project in 2021. The third picture is the plans submitted with the permit application. The last two pictures show this shoreline in 2017 before bioengineering was installed.

Design: Biotechnical

Installation date: 2018

Estimated wave height classification: Moderately higher energy (>1.5 - ≤2ft.). Link to assessment

Consultant/Contractor: David Spieser, Habitat Landscape LLC

Total cost: Information coming soon!

Materials list:

Plant list: *Schizachyrium scoparium* ('The Blues' cultivar), *Schoenoplectus*, *Carex*, *Iris*, *Baptisia australus*, *Amsonia taebernaemontana*, *Rhus cultivar* ('Gro Low')

Yearly maintenance activity: Information coming soon!

Yearly maintenance cost: Information coming soon!

More information: Estimated nutrient load reduction as a result of this project is 16.2 tons of sediment, 13.8 pounds of phosphorus, and 27.6 pounds of nitrogen.

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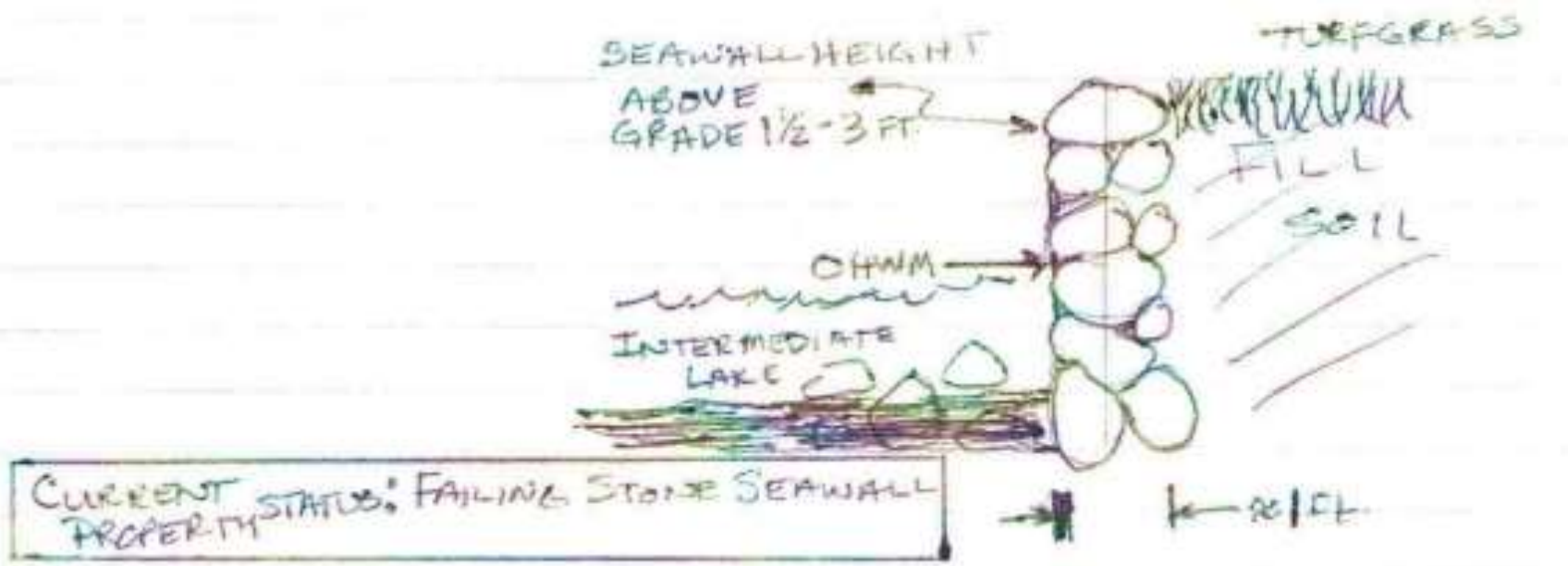
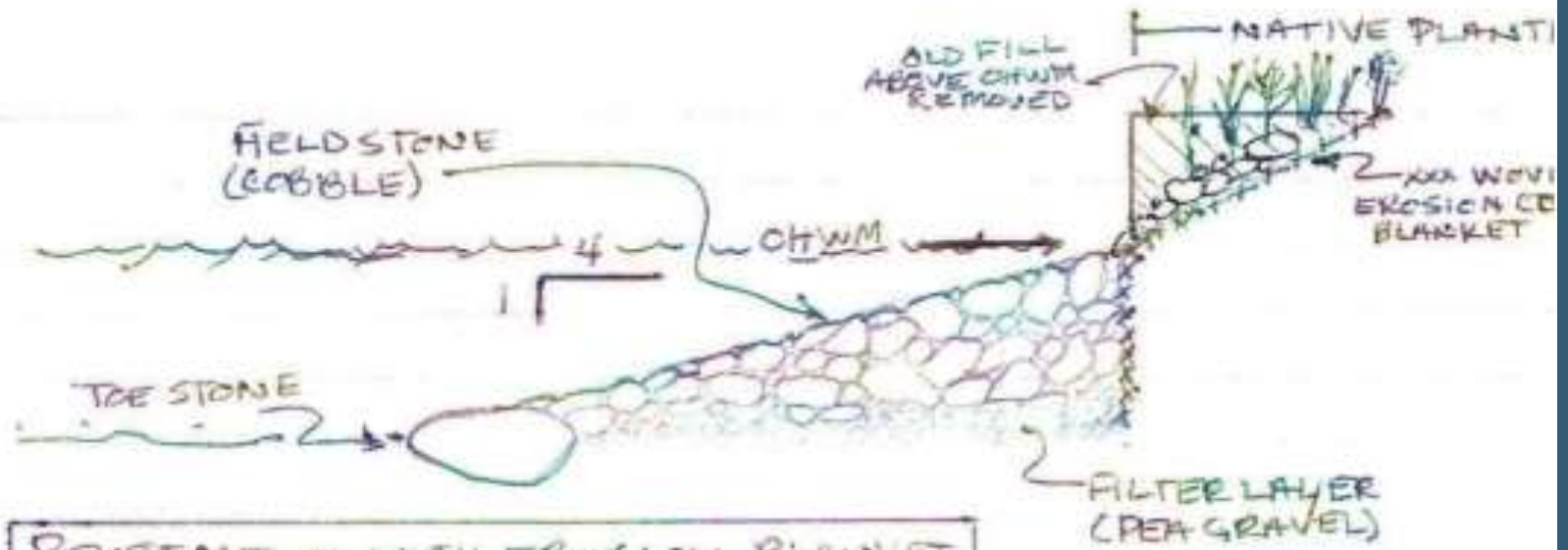

SEAWALL HEIGHT
ABOVE GRADE 1½-3 FT
TURFGRASS
FILL
SOIL
OHWM
INTERMEDIATE LAKE
CURRENT PROPERTY STATUS: FAILING STONE SEAWALL
RC/FL


NATIVE PLANTI
OLD FILL ABOVE OHWM REMOVED
FIELDSTONE (COBBLE)
OHWM
4
1
TOE STONE
FILTER LAYER (PEA GRAVEL)
REVETMENT WITH EROSION BLANKET AND NATIVE PLANTINGS.

Diamond Lake, Cass County

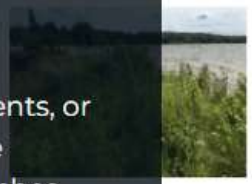
Wing Lake, Oakland County

Intermediate Lake, Antrim County

Brighton Lake, Livingston County

Lake Lansing, Ingham County

Walloon Lake, Charlevoix County



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Burt Lake, Cheboygan County

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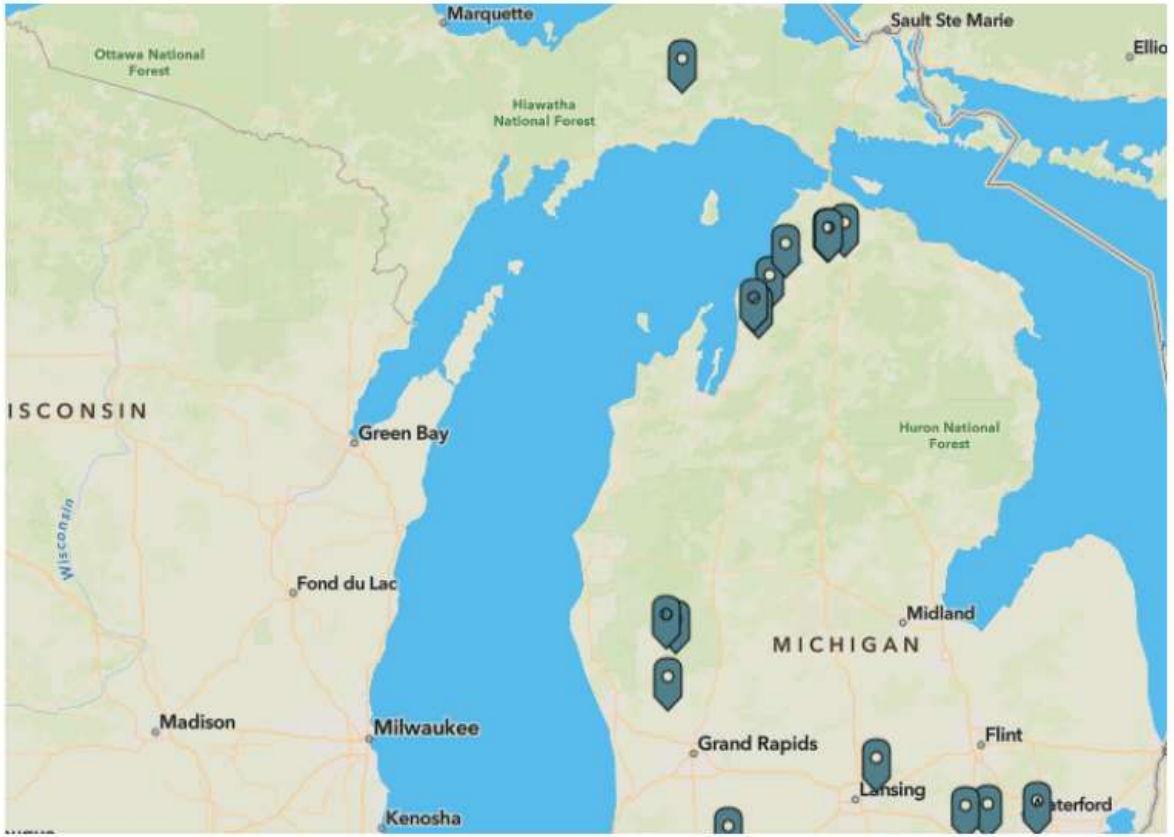

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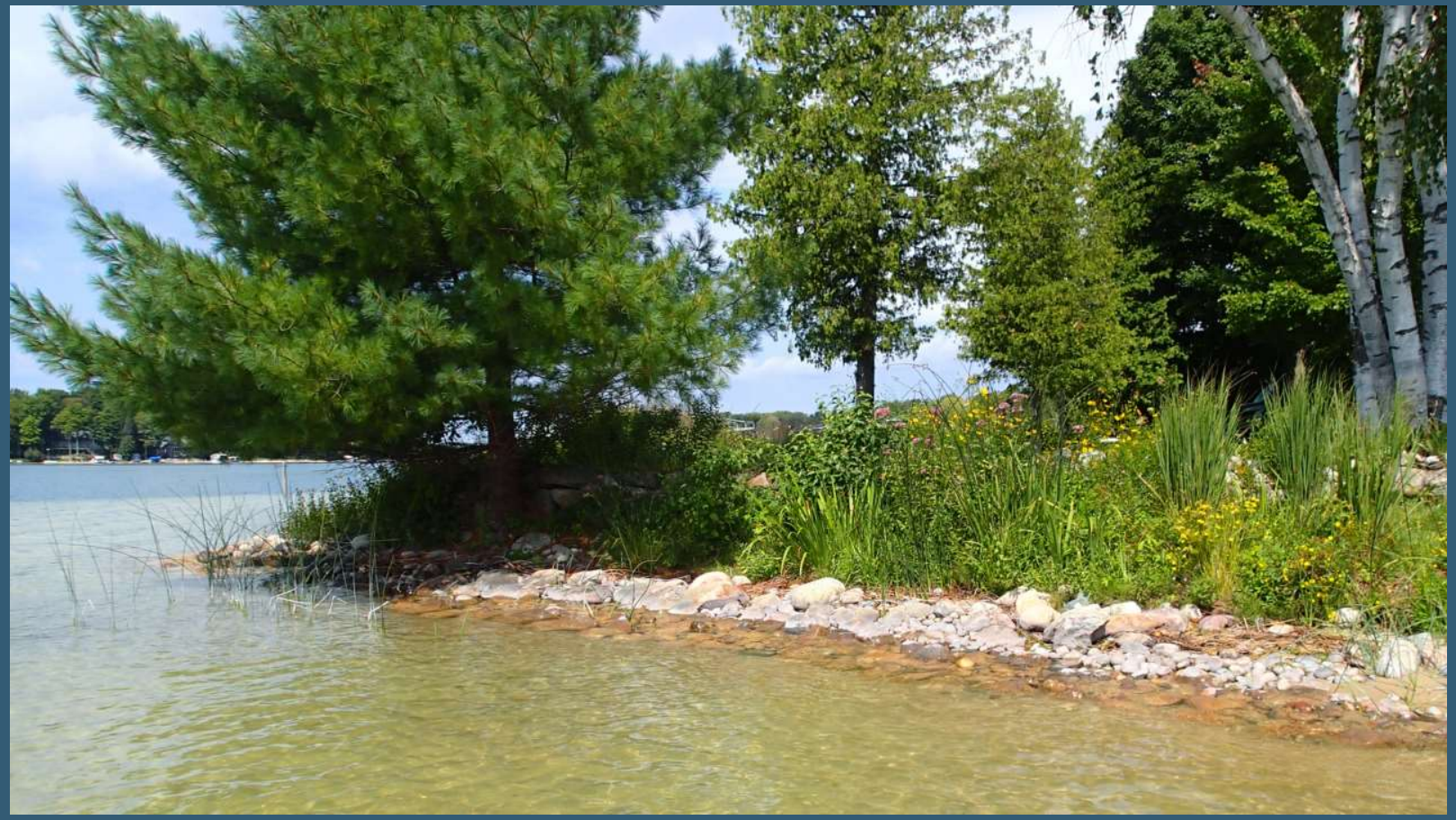

EGLE Bioengineering Survey

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WE'D LOVE TO HIGHLIGHT YOUR PROPERTY!!!

We would like to use information about your shoreline bioengineering project for promotional and educational purposes such as including it in the Bioengineering Storymap! Please use this form to provide information on your inland lake bioengineering project.

Please use one form per property or project.

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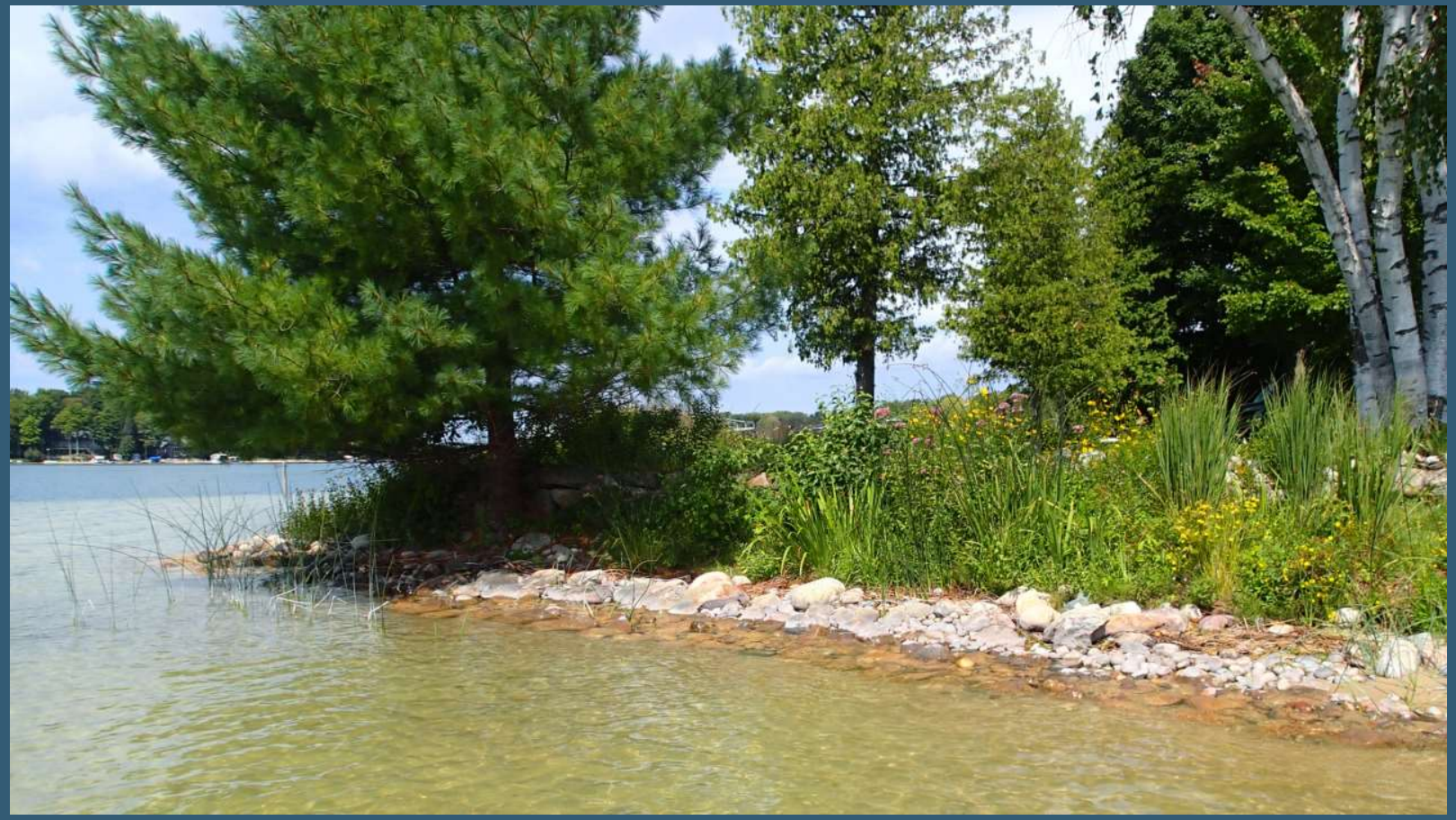

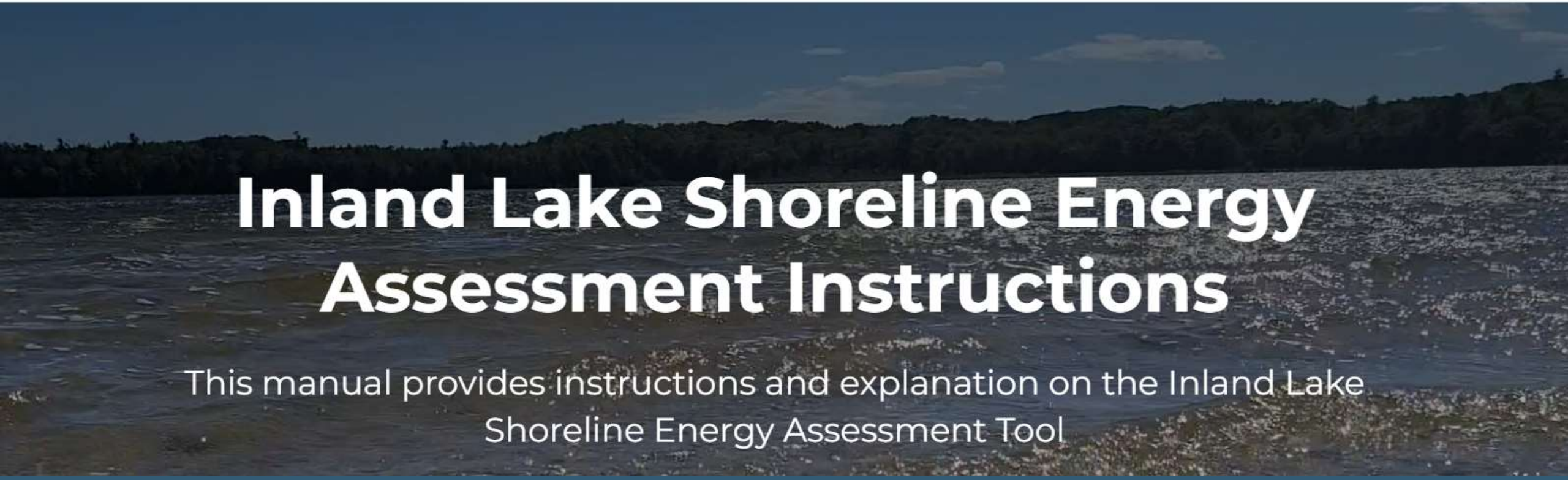

Inland Lake Shoreline Energy Assessment Instructions

This manual provides instructions and explanation on the Inland Lake Shoreline Energy Assessment Tool

MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY

This shoreline assessment was built to aid inland lake homeowners, contractors, consultants, and other interested parties in evaluating shoreline energy potential on inland lake shoreline properties. Included in the shoreline assessment are some questions that can be used to inform shoreline protection design.

It is recommended this shoreline assessment be completed on a desktop computer and not on a mobile device. This must be completed in one sitting and cannot be saved.

Section I: Wave Energy Information

For questions about this section, please review these instructions.

EGLE MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

Inland Lake Shoreline Energy Analysis Submission Report

Submitter Information

Full Name: **Eric Calabro**

Submitter Email Address: **CalabroE@michigan.gov**

Project Address: **21330 Sail Bay Dr**

Cassopolis, Michigan, 49031, Cass Count

Unique ID: **3**

Submitted: **04/**

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Wave Energy Information

Maximum Fetch Distance: **0.24mi**

Water Depths on Fetch Line: **9ft**

2nd Fetch Depth: **6ft**

3rd Fetch Depth: **11ft**

4th Fetch Depth: **15ft**

5th Fetch Depth: **12ft**

Average Depth along Maximum Fetch Line: **10.6ft**

Distance to a Water Depth of 2ft:

The 2ft depth contour is less than 50ft from shoreline

Highest Level of Boating Activity:

Motor ... 200-500ft of the prop...

Estimated Storm-Wave Height Classification: **lower energy**

Estimated Boating Activity Wave Height Classification: **lower energy**

Wave height (ft.)	Estimated wave height classification
0 - <1	lower energy
1 - ≤1.5	moderately lower energy
>1.5 - ≤2	moderately higher energy
>2	higher energy

Estimated Wave Height Classification Comments: **No additional comments at this time**

Erosion and shoreline conditions: **No erosion apparent**

Unique ID: **3**

Submitted: **April 3, 2024 6:18 PM**

EGLE Page 3

Erosion Photos:

No erosion occurring at this property

EGLE Page 4

Bank Height: **Less than 1ft**

Water Level: **At Ordinary High Water Mark (OHWM)**

Shoreline and Buffer Vegetation: **50% or less of the area 35ft landward of the OHWM along the shoreline contains a majority of trees, shrubs, flowers, and native grasses**

Aquatic Vegetation: **Scattered/patchy vegetation**

Infrastructure Distance: **50+ ft**

Comments or Questions:

No additional comments at this time

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EGLE Bioengineered Shoreline Protection on Inland Lakes

Intermediate Lake, Antrim County

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Design: Biotechnical

Installation date: 2018

Estimated wave height classification: Moderately higher energy (>1.5 - ≤2ft.) Link to assessment report

Consultant/Contractor: David Spieser, Habitat Landscape LLC

Total cost: Information coming soon!

Materials list:

Plant list: *Schizachyrium scoparium* ('The Blues' cultivar), *Schoenoplectus*, *Carex*, *Iris*, *Baptisia australus*, *Amsonia taebernaemontana*, *Rhus cultivar* ('Gro Low')

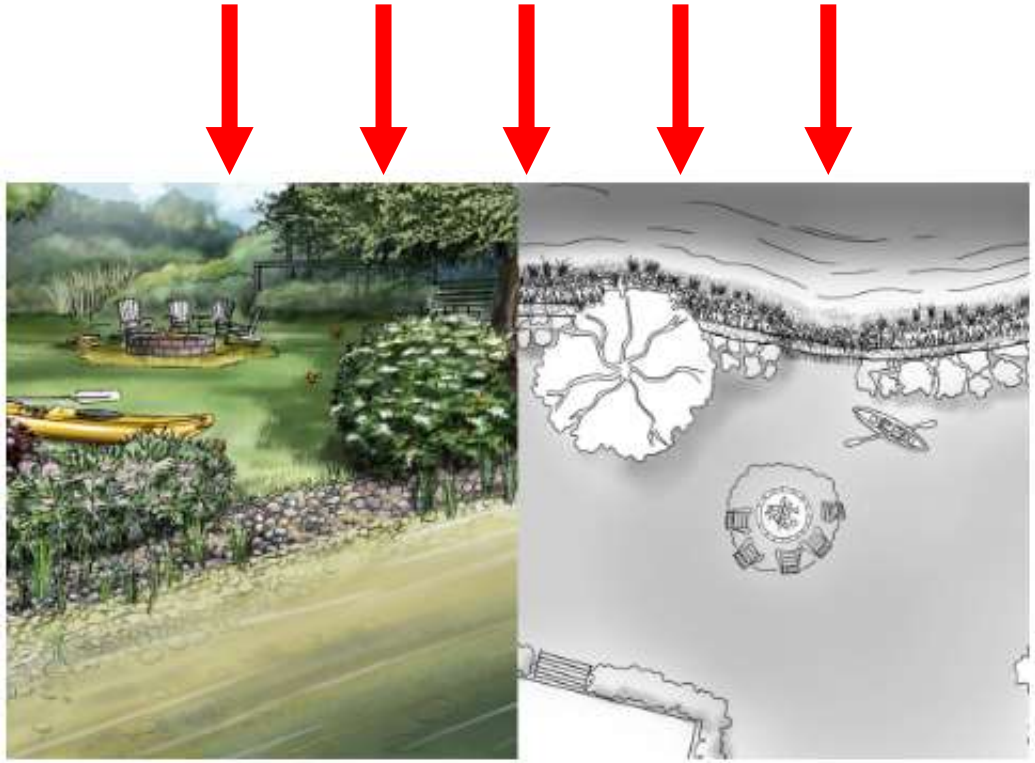
Yearly maintenance activity: Information coming soon!

Yearly maintenance cost: Information coming soon!

More information: Estimated nutrient load reduction as a result of this project is 16.2 tons of sediment, 13.8 pounds of phosphorus, and 27.6 pounds of nitrogen.

Example 1. Higher Energy Site

Example 1 Assessment Report



Example plans for a higher-energy bioengineering project.

The combination of the following shoreline assesment results has shown this site to have a relatively high erosive potential and energy level:

- The 3.3 mile fetch and the average depth along the maximum fetch line, in combination with the 2ft depth contour being less than 50ft from the shoreline resulted in the estimated storm-wave height classification of "moderately high energy".

- Wake surfing occurring 200-500ft of the shoreline, in combination with the 2ft depth contour being less than 50ft from the shoreline resulted in the the estimated boating activity wave height classification of "moderately high energy" .

- The majority of the shoreline being mowed turf grass, and the lack of aquatic vegetation increase the erosive potential at this site.

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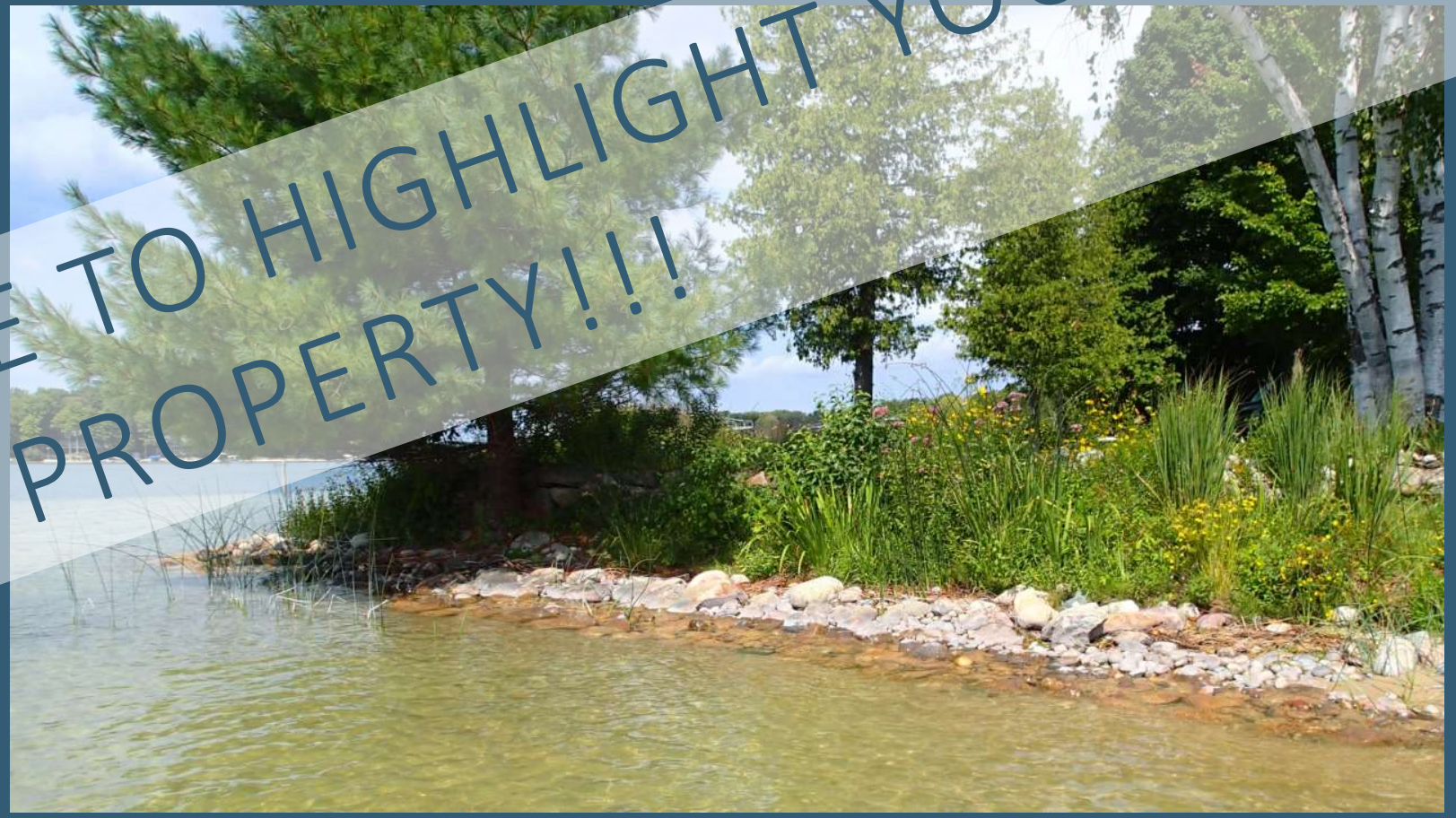

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