



HURON-CLINTON metroparks

Oakwoods Metropark Stormwater Management Plan

September 2019



Table of Contents

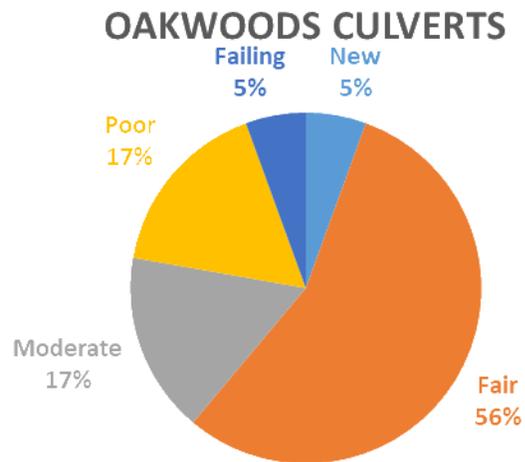
❖ Stormwater Structures Recommendations	3
❖ Stormwater Structure Maps	6
❖ Streambank Summary and Recommendation Maps	9
❖ Shoreline Summary	15
❖ Green Infrastructure Concepts and Maps	16
❖ Recommendation Summary Tables	18

Oakwoods Metropark Stormwater Structure Recommendations

Table 1. Summary of Oakwoods Culvert Inspection and Maintenance Needs

Culvert Rating	Number of Culverts	Culverts Needing Immediate Cleanout	Culverts Needing Future Cleanout	Culverts Needing Replacement or Repair
New	1	0	0	0
Fair	22	0	2	0
Moderate	5	0	2	0
Poor	9	0	1*	8
Failing	1	1*	0	1
Total:	38	1*	5*	9
Repair Cost:		\$0	\$1,201	\$74,990

*Culvert may be replaced before it can be cleaned out.



Left: Failing culvert in Oakwoods. Right: Proportion of culverts in each condition category.

Table 2. Individual Culvert Replacement Costs

Culvert ID	Diameter (in)	Length (ft)	Condition	Maintenance Need	Cost Opinion
CUL-OAK-003*	42	23	Poor	Replacement	\$7,636
CUL-OAK-005	10	19	Fair	Future Cleanout	\$66
CUL-OAK-006*	24	44	Failing	Replacement	\$8,789
CUL-OAK-007	27	60	Fair	Future Cleanout	\$357
CUL-OAK-009	16	20	Moderate	Future Cleanout	\$79
CUL-OAK-011	15	71	Poor	Replacement	\$8,872
CUL-OAK-013	15	45	Poor	Replacement	\$5,609
CUL-OAK-017	48	58	Moderate	Future Cleanout	\$699
CUL-OAK-022	24	56	Poor	Replacement	\$11,200
CUL-OAK-028	18	54	Poor	Replacement	\$8,100
CUL-OAK-035	14	54	Poor	Replacement	\$6,750
CUL-OAK-037	18	54	Poor	Replacement	\$8,100
CUL-OAK-039	12	67	Poor	Replacement	\$8,375
CUL-OAK-021!^	12	9	Poor	Complete Replacement	\$1,559
Total:					\$76,191

*Culvert may be replaced before it needs to be cleaned out.

Table 3. Individual Stormwater Gravity Main Replacement Costs

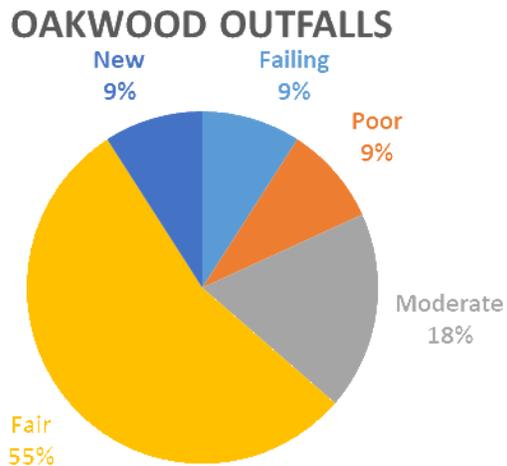
Stormwater Gravity Main ID	Diameter (in)	Length (ft)	Maintenance Need	Cost Opinion
STG-OAK-0002^	12	72	Cutting and Grouting	\$1,967
STG-OAK-0003^	12	227	Cutting and Grouting	\$6,232
Total:				\$8,199

^Televised

Table 4. Summary of Oakwoods Outfall Inspection and Maintenance Needs

Outfall Rating	Number of Outfalls	Outfalls Needing Immediate Cleanout	Outfalls Needing Future Cleanout	Outfalls Needing Replacement or Repair
New	1	0	0	0
Fair	6	0	0	0
Good	2	0	0	0
Poor	1	1*	0	1
Failing	1	0	0	1
Total:	11	1*	0	2
Repair Cost:		\$0	\$0	\$12,500

*Outfall may be replaced before it needs to be cleaned out.



Left: Proportion of outfalls in each condition category. Right: Detached outfall in failing condition in Oakwoods Metropark.

Table 5. Individual Outfall Replacement Costs

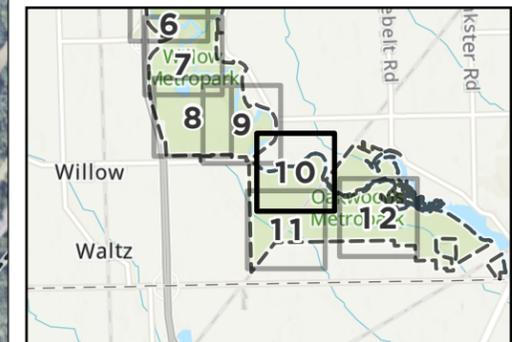
Outfall ID	Diameter (in)	Condition	Maintenance Need	Cost Opinion
SDC-OAK-010	6	Failing	Replacement	\$5,000
SDC-OAK-004*	18	Poor	Replacement	\$7,500
Total:				\$12,500

*Outfall may be replaced before it needs to be cleaned out.

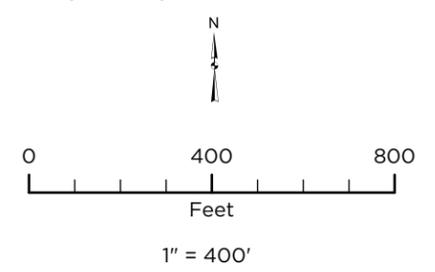
Stormwater Structure Ratings

Oakwoods Metropark

Map Sheet: 10 of 48



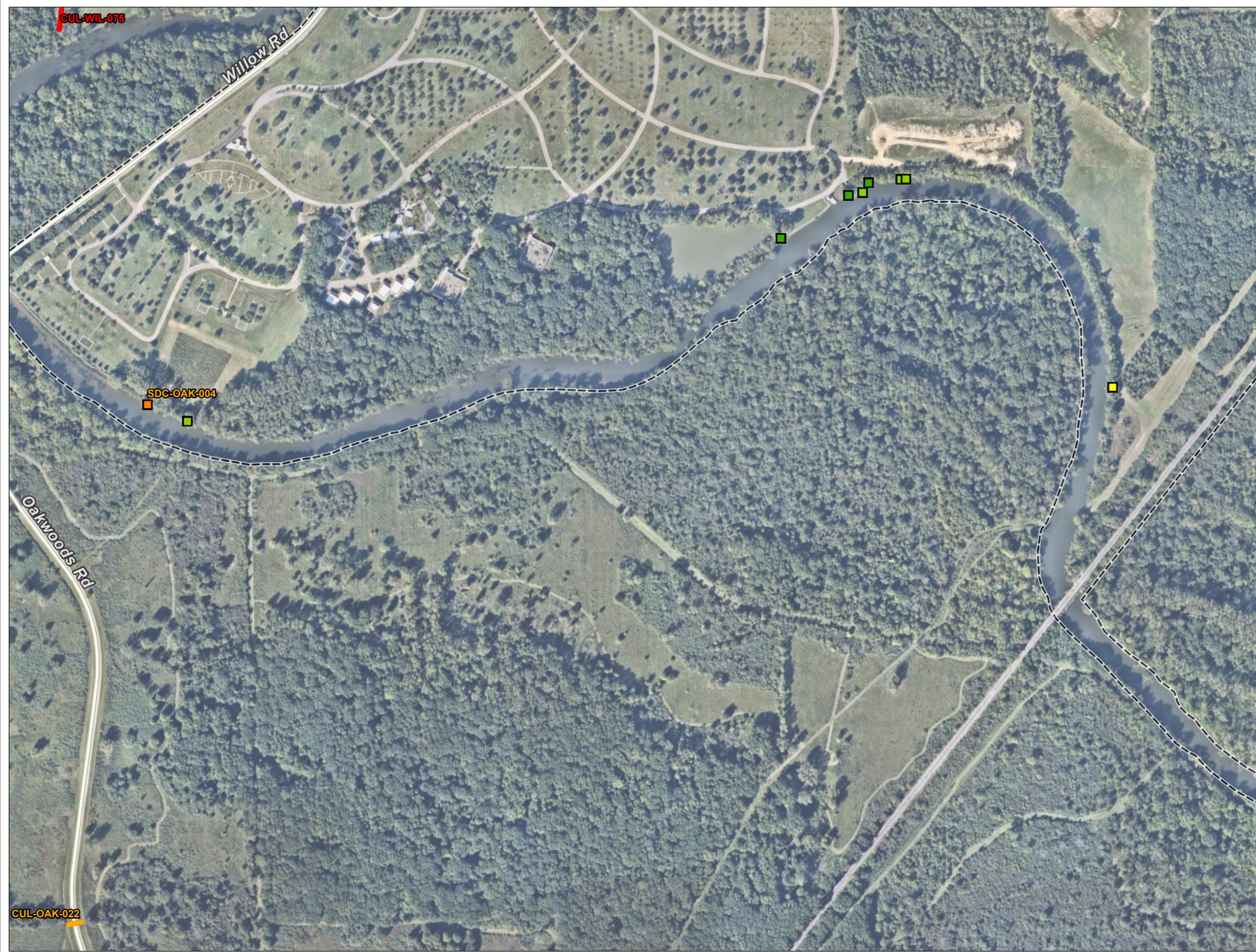
Outfalls (Field Rating)	Gravity Main (Pipe Rating Index)
<ul style="list-style-type: none"> ■ Failing ■ Poor ■ Moderate ■ Fair ■ New 	<ul style="list-style-type: none"> 1 2 3 4 5
Culverts (Field Rating)	Gravity Main (Other)
<ul style="list-style-type: none"> Failing Poor Moderate Fair New (Not Rated) 	 Gravity Main (Other)
	 Culvert (Other)
	Roads
	 Roads
	 Park Boundary



Source: Data provided by Huron-Clinton Metroparks, State of Michigan, OHM Advisors, NearMap and ESRI. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl.

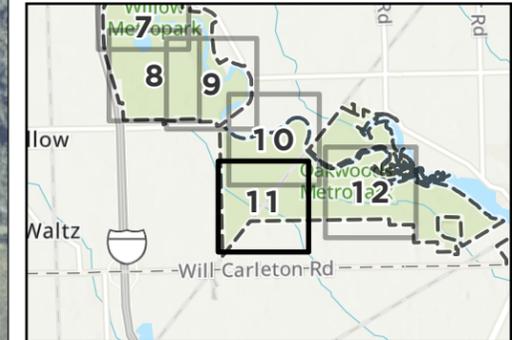
Map Published: October 23, 2019



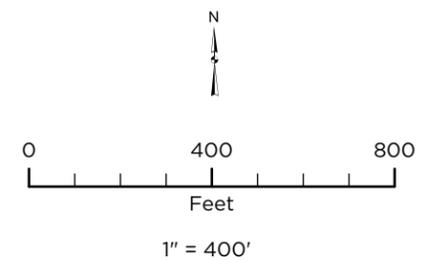
Stormwater Structure Ratings

Oakwoods Metropark

Map Sheet: 11 of 48



Outfalls (Field Rating)	Gravity Main (Pipe Rating Index)
Failing	1
Poor	2
Moderate	3
Fair	4
New	5
Culverts (Field Rating)	Gravity Main (Other)
Failing	Culvert (Other)
Poor	Roads
Moderate	Roads
Fair	Park Boundary
New	
(Not Rated)	



Source: Data provided by Huron-Clinton Metroparks, State of Michigan, OHM Advisors, NearMap and ESRI. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl.

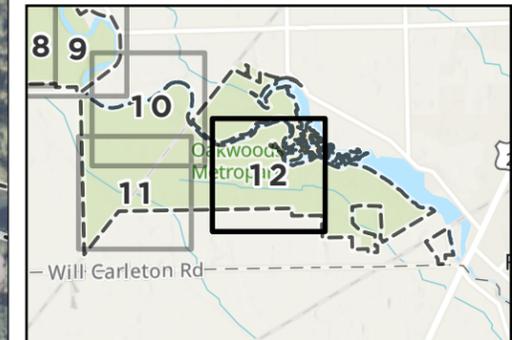
Map Published: October 23, 2019



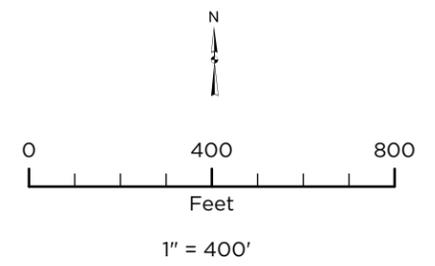
Stormwater Structure Ratings

Oakwoods Metropark

Map Sheet: 12 of 48



Outfalls (Field Rating)	Gravity Main (Pipe Rating Index)
Failing	1
Poor	2
Moderate	3
Fair	4
New	5
Culverts (Field Rating)	Gravity Main (Other)
Failing	Culvert (Other)
Poor	Roads
Moderate	Roads
Fair	Park Boundary
New	
(Not Rated)	



Source: Data provided by Huron-Clinton Metroparks, State of Michigan, OHM Advisors, NearMap and ESRI. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl.

Map Published: October 23, 2019

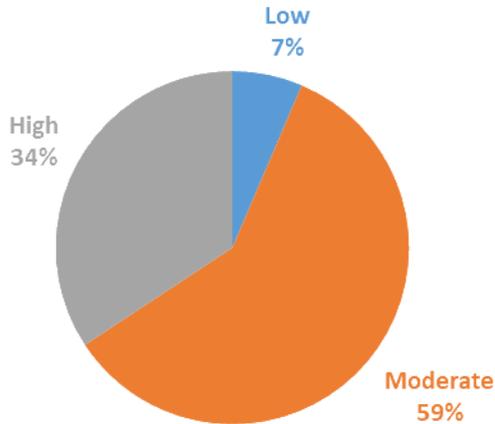


Oakwoods Metropark Streambank Summary and Recommendations

Table 6. Streambank Inspection Summary

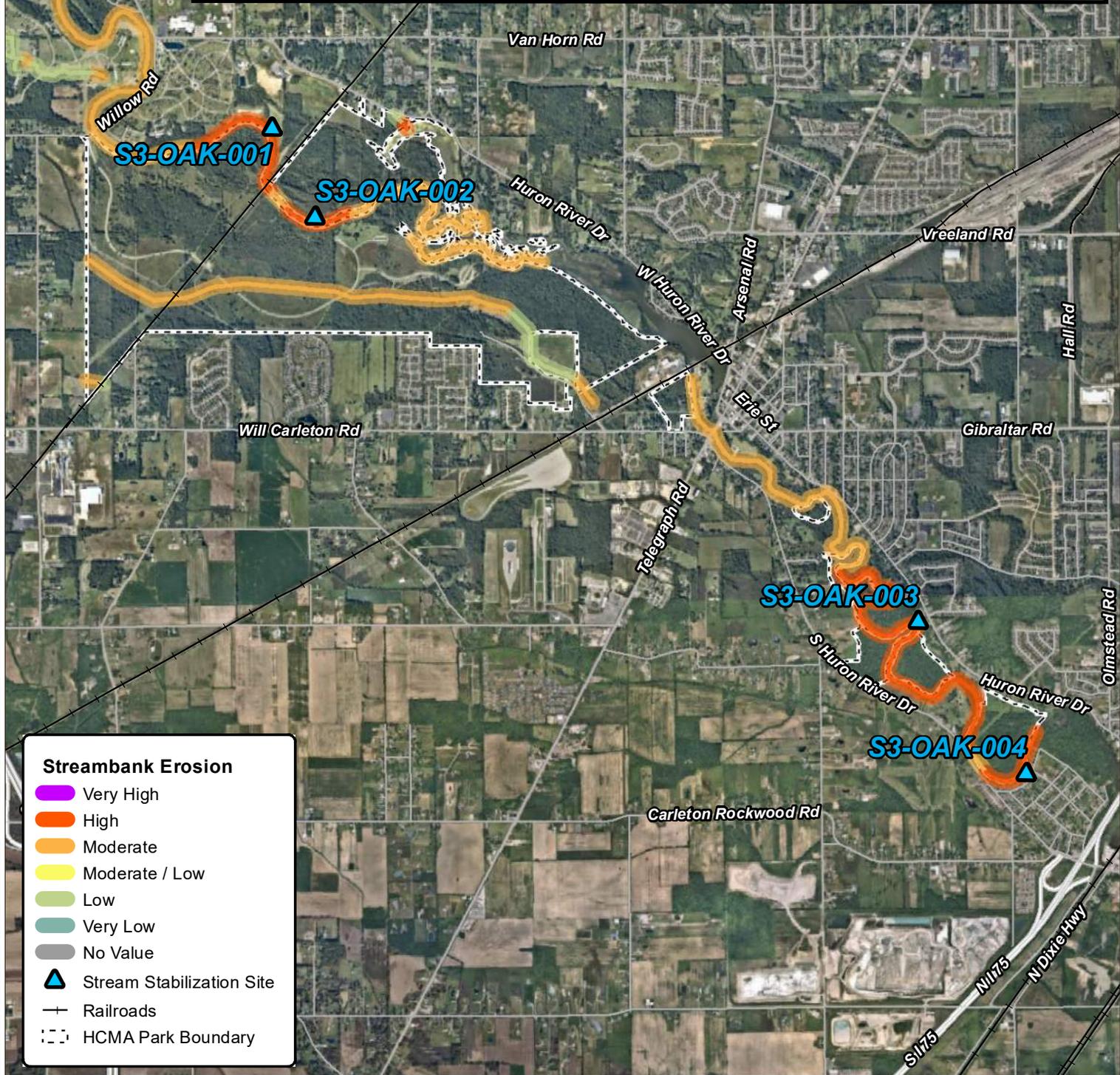
Erosion Condition	Feet of Streambank (miles)	Cost of Restoration
Very High	0 (0)	
High	19,348 (3.66)	\$12,995,762
Moderate	33,471 (6.34)	
Low	3,630 (0.07)	
Very Low	0 (0)	
Total:	56,449 (10.69)	\$12,995,762

OAKWOODS EROSION SEVERITY



Left: Proportion of stream bank in each erosion severity category. Right: Severe erosion on bank in Oakwood Metropark.

Oakwood Metropark - Recommended Streambank Stabilization					
Site	Length, ft	Streambank Erosion	Rec Treatment	Unit Price, \$/ft	Cost
001	3983.23	High/Moderate	Soil Lifts with Live Stakes	678	\$2,701,000.00
002	1799.19	High	Soil Lifts with Live Stakes	678	\$1,220,000.00
003	11105.11	High	Soil Lifts with Live Stakes	678	\$7,530,000.00
004	2280.26	High/Moderate	Soil Lifts with Live Stakes	678	\$1,547,000.00
Note: Includes cost to stabilize both banks					\$12,998,000.00

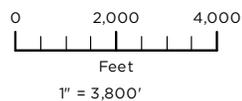


Oakwoods Metropark Streambank Stabilization Siting

Source: Data provided by OHM Advisors, Huron Clinton Metroparks and Near Map. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl

Map Published: September 25, 2019



S3-OAK-001

Length: 3,983.23 ft

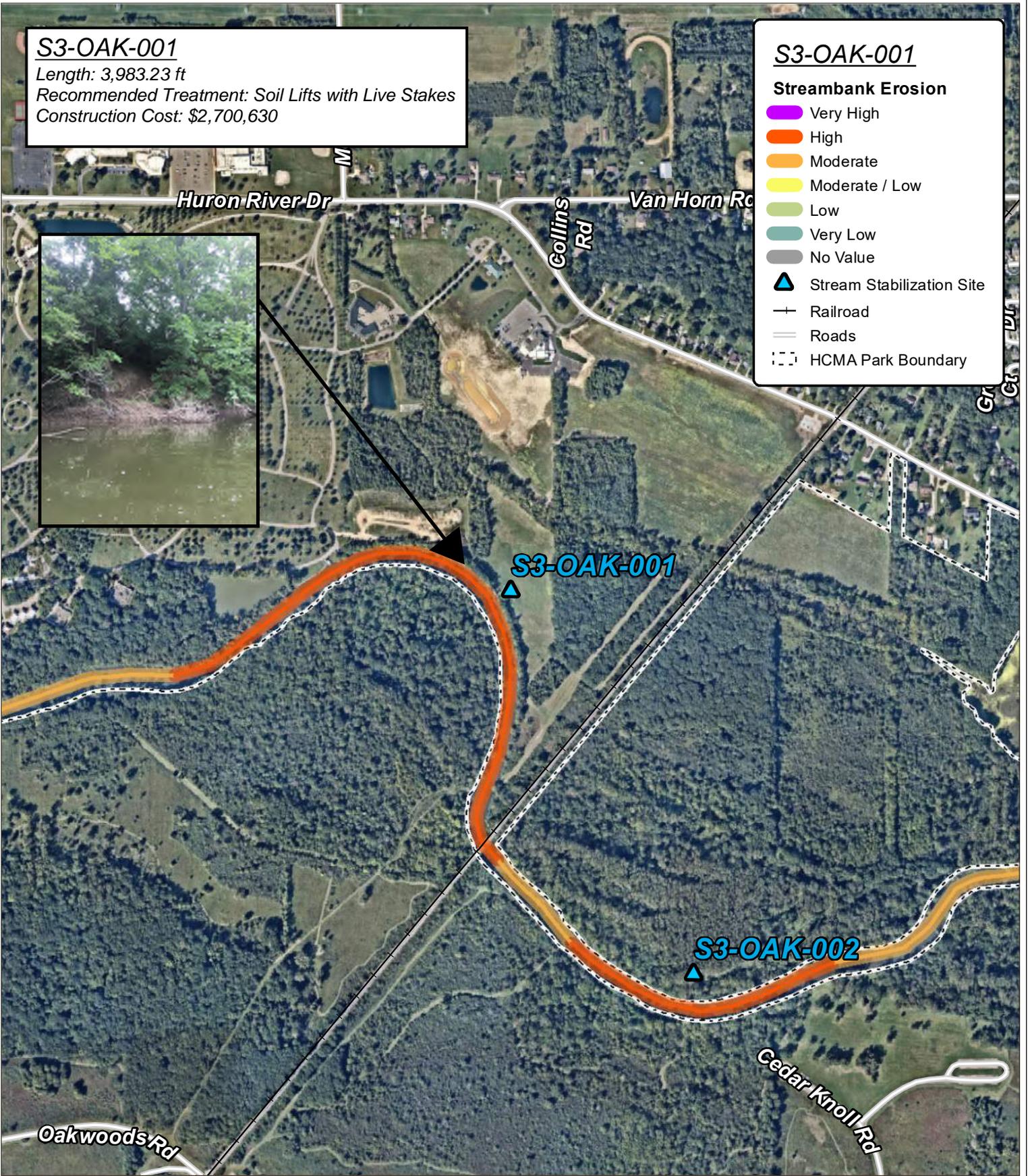
Recommended Treatment: Soil Lifts with Live Stakes

Construction Cost: \$2,700,630

S3-OAK-001

Streambank Erosion

-  Very High
-  High
-  Moderate
-  Moderate / Low
-  Low
-  Very Low
-  No Value
-  Stream Stabilization Site
-  Railroad
-  Roads
-  HCMA Park Boundary

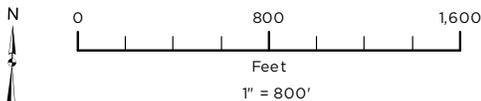


**Oakwoods Metropark
Streambank Stabilization Siting**

Source: Data provided by OHM Advisors, Huron Clinton Metroparks and Near Map. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: NAD 1983 StatePlane: Michigan South FIPS 2113 Feet Intl

Map Published: September 25, 2019



S3-OAK-002
 Length: 1799.19 ft
 Recommended Treatment: Soil Lifts with Live Stakes
 Construction Cost: \$1,219,851

S3-OAK-002

Streambank Erosion

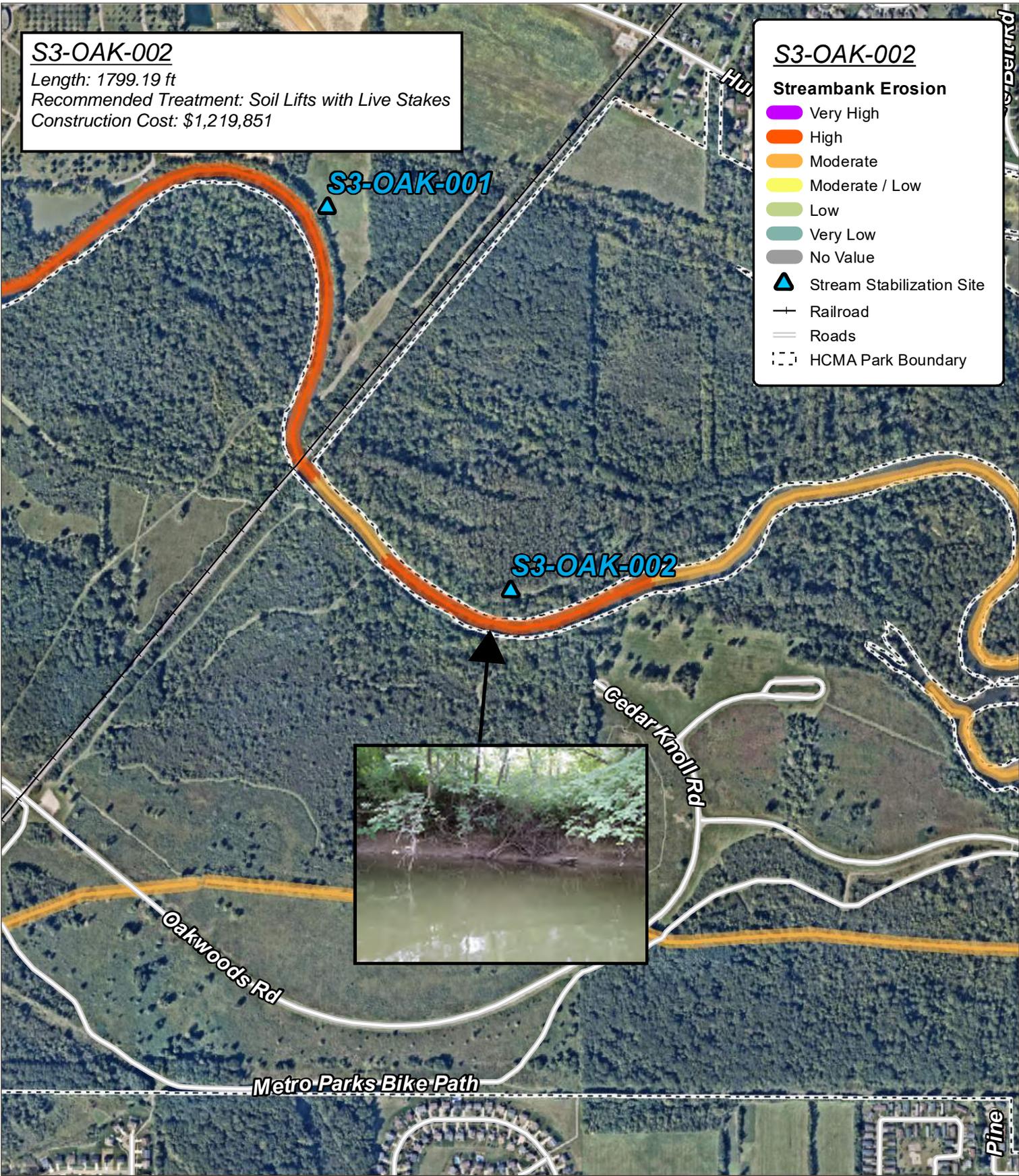
- █ Very High
- █ High
- █ Moderate
- █ Moderate / Low
- █ Low
- █ Very Low
- █ No Value

▲ Stream Stabilization Site

—+— Railroad

— — — Roads

- - - - - HCMA Park Boundary

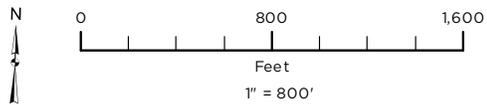


Oakwoods Metropark Streambank Stabilization Siting

Source: Data provided by OHM Advisors, Huron Clinton Metroparks and Near Map. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: NAD 1983 StatePlane: Michigan South FIPS 2113 Feet Intl

Map Published: September 25, 2019



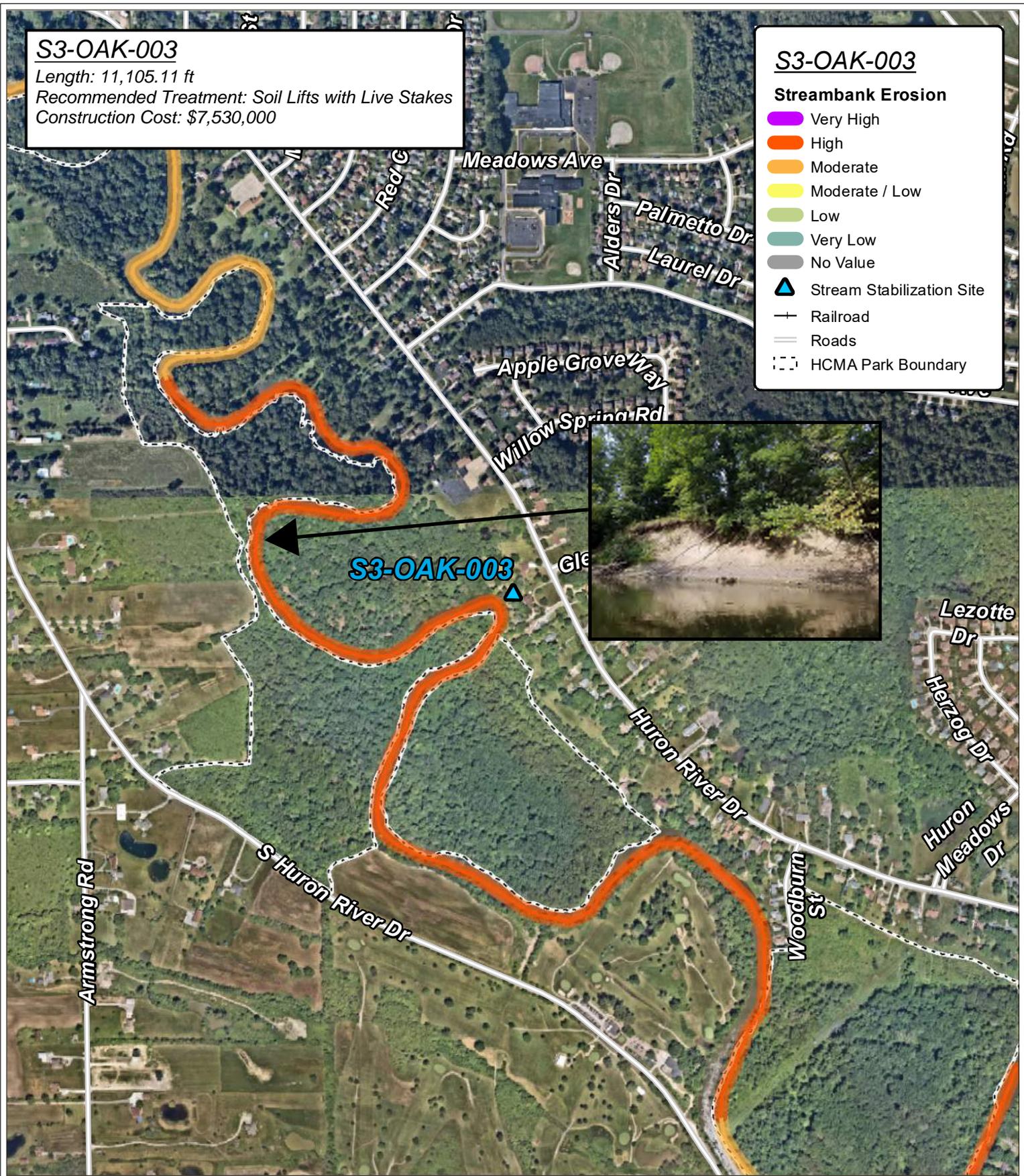
S3-OAK-003

Length: 11,105.11 ft
Recommended Treatment: Soil Lifts with Live Stakes
Construction Cost: \$7,530,000

S3-OAK-003

Streambank Erosion

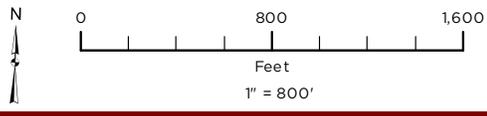
-  Very High
-  High
-  Moderate
-  Moderate / Low
-  Low
-  Very Low
-  No Value
-  Stream Stabilization Site
-  Railroad
-  Roads
-  HCMA Park Boundary



Oakwoods Metropark Streambank Stabilization Siting

Source: Data provided by OHM Advisors, Huron Clinton Metroparks and Near Map. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: NAD 1983 StatePlane: Michigan South FIPS 2113 Feet Intl
Map Published: September 25, 2019



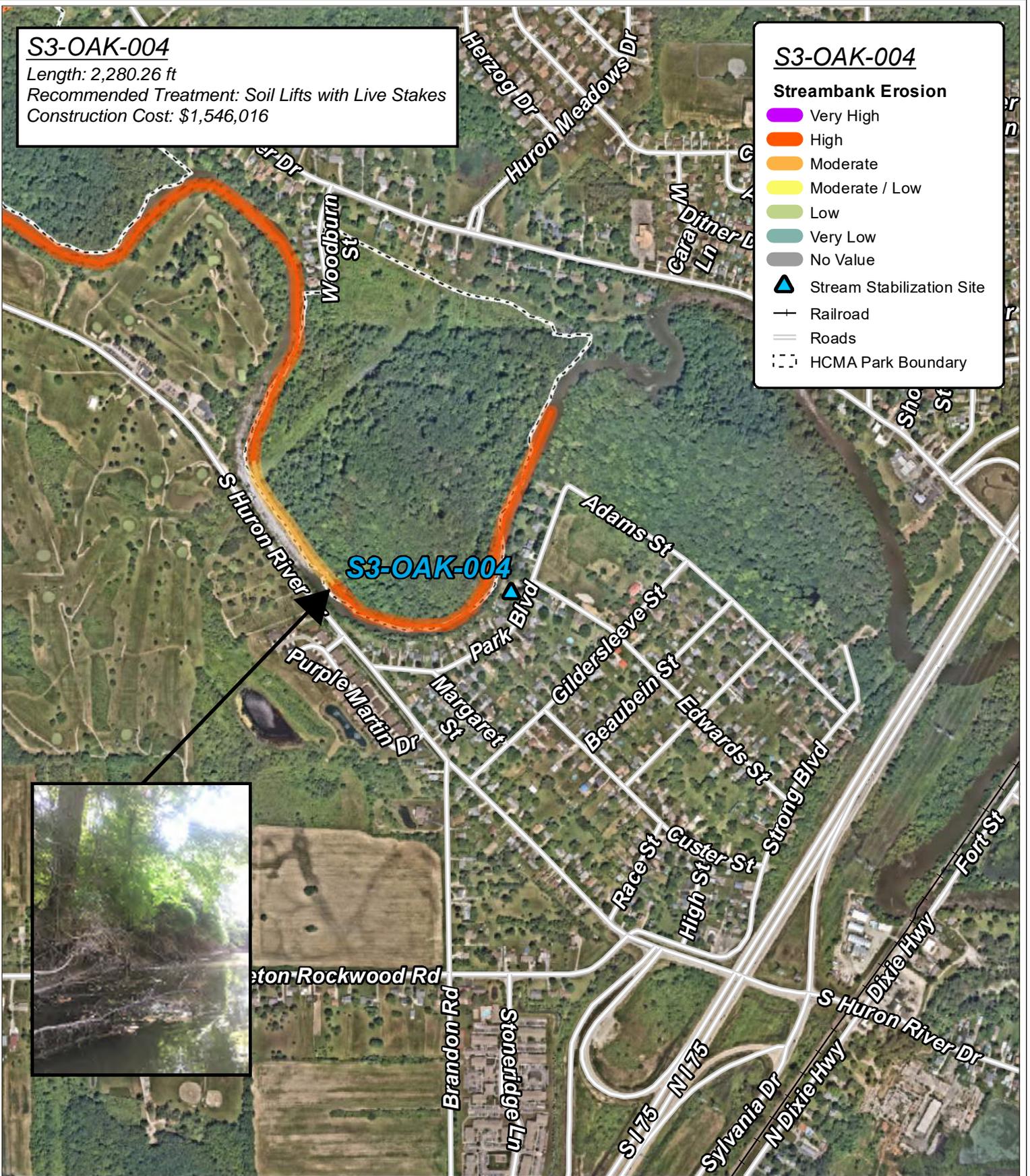
S3-OAK-004

Length: 2,280.26 ft
Recommended Treatment: Soil Lifts with Live Stakes
Construction Cost: \$1,546,016

S3-OAK-004

Streambank Erosion

-  Very High
-  High
-  Moderate
-  Moderate / Low
-  Low
-  Very Low
-  No Value
-  Stream Stabilization Site
-  Railroad
-  Roads
-  HCMA Park Boundary

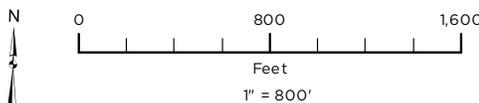


**Oakwoods Metropark
Streambank Stabilization Siting**

Source: Data provided by OHM Advisors, Huron Clinton Metroparks and Near Map. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: NAD 1983 StatePlane: Michigan South FIPS 2113 Feet Intl

Map Published: September 25, 2019



Oakwoods Metropark Shoreline Summary and Recommendations



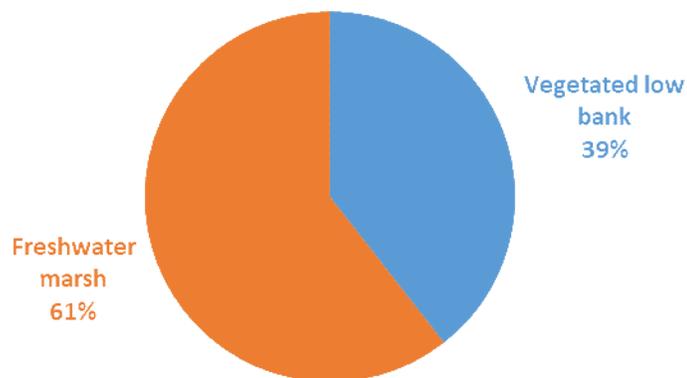
Freshwater marsh with no slumping in Oakwoods Metropark.

Table 7. Shoreline Inspection Summary

Erosion Condition	Length of Shoreline (unit)
Major	0.0
Minor	0.0
None	8,093.1
Total:	8,093.1
Restoration Cost:	\$0

Oakwoods Metropark has no large water bodies. The shoreline represented here is small ponds and wetland borders in the northeast section of the park. No restoration is recommended at this time.

OAKWOODS SHORELINE TYPE



Proportion of each shoreline type present in Oakwoods Metropark.

Oakwoods Metropark Green Infrastructure Recommendations

In Oakwoods, the green infrastructure practices listed in Table 1 are recommended to improve water quality and ameliorate flooding issues in the park where feasible. These practices are also outlined on the attached green infrastructure maps.

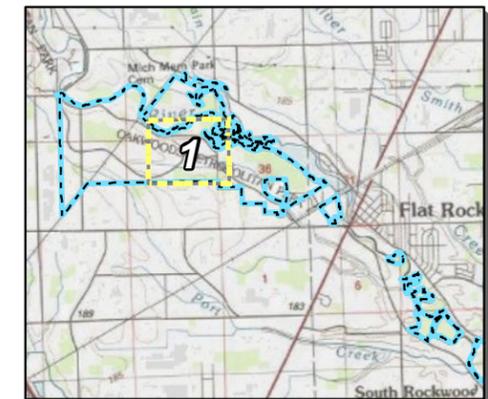
Table 8. Oakwoods Green Infrastructure Recommendations

Site ID	Site	Practice Type	Treatment Surface Area (ft ²)	Cost Opinion	Cost per sq ft of Treatment Area (\$/ft ²)
GI-OAK-01	Nature Center	Naturalized Swale	8,850	\$15,045	\$1.70
GI-OAK-02	Nature Center	Naturalized Swale	17,606	\$29,930	\$1.70
GI-OAK-03	Nature Center	Naturalized Swale	15,740	\$26,758	\$1.70
GI-OAK-04	Nature Center	Native Landscaping	14,000	\$58,800	\$4.20
GI-OAK-05	Nature Center	Native Landscaping	14,500	\$60,900	\$4.20
GI-OAK-06	Nature Center	Naturalized Swale	3,140	\$5,338	\$1.70
GI-OAK-07	Nature Center	Rain Garden	760	\$6,038	\$7.94
GI-OAK-08	Lot NW of Nature Center	Pavement Removal	39,166	\$214,107	\$5.47
GI-OAK-09	Nature Center	Pavement Removal	23,566	\$128,827	\$5.47
Total:			137,328	\$545,743	

Oakwoods Metropark

Green Infrastructure Recommendation Areas

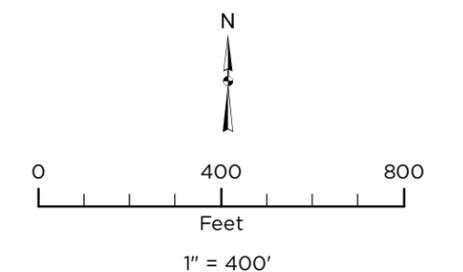
Area: 1 of 1



Recommendation Area

GSI Type

- Native Landscaping (2)
- Naturalized Swale (4)
- Rain Garden (1)
- Pavement Removal (2)
- Stormwater Gravity Main
- Culvert (21)
- HCMA Park Boundary
- Roads



Source: Data provided by OHM Advisors, Huron Clinton Metroparks and Near Map. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 IntlFeet

Map Published: October 1, 2019



Oakwoods Metropark Recommendation Prioritization

Each table in this section is prioritized, with the most urgent projects listed first. Projects with **red** Site IDs need immediate attention. Projects with **green** Site IDs can be accomplished by HCMA staff. **Bold** projects may be eligible for grant funding. Underlined projects may be good volunteer or education opportunities. All other projects will likely require annual budget allocations to complete.

Table 9. Oakwoods Culvert Repair Priorities

Culvert ID	Diameter (in)	Length (ft)	Condition	Maintenance Need	Cost Opinion
CUL-OAK-006	24	44	Failing	Replacement	\$8,789
CUL-OAK-003	42	23	Poor	Replacement	\$7,636
CUL-OAK-022	24	56	Poor	Replacement	\$11,200
CUL-OAK-028	18	54	Poor	Replacement	\$8,100
CUL-OAK-037	18	54	Poor	Replacement	\$8,100
CUL-OAK-011	15	71	Poor	Replacement	\$8,872
CUL-OAK-035	14	54	Poor	Replacement	\$6,750
CUL-OAK-013	15	45	Poor	Replacement	\$5,609
CUL-OAK-039	12	67	Poor	Replacement	\$8,375
CUL-OAK-021	12	9	Poor	Complete Replacement	\$1,559
CUL-OAK-017	48	58	Moderate	Future Cleanout	\$699
CUL-OAK-007	27	60	Fair	Future Cleanout	\$357
CUL-OAK-009	16	20	Moderate	Future Cleanout	\$79
CUL-OAK-005	10	19	Fair	Future Cleanout	\$66
Total:					\$76,191

Table 10. Oakwoods Outfall Repair Priorities

Outfall ID	Diameter (in)	Condition	Maintenance Need	Cost Opinion
SDC-OAK-010	6	Failing	Replacement	\$5,000
SDC-OAK-004	18	Poor	Replacement	\$7,500
Total:				\$12,500

Table 11. Oakwoods Stormwater Gravity Main Repair Priorities

Stormwater Gravity Main ID	Diameter (in)	Length (ft)	Maintenance Need	Cost Opinion
STG-OAK-0003	12	227	Cutting and Grouting	\$6,232
STG-OAK-0002	12	72	Cutting and Grouting	\$1,967
Total:				\$8,199

Table 12. Oakwoods Green Infrastructure Installation Priorities

Site ID	Site	Practice Type	Treatment Surface Area (ft ²)	Cost Opinion	Cost per sq ft of Treatment Area (\$/ft ²)
GI-OAK-07	Nature Center	Rain Garden	760	\$6,038	\$7.94
GI-OAK-02	Nature Center	Naturalized Swale	17,606	\$29,930	\$1.70
GI-OAK-03	Nature Center	Naturalized Swale	15,740	\$26,758	\$1.70
GI-OAK-01	Nature Center	Naturalized Swale	8,850	\$15,045	\$1.70
GI-OAK-06	Nature Center	Naturalized Swale	3,140	\$5,338	\$1.70
GI-OAK-05	Nature Center	Native Landscaping	14,500	\$60,900	\$4.20
GI-OAK-04	Nature Center	Native Landscaping	14,000	\$58,800	\$4.20
GI-OAK-08	Lot NW of Nature Center	Pavement Removal	39,166	\$214,107	\$5.47
GI-OAK-09	Nature Center	Pavement Removal	23,566	\$128,827	\$5.47
Total:			137,328	\$545,743	

Table 13. Oakwoods Stream Stabilization Priorities

Stream Stabilization Site ID	Length (ft)	Erosion Severity	Recommended Treatment	Unit Cost (\$/ft)	Cost Opinion
S3-OAK-003	11,105.11	High	Soil Lifts with Live Stakes	\$678	\$7,530,000
S3-OAK-002	1,799.19	High	Soil Lifts with Live Stakes	\$678	\$1,220,000
S3-OAK-001	3,983.23	High/Moderate	Soil Lifts with Live Stakes	\$678	\$2,701,000
S3-OAK-004	2,280.26	High/Moderate	Soil Lifts with Live Stakes	\$678	\$1,547,000
Total:					\$12,998,000