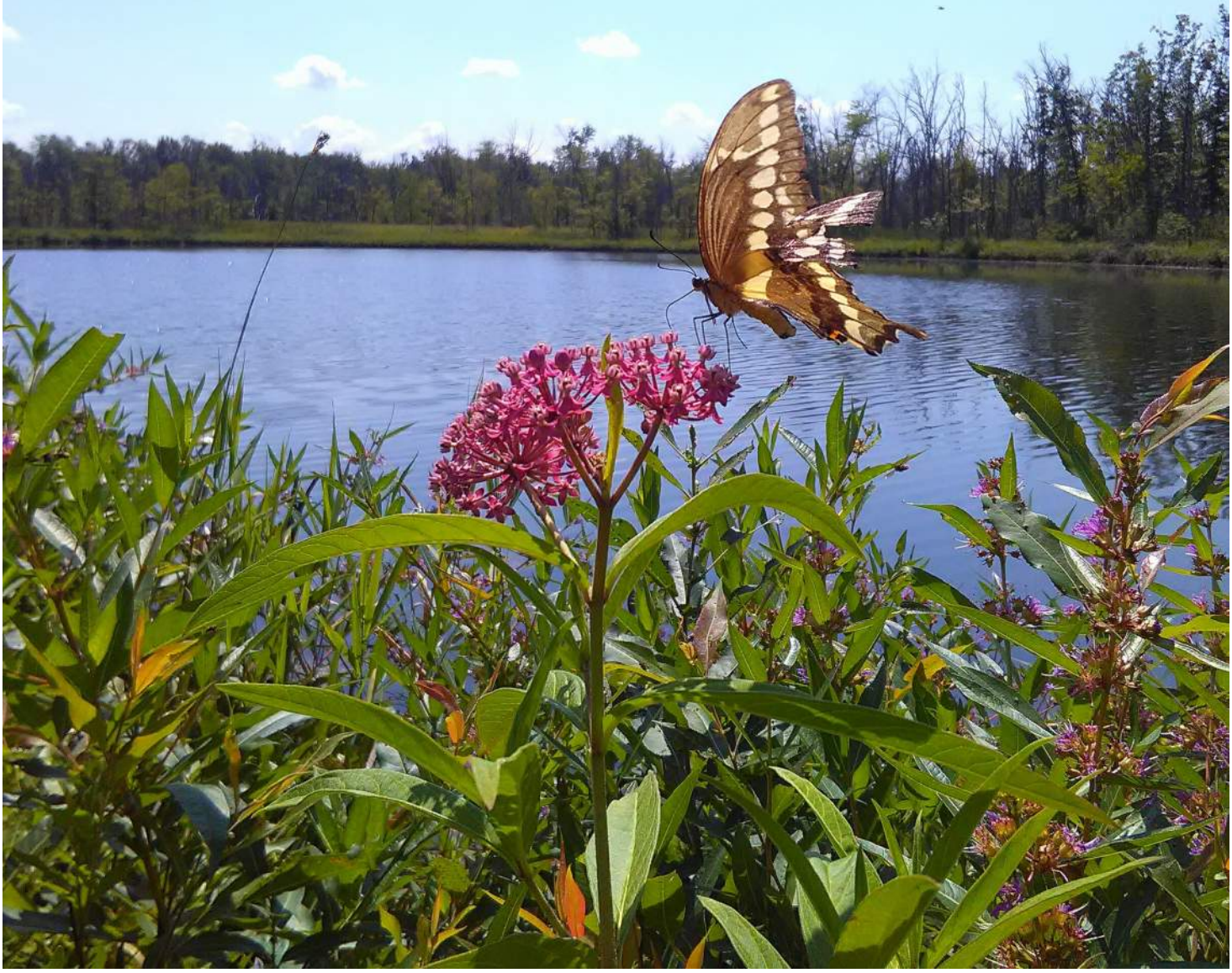
HURON-CLINTON metroparks

Lower Huron Metropark
Stormwater Management Plan

September 2019



Prepared by: OHM Advancing Communities

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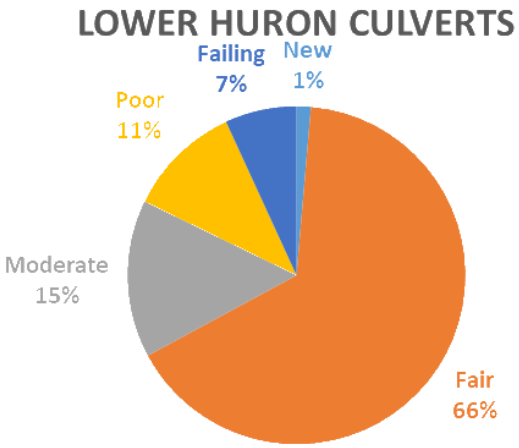
HURON-CLINTON metroparks

Lower Huron Metropark
Stormwater Structure Recommendations

Table 1. Summary of Lower Huron 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	48	3	10	0
Moderate	11	3	1	0
Poor	8	4*	1*	8
Failing	5	1*	0	5
Total:	**73**	**11**	**12**	**13**
Repair Cost:		**$1,111**	**$1,316**	**$76,254**

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



Left: Failing culvert in Lower Huron. 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-LOW-001	30	47	Moderate	Immediate Cleanout	$279
CUL-LOW-006*	16	19	Poor	Replacement	$2,387
CUL-LOW-014	18	36	Fair	Future Cleanout	$146
CUL-LOW-015	18	38	Fair	Immediate Cleanout	$151
CUL-LOW-016	10	15	Fair	Future Cleanout	$53
CUL-LOW-017	12	19	Fair	Future Cleanout	$66
CUL-LOW-018	18	42	Fair	Future Cleanout	$167
CUL-LOW-019	12	19	Fair	Future Cleanout	$67
CUL-LOW-020	12	20	Fair	Future Cleanout	$70
CUL-LOW-031	20	97	Failing	Replacement	$14,549
CUL-LOW-032	20	34	Poor	Replacement	$5,069
CUL-LOW-037*	12	54	Failing	Replacement	$6,775
CUL-LOW-038	36	41	Poor	Replacement	$12,406
CUL-LOW-042*	10	21	Poor	Replacement	$2,097
CUL-LOW-044	12	30	Fair	Immediate Cleanout	$107
CUL-LOW-045	12	40	Fair	Immediate Cleanout	$141
CUL-LOW-046	24	58	Fair	Future Cleanout	$290
CUL-LOW-048	12	50	Fair	Immediate Cleanout	$176
CUL-LOW-050*	12	23	Poor	Replacement	$2,925
CUL-LOW-052	8	16	Fair	Future Cleanout	$55
CUL-LOW-054*	10	25	Poor	Replacement	$2,489
CUL-LOW-059	18	17	Poor	Replacement	$2,508
CUL-LOW-061	16	40	Fair	Future Cleanout	$159
CUL-LOW-062	20	42	Moderate	Immediate Cleanout	$167
CUL-LOW-063*	10	15	Failing	Replacement	$1,450
CUL-LOW-064	10	25	Failing	Replacement	$2,477
CUL-LOW-069	24	53	Moderate	Immediate Cleanout	$266
CUL-LOW-071*	18	60	Poor	Replacement	$9,032
CUL-LOW-072	12	97	Failing	Replacement	$12,090
Total:					**$78,681**

**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-LOW-0001^	24	188	Partial Replacement, Grouting	$18,363
STG-LOW-0002^	24	326	Cutting and Grouting	$23,281
STG-LOW-0003^	24	255	Cutting and Grouting	$18,219
STG-LOW-0004^	24	199	Cutting and Grouting	$14,200
STG-LOW-0007^	12	189	Cutting and Grouting	$5,195
STG-LOW-0010^	15	173	Cutting and Grouting	$6,200
STG-LOW-0011^	18	193	Full Liner	$18,364
STG-LOW-0012^	12	208	Cutting and Grouting	$5,731
STG-LOW-0013^	12	201	Cutting and Grouting	$5,525
STG-LOW-0015^	12	183	Monitor Closely	$0
STG-LOW-0041^	24	146	Cutting and Grouting	$10,418
Total:				**$125,496**

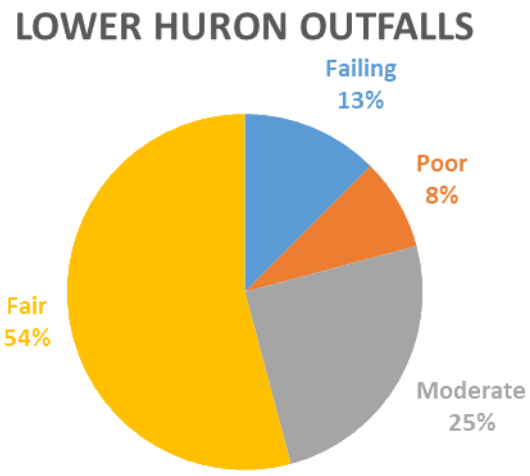
^Televised

Table 4. Summary of Lower Huron Outfall Inspection and Maintenance Needs

Outfall Rating	Number of Outfalls	Outfalls Needing Immediate Cleanout	Outfalls Needing Future Cleanout	Outfalls Needing Replacement or Repair
New	0	0	0	0
Fair	13	0	1	0
Moderate	6	0	1	0
Poor	2	0	0	2
Failing	3	0	1*	3
Total:	**24**	**0**	**2**	**5**
Repair Cost:			**$550**	**$32,500**

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

.



Left: Proportion of outfalls in each condition category. Right: Failing outfall completely falling apart.

Table 5. Individual Outfall Replacement Costs

Outfall ID	Diameter (in)	Condition	Maintenance Need	Cost Opinion
SDC-LOW-012	6	Poor	Replacement	$5,000
SDC-LOW-007	14	Failing	Replacement	$6,250
SDC-LOW-008	15	Failing	Replacement	$6,250
SDC-LOW-004	18	Failing	Replacement	$7,500
SDC-LOW-023	20	Poor	Replacement	$7,500
SDC-LOW-018	12	Moderate	Future Cleanout	$175
SDC-LOW-006	36	Fair	Future Cleanout	$375
Total:				**$33,050**

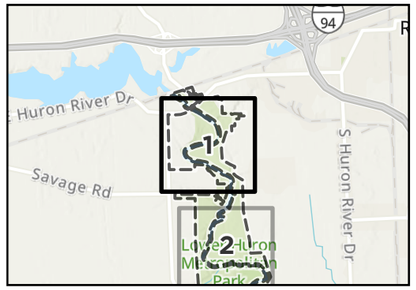
**Outfall may be replaced before it needs to be cleaned out.*

HURON-CLINTON metroparks

Stormwater Structure Ratings

Lower Huron Metropark

Map Sheet: 1 of 48



Outfalls
(Field Rating)
- Failing
- Poor
- Moderate
- Fair
- New

Gravity Main
(Pipe Rating Index)
- 1
- 2
- 3
- 4
- 5

Culverts
(Field Rating)
- Failing
- Poor
- Moderate
- Fair
- New
- (Not Rated)

- Gravity Main (Other)
- Culvert (Other)

Roads
- Roads
- Park Boundary

N

0 400 800
Feet

1″ = 400′

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

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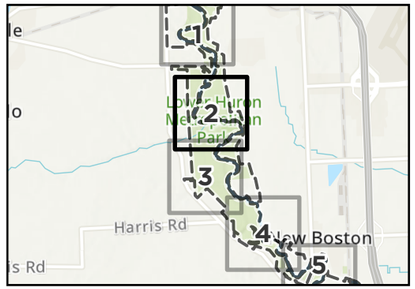
HURON-CLINTON metroparks

Stormwater Structure Ratings

Lower Huron Metropark

Map Sheet: 2 of 48



Outfalls (Field Rating)	Gravity Main (Pipe Rating Index)
Failing	1
Poor	2
Moderate	3
Fair	4
New	5

Culverts (Field Rating)	
Failing	Gravity Main (Other)
Poor	Culvert (Other)
Moderate	**Roads**
Fair	Roads
New	Park Boundary
(Not Rated)	

N

0 400 800

Feet

1" = 400'

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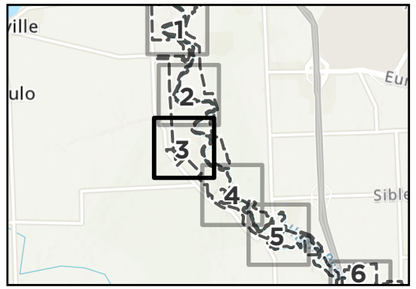
Stormwater Structure Ratings

Lower Huron Metropark

Map Sheet: 3 of 48



Outfalls (Field Rating)
- Failing
- Poor
- Moderate
- Fair
- New

Gravity Main (Pipe Rating Index)
- 1
- 2
- 3
- 4
- 5

Culverts (Field Rating)
- Failing
- Poor
- Moderate
- Fair
- New
- (Not Rated)

- Gravity Main (Other)
- Culvert (Other)

Roads
- Roads
- Park Boundary

N

0 400 800

Feet

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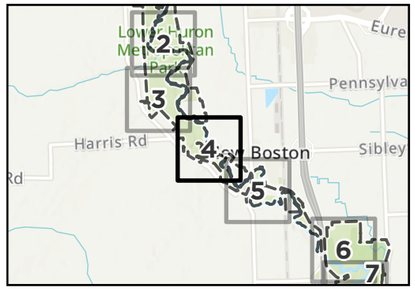
Stormwater Structure Ratings

Lower Huron Metropark

Map Sheet: 4 of 48



Outfalls
(Field Rating)
- Failing
- Poor
- Moderate
- Fair
- New

Gravity Main
(Pipe Rating Index)
- 1
- 2
- 3
- 4
- 5

Culverts
(Field Rating)
- Failing
- Poor
- Moderate
- Fair
- New
- (Not Rated)

- Gravity Main (Other)
- Culvert (Other)

Roads
- Roads
- Park Boundary

N

0 400 800
Feet

1" = 400'

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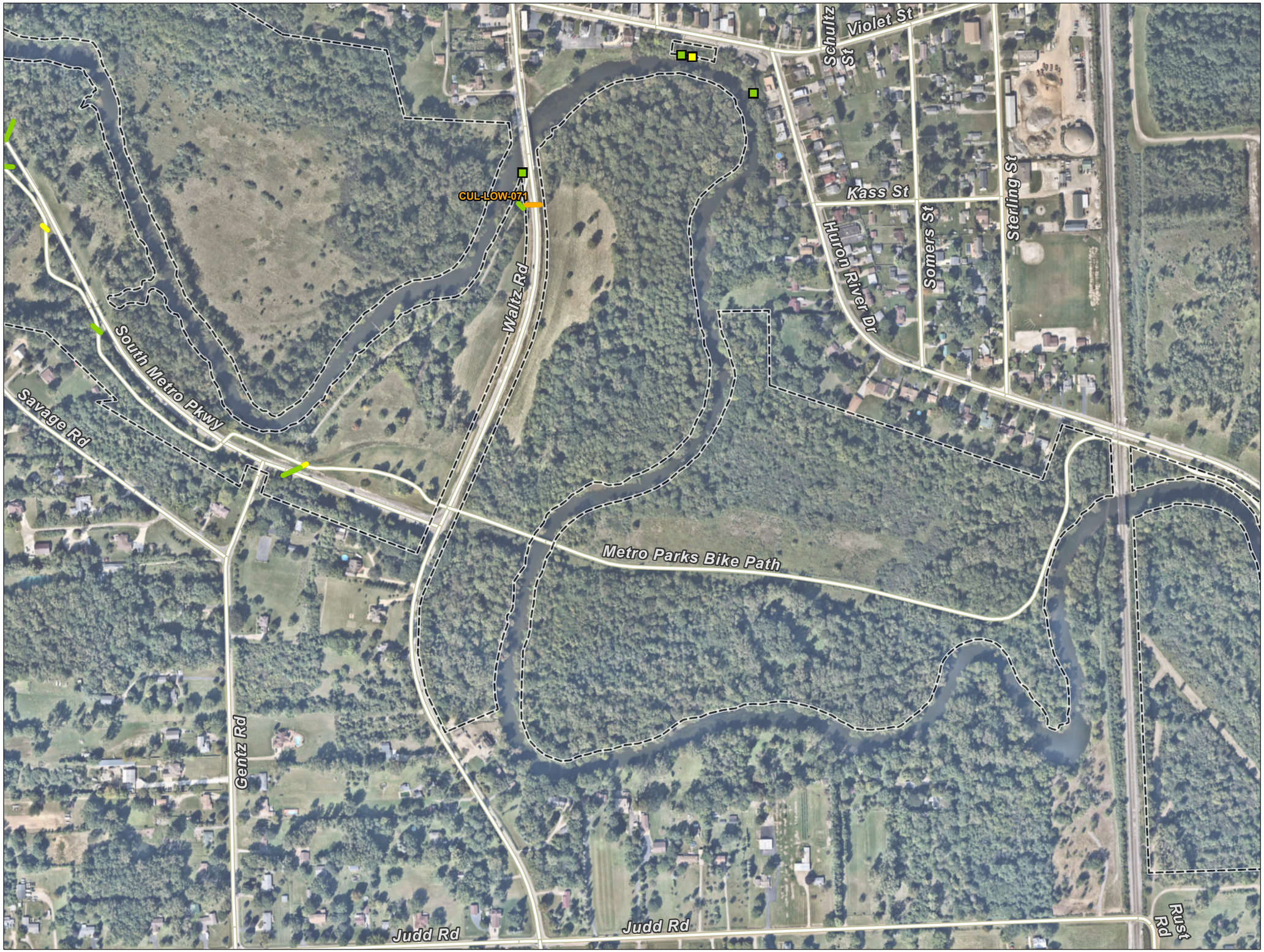
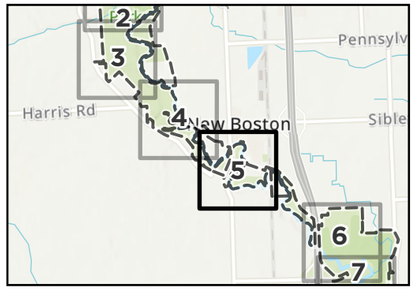


HURON-CLINTON metroparks

Stormwater Structure Ratings

Lower Huron Metropark

Map Sheet: 5 of 48



Outfalls
(Field Rating)
- Failing
- Poor
- Moderate
- Fair
- New

Gravity Main
(Pipe Rating Index)
- 1
- 2
- 3
- 4
- 5

Culverts
(Field Rating)
- Failing
- Poor
- Moderate
- Fair
- New
- (Not Rated)

- Gravity Main (Other)
- Culvert (Other)

Roads
- Roads
- Park Boundary

N

0 400 800
Feet

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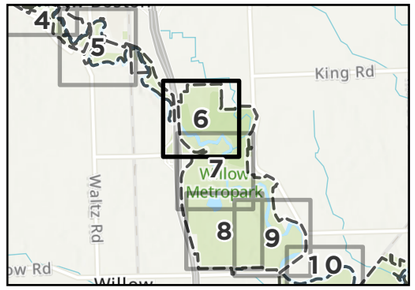
Stormwater Structure Ratings

Lower Huron Metropark

Map Sheet: 6 of 48



Outfalls
(Field Rating)
- Failing
- Poor
- Moderate
- Fair
- New

Gravity Main
(Pipe Rating Index)
- 1
- 2
- 3
- 4
- 5

Culverts
(Field Rating)
- Failing
- Poor
- Moderate
- Fair
- New
- (Not Rated)

- Gravity Main (Other)
- Culvert (Other)

Roads
- Roads
- Park Boundary

N

0 400 800
Feet

1" = 400'

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Map Published: October 23, 2019

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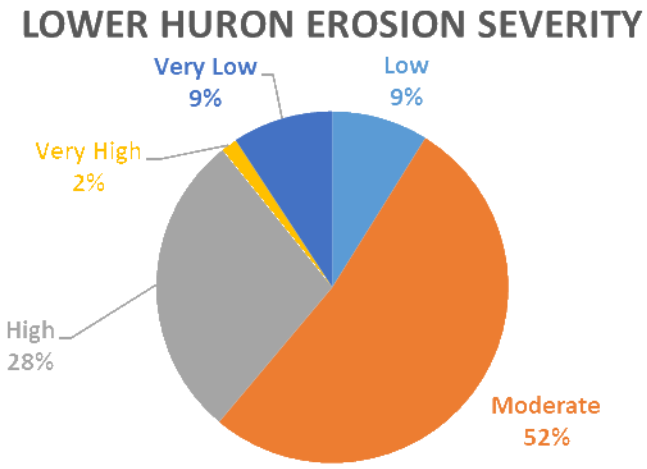
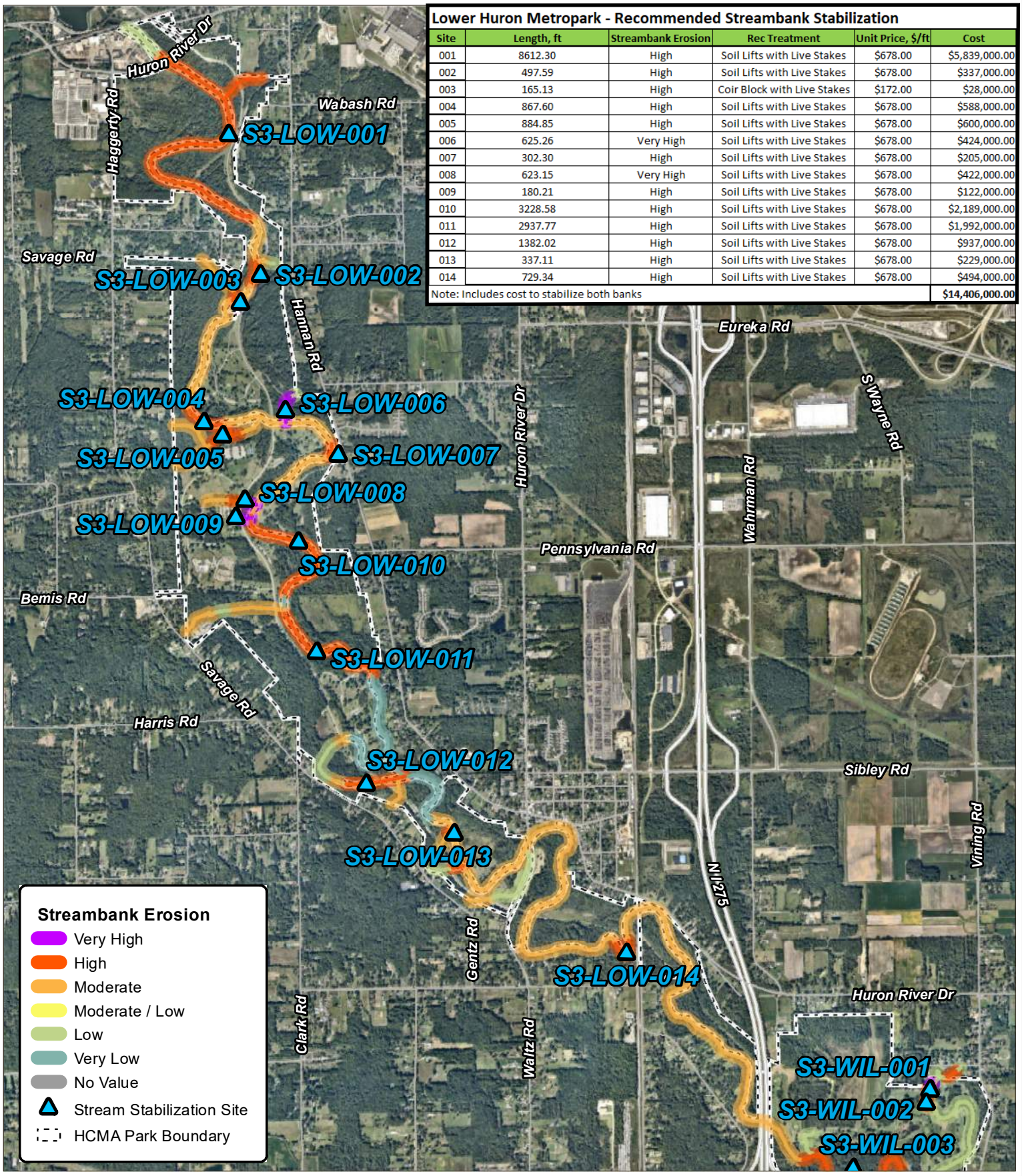
Lower Huron Metropark
Streambank Summary and Recommendations

Table 6. Lower Huron Erosion Severity Summary

Erosion Condition	Feet of Streambank (miles)	Cost of Restoration
Very High	1,069 (0.20)	$846,000
High	20,304 (3.85)	$13,560,000
Moderate	37,660 (7.13)	
Low	6,388 (1.21)	
Very Low	6,661 (1.26)	
Total:	**72,082 (13.65)**	**$14,406,000**



Left: Proportion of stream in each erosion category. Right: High erosion damaging Lower Huron Metropark culvert.



Lower Huron Metropark - Recommended Streambank Stabilization

Site	Length, ft	Streambank Erosion	Rec Treatment	Unit Price, $/ft	Cost
001	8612.30	High	Soil Lifts with Live Stakes	$678.00	$5,839,000.00
002	497.59	High	Soil Lifts with Live Stakes	$678.00	$337,000.00
003	165.13	High	Coir Block with Live Stakes	$172.00	$28,000.00
004	867.60	High	Soil Lifts with Live Stakes	$678.00	$588,000.00
005	884.85	High	Soil Lifts with Live Stakes	$678.00	$600,000.00
006	625.26	Very High	Soil Lifts with Live Stakes	$678.00	$424,000.00
007	302.30	High	Soil Lifts with Live Stakes	$678.00	$205,000.00
008	623.15	Very High	Soil Lifts with Live Stakes	$678.00	$422,000.00
009	180.21	High	Soil Lifts with Live Stakes	$678.00	$122,000.00
010	3228.58	High	Soil Lifts with Live Stakes	$678.00	$2,189,000.00
011	2937.77	High	Soil Lifts with Live Stakes	$678.00	$1,992,000.00
012	1382.02	High	Soil Lifts with Live Stakes	$678.00	$937,000.00
013	337.11	High	Soil Lifts with Live Stakes	$678.00	$229,000.00
014	729.34	High	Soil Lifts with Live Stakes	$678.00	$494,000.00
Note: Includes cost to stabilize both banks					**$14,406,000.00**

Lower Huron Metropark
Streambank Stabilization Siting

HURON-CLINTON metroparks

N

0 2,000 4,000

Feet

1" = 3,000'

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.

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Map Published: September 25, 2019

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P:\0601_0999\0659180010_HCMA_SAW_Grant_2018_GIS\ArcLayouts\Report_Maps\Recommendation_Maps\01_LowerHuron\Lower Huron Stream Stabilization.mxd

S3-LOW-001

Length: 8,612.30 ft
Recommended Treatment: Soil Lifts with Live Stakes
Construction Cost: $5,839,000

S3-LOW-001

Streambank Erosion

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

Huron R

Northline Rd

Wabash Rd

S3-LOW-001

South Metro Pkwy

Hannan Rd

Ross Pl

Metro Parks Bike Path

Superior Ave

Lower Huron Metropark Streambank Stabilization Siting

HURON-CLINTON metroparks

N

0 500 1,000

Feet

1" = 500'

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S3-LOW-002

Length: 497.59 ft
Recommended Treatment: Soil Lifts with Live Stakes
Construction Cost: $337,000

S3-LOW-002 & 003

Streambank Erosion

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

Metro Parks Bike Path

Wade Ave

Hannan Rd

S3-LOW-002

S3-LOW-003

South Metro Pkwy

Tulliptree Rd

S3-LOW-003

Length: 165.13 ft
Recommended Treatment: Coir Block with Live Stakes
Construction Cost: $28,000

Lower Huron Metropark
Streambank Stabilization Siting

HURON-CLINTON metroparks

N

0 500 1,000

Feet

1" = 500'

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S3-LOW-004

Length: 867.60 ft
Recommended Treatment: Soil Lifts with Live Stakes
Construction Cost: $588,000

S3-LOW-004 & 005

Streambank Erosion

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

Metro Pa...
Tuliptree Rd
...p Dr
S3-LOW-006
S3-LOW-004
S3-LOW-005
South Metro Pkwy
Woods Creek Rd
Haggerty Rd
Riggs Rd
...wthorn
...glade Rd
Ellwoods Rd
S3-LOW-009

S3-LOW-005

Length: 884.85 ft
Recommended Treatment: Soil Lifts with Live Stakes
Construction Cost: $600,000

Lower Huron Metropark
Streambank Stabilization Siting

HURON-CLINTON metroparks

N

0 500 1,000

Feet

1" = 500'

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S3-LOW-006

Length: 625.26 ft
Recommended Treatment: Soil Lifts with Live Stakes
Construction Cost: $424,000

S3-LOW-006 & 007

Streambank Erosion

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

Barth Rd
Tuliptree Rd
South Metro Pkwy
Hannan Rd
Ancaster
Oster
Camp Dr
Valley View Dr
S3-LOW-006
S3-LOW-007
South Metro Pkwy
Hawthorn Glade Rd
S3-LOW-008

S3-LOW-007

Length: 302.30 ft
Recommended Treatment: Soil Lifts with Live Stakes
Construction Cost: $205,000

Lower Huron Metropark Streambank Stabilization Siting

HURON-CLINTON metroparks

N

0 500 1,000

Feet

1" = 500'

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S3-LOW-008 CRITICAL

Length: 623.15 ft
Recommended Treatment: Soil Lifts with Live Stakes
Construction Cost: $422,000

S3-LOW-008

Streambank Erosion

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

S3-LOW-005
S3-LOW-008
S3-LOW-009
S3-LOW-010
Hawthorn Glade Rd
Camp Dr
Ellwoods Rd
Sycamore Bend Rd
South Metro Pkwy
Fox Woods Rd

INFRASTRUCTURE IMPACTED BY VERY HIGH EROSION INDICATES CRITICAL CONDITON

Lower Huron Metropark Streambank Stabilization Siting

HURON-CLINTON metroparks

N

0 500 1,000

Feet

1" = 500'

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S3-LOW-009

Length: 180.21 ft
Recommended Treatment: Soil Lifts with Live Stakes
Construction Cost: $122,000

S3-LOW-010

Length: 3228.58 ft
Recommended Treatment: Soil Lifts with Live Stakes
Construction Cost: $2,189,000

S3-LOW-009 & 010

Streambank Erosion

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

S3-LOW-005
Woods Creek Rd
Metro Parks Bike Path
South Metro Pkwy
Hawthorn Glade Rd
S3-LOW-008
Camp Dr
S3-LOW-009
Ellwo
S3-LOW-010
Sycamore Bend Rd
South Metro Pkwy
Fox Woods Rd
Haggert

Lower Huron Metropark Streambank Stabilization Siting

HURON-CLINTON metroparks

N

0 500 1,000

Feet

1" = 500'

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.

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S3-LOW-011

Length: 2937.77 ft
Recommended Treatment: Soil Lifts with Live Stakes
Construction Cost: $1,992,000

S3-LOW-011

Streambank Erosion

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

Fox Woods Rd
South Metro Pkwy
S3-LOW-011
Metro Parks Bike Path
East Bend Rd
South Metro Pkwy
Savage Rd

Lower Huron Metropark Streambank Stabilization Siting

HURON-CLINTON metroparks

N

0 500 1,000

Feet

1" = 500'

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Map Published: September 25, 2019

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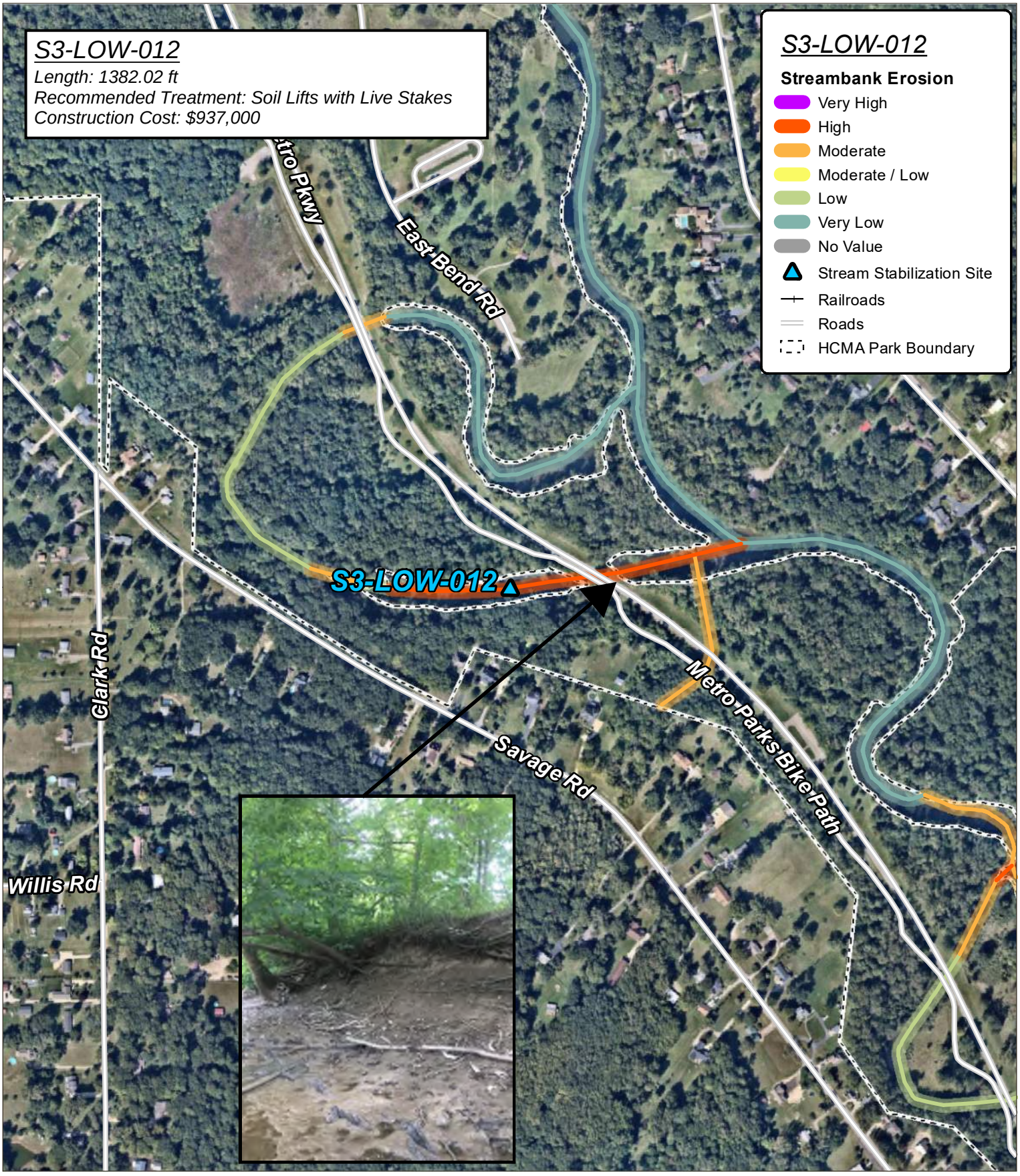
S3-LOW-012

Length: 1382.02 ft
Recommended Treatment: Soil Lifts with Live Stakes
Construction Cost: $937,000



S3-LOW-012

Streambank Erosion

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

Lower Huron Metropark Streambank Stabilization Siting

HURON-CLINTON metroparks

N

0 500 1,000

Feet

1" = 500'

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Map Published: September 25, 2019

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S3-LOW-013

Length: 337.11 ft
Recommended Treatment: Soil Lifts with Live Stakes
Construction Cost: $229,000

S3-LOW-013

Streambank Erosion

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

Hannan Rd
Evans St
Metro Parks Bike Path
S3-LOW-013
Savage Rd
South Metro Pkwy
Waltz Rd
Gentz Rd

Lower Huron Metropark Streambank Stabilization Siting

HURON-CLINTON metroparks

N

0 500 1,000

Feet

1" = 500'

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

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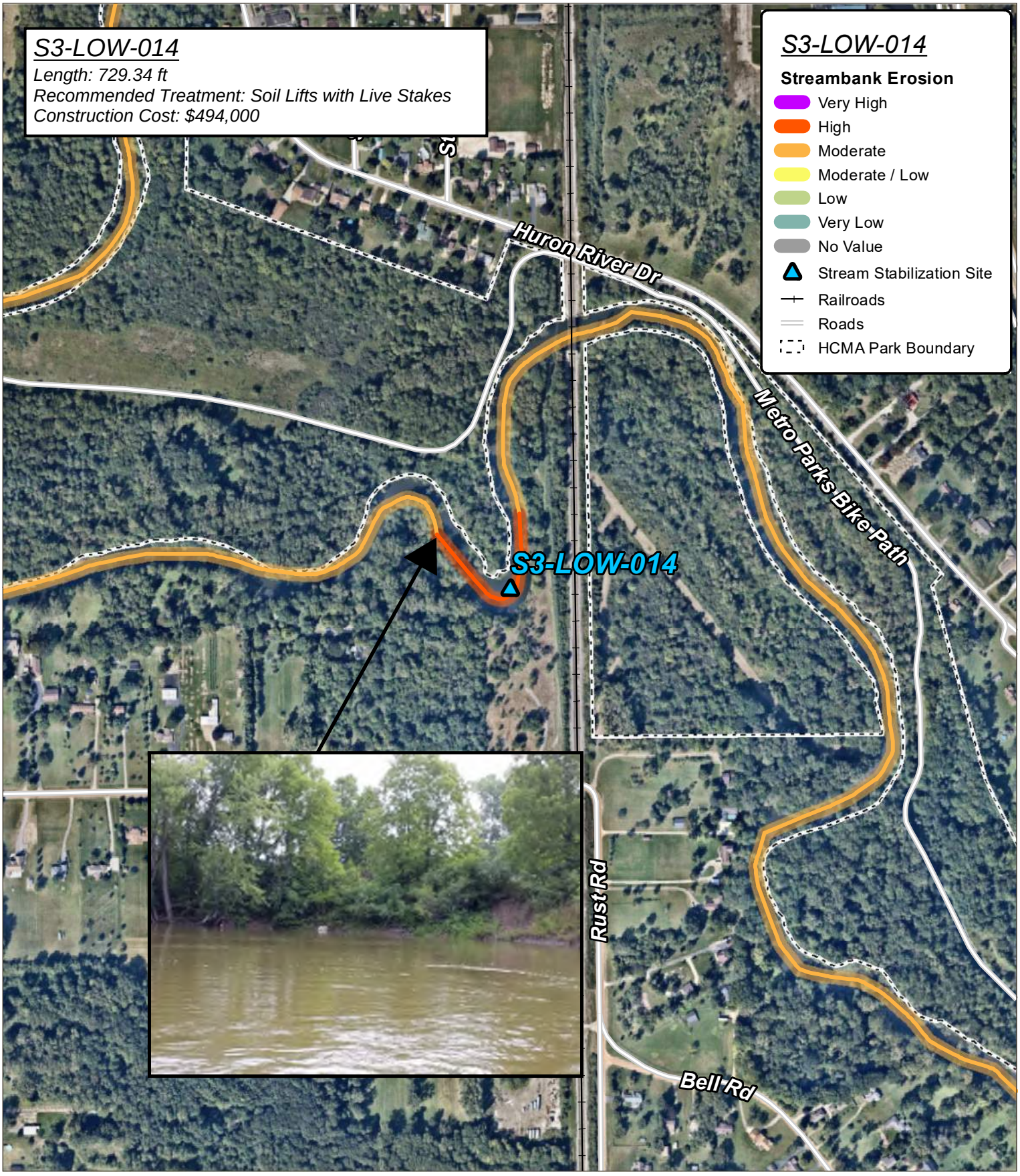
S3-LOW-014

Length: 729.34 ft
Recommended Treatment: Soil Lifts with Live Stakes
Construction Cost: $494,000



Lower Huron Metropark Streambank Stabilization Siting

HURON-CLINTON metroparks

N

0 500 1,000

Feet

1" = 500'

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

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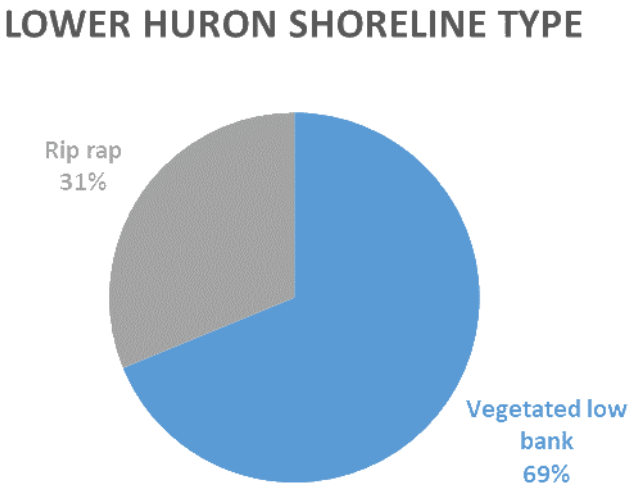
Lower Huron Metropark
Shoreline Summary and Recommendations

Minor slumping in Lower Huron Metropark.

Table 7. Shoreline Inspection Summary

Erosion Condition	Length of Shoreline (ft)
Major	0.0
Minor	1,813.1
None	2,297.4
Total:	**4,110.5**
Restoration Cost:	**$0**

The shoreline in Lower Huron is composed of several small lakes and ponds. No restoration activity is recommended at this time.



Proportion of each shoreline type present in Lower Huron Metropark.

HURON-CLINTON metroparks

Lower Huron Metropark
Green Infrastructure Recommendations

In Lower Huron, 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. Lower Huron 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-LOW-01	South Entrance	Stormwater Treatment Wetland	58,018	$638,205	$11.00
GI-LOW-02	Shelter J	No Mow	7,029	$0.00	$0.00
GI-LOW-03	Shelter J	Naturalized Swale	714	$1,214	$1.70
GI-LOW-04	Shelter I	Naturalized Swale	3,980	$6,765	$1.70
GI-LOW-05	Shelter I	Naturalized Swale	19,624	$33,362	$1.70
GI-LOW-06	Aquatic	Naturalized Swale	1,246	$2,118	$1.70
GI-LOW-07	Shelter G	Naturalized Swale	13,815	$23,486	$1.70
GI-LOW-08	Shelter G	Native Prairie	134,760	$157,221	$1.17
GI-LOW-09	Shelter G	Naturalized Swale	11,448	$19,461	$1.70
GI-LOW-10	Shelter G	Bioswale	4,691	$37,267	$7.94
GI-LOW-11	Shelter G	Bioswale	4,589	$36,454	$7.94
GI-LOW-12	Shelter C	Naturalized Swale	2,513	$4,272	$1.70
GI-LOW-13	Shelter C	Naturalized Swale	3,037	$5,163	$1.70
GI-LOW-14	Shelter C	Pavement Removal	134,189	$696,174	$5.19
GI-LOW-15	Shelter C	No Mow	94,825	$0.00	$0.00

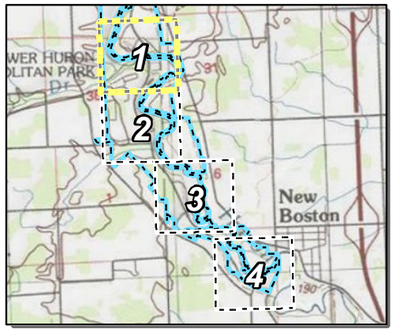
Site ID	Site	Practice Type	Treatment Surface Area (ft^2)	Cost Opinion	Cost per sq ft of Treatment Area ($/ft^2$)
GI-LOW-16	Walnut Grove Camp	Naturalized Swale	10,046	$17,078	$1.70
GI-LOW-17	Walnut Grove Camp	No Mow	29,329	$0.00	$0.00
GI-LOW-18	Walnut Grove Camp	Naturalized Swale	1,489	$2,532	$1.70
GI-LOW-19	Shelter J	Native Prairie	29,970	$34,965	$1.17
GI-LOW-20	Shelter J	Pavement Removal	37,769	$225,859	$5.98
GI-LOW-21	Shelter J	Pavement Removal	23,204	$162,946	$7.02
GI-LOW-22	Shelter J	Pavement Removal	8,495	$59,656	$7.02
GI-LOW-23	Shelter J	Pavement Removal	17,471	$122,687	$7.02
GI-LOW-24	Shelter J	Pavement Removal	4,907	$34,457	$7.02
GI-LOW-25	Shelter J	Pavement Removal	9,727	$68,303	$7.02
GI-LOW-26	Walnut Grove Camp	Pavement Removal	6,581	$35,974	$5.47
GI-LOW-27	Walnut Grove Camp	Pavement Removal	21,063	$147,907	$7.02
Total:			**694,529**	**$2,573,526**	

HURON-CLINTON metroparks

Lower Huron Metropark

Green Infrastructure Recommendation Areas

Area: 1 of 4



Recommendation Area

GSI Type

- Native Praire (1)
- No-Mow (2)
- Naturalized Swale (5)
- Pavement Removal (3)
- Stormwater Gravity Main
- Culvert (24)
- HCMA Park Boundary
- Roads

N

0 400 800

Feet

1" = 400'

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Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 IntlFeet

Map Published: October 1, 2019

OHM

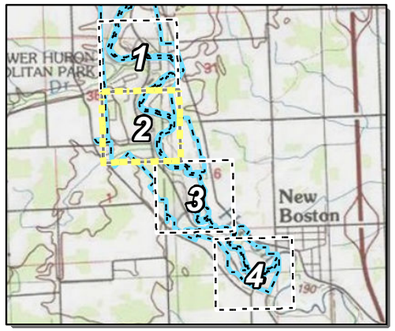
P:\0601.0999\065918001O_HCMA_SAW_Grant_2018_GIS\ArcLayouts\Report_Maps\Recommendation_Maps\01_LowerHuron\Lower Huron Green Infrastructure Landscape_11x17_v2.mxd

HURON-CLINTON metroparks

Lower Huron Metropark

Green Infrastructure Recommendation Areas

Area: 2 of 4



Recommendation Area GSI Type

- Bioswale (2)
- Native Praire (1)
- Naturalized Swale (4)
- Stormwater Gravity Main
- Culvert (37)
- HCMA Park Boundary
- Roads

N

0 400 800

Feet

1" = 400'

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Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 IntlFeet

Map Published: October 1, 2019

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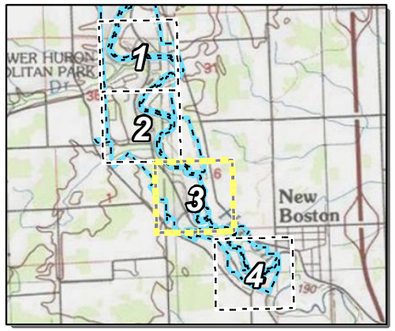
HURON-CLINTON metroparks

Lower Huron Metropark

Green Infrastructure Recommendation Areas

Area: 3 of 4



Recommendation Area

GSI Type

- Native Praire (1)
- No-Mow (1)
- Naturalized Swale (1)
- Porous Pavement (1)
- Pavement Removal (5)
- Stormwater Gravity Main
- Culvert (10)
- HCMA Park Boundary
- Roads

N

0 400 800

Feet

1" = 400'

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Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 IntlFeet

Map Published: October 1, 2019

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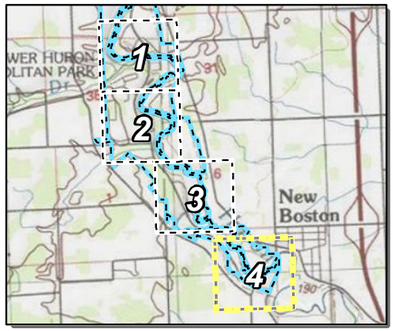
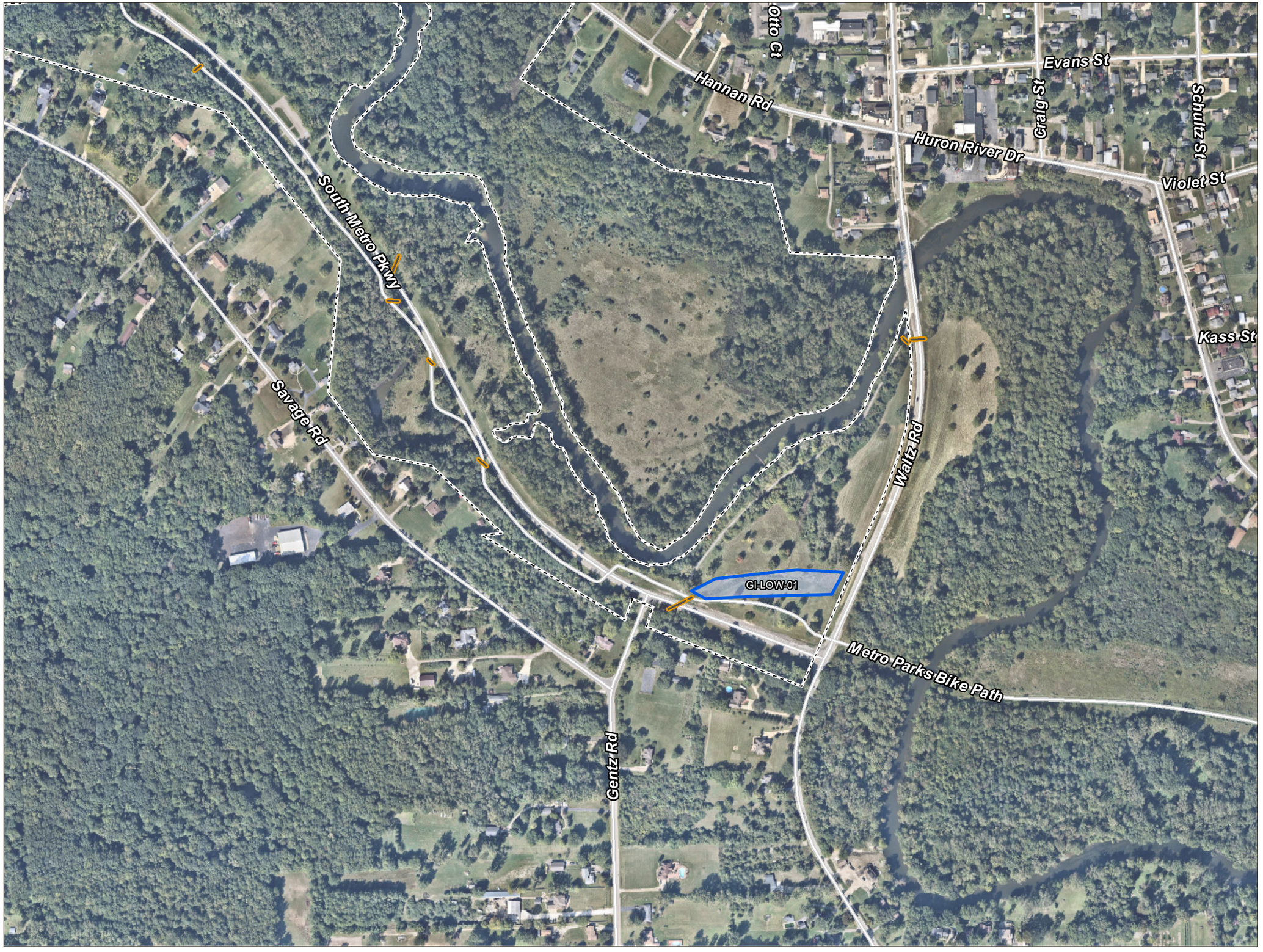
HURON-CLINTON metroparks

Lower Huron Metropark

Green Infrastructure Recommendation Areas

Area: 4 of 4





Recommendation Area

GSI Type

- Stormwater Treatment Wetland (1)
- Stormwater Gravity Main
- Culvert (8)
- HCMA Park Boundary
- Roads

N

0 400 800

Feet

1" = 400'

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Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 IntlFeet

Map Published: October 1, 2019

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Lower Huron Oil & Grit Separator

Background

Oil/grit separators are underground storage tanks designed to remove heavy particulates, floating debris and hydrocarbons from stormwater. These structures play an important role in reducing pollutants and sediments from outfalls and in turn improving water quality. However for these structures to perform properly a maintenance program and maintenance log should be developed to ensure their longevity and performance.

Methodology

Background documents were obtained from the manufacturer for each structure model and reviewed for maintenance and component specifications. Onsite inspections were conducted where video and images were taken of the structures as well as any inlet and outlet if accessible. Water depth, and sediment depth measurements were taken and structure condition was evaluated during the surface inspection.

Structure Findings

Sediment Chamber

Structure: Hancor 4840	Top Riser/ Chamber Floor	Top of Riser/ Top of Water	Top of Riser/ Top of Sediment	Sediment Depth	Sediment Removal Depth
Sediment Chamber	10.00’	7.50’	9.20’	9.60”	12.00”
Oil Chamber	9.50’	7.00’	8.90’	7.2”	12”

Condition

Inlet	Outlet	Weir	Chamber
Sound	Sound	Sound	Sound

Maintenance

Sediments and associated pollutants are removed only when inlets or sumps are cleaned out, this makes regular maintenance essential. The more frequent the cleaning, the less likely sediments will be re-suspended and subsequently discharged to nearby waterbodies. In addition, frequent cleaning also makes more volume available for future storms and enhances overall performance. Cleaning includes removal of accumulated oil and grease and sediment using a vactor truck or other ordinary catch basin cleaning device. In areas of high sediment loading, inspect and clean inlets after every major storm. At a minimum, inspect oil grit separator quarterly, and vactor out the structure when sediment reaches 12” in depth or 20% of the sediment chamber volume. Polluted water or sediments removed from an oil grit separator should be disposed of in accordance with all applicable local, state and federal laws and regulations. A maintenance log should be kept to record all inspection and maintenance duties.

Maintenance	Frequency
Visual Inspection of Inlets	Quarterly and After Major Storm Events 1”+
Sediment Removal	When Sediment Depth Reaches 12” or 20% of Chamber Vol.
Oil/Floatable Removal	Coincides with Sediment Removal

Lower Huron 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. Lower Huron Culvert Repair Priorities

Culvert ID	Diameter (in)	Length (ft)	Condition	Maintenance Need	Cost Opinion
CUL-LOW-031	20	97	Failing	Replacement	$14,549
CUL-LOW-072	12	97	Failing	Replacement	$12,090
CUL-LOW-037	12	54	Failing	Replacement	$6,775
CUL-LOW-064	10	25	Failing	Replacement	$2,477
CUL-LOW-063	10	15	Failing	Replacement	$1,450
CUL-LOW-038	36	41	Poor	Replacement	$12,406
CUL-LOW-071	18	60	Poor	Replacement	$9,032
CUL-LOW-032	20	34	Poor	Replacement	$5,069
CUL-LOW-059	18	17	Poor	Replacement	$2,508
CUL-LOW-006	16	19	Poor	Replacement	$2,387
CUL-LOW-050	12	23	Poor	Replacement	$2,925
CUL-LOW-054	10	25	Poor	Replacement	$2,489
CUL-LOW-042	10	21	Poor	Replacement	$2,097
CUL-LOW-069	24	53	Moderate	Immediate Cleanout	$266
CUL-LOW-046	24	58	Fair	Future Cleanout	$290
CUL-LOW-001	30	47	Moderate	Immediate Cleanout	$279
CUL-LOW-062	20	42	Moderate	Immediate Cleanout	$167
CUL-LOW-015	18	38	Fair	Immediate Cleanout	$151
CUL-LOW-048	12	50	Fair	Immediate Cleanout	$176
CUL-LOW-045	12	40	Fair	Immediate Cleanout	$141
CUL-LOW-044	12	30	Fair	Immediate Cleanout	$107
CUL-LOW-018	18	42	Fair	Future Cleanout	$167
CUL-LOW-014	18	36	Fair	Future Cleanout	$146
CUL-LOW-061	16	40	Fair	Future Cleanout	$159
CUL-LOW-020	12	20	Fair	Future Cleanout	$70
CUL-LOW-017	12	19	Fair	Future Cleanout	$66
CUL-LOW-019	12	19	Fair	Future Cleanout	$67
CUL-LOW-016	10	15	Fair	Future Cleanout	$53
CUL-LOW-052	8	16	Fair	Future Cleanout	$55
Total:					**$78,681**

Table 10. Lower Huron Culvert Repair Priorities

Outfall ID	Diameter (in)	Condition	Maintenance Need	Cost Opinion
SDC-LOW-004	18	Failing	Replacement	$7,500
SDC-LOW-008	15	Failing	Replacement	$6,250
SDC-LOW-007	14	Failing	Replacement	$6,250
SDC-LOW-023	20	Poor	Replacement	$7,500
SDC-LOW-012	6	Poor	Replacement	$5,000
SDC-LOW-018	12	Moderate	Future Cleanout	$175
SDC-LOW-006	36	Fair	Future Cleanout	$375
Total:				**$33,050**

Table 11. Lower Huron Culvert Repair Priorities

Stormwater Gravity Main ID	Diameter (in)	Length (ft)	Maintenance Need	Cost Opinion
STG-LOW-0011	18	193	Full Liner	$18,364
STG-LOW-0001	24	188	Partial Replacement, Grouting	$18,363
STG-LOW-0002	24	326	Cutting and Grouting	$23,281
STG-LOW-0003	24	255	Cutting and Grouting	$18,219
STG-LOW-0004	24	199	Cutting and Grouting	$14,200
STG-LOW-0041	24	146	Cutting and Grouting	$10,418
STG-LOW-0010	15	173	Cutting and Grouting	$6,200
STG-LOW-0012	12	208	Cutting and Grouting	$5,731
STG-LOW-0013	12	201	Cutting and Grouting	$5,525
STG-LOW-0007	12	189	Cutting and Grouting	$5,195
STG-LOW-0015	12	183	Monitor Closely	$0
Total:				**$125,496**

Table 12. Lower Huron Culvert Repair Priorities

Site ID	Site	Practice Type	Treatment Surface Area (ft^2)	Cost Opinion	Cost per sq ft of Treatment Area ($/ft^2$)
GI-LOW-18	Walnut Grove Camp	Naturalized Swale	1,489	$2,532	$1.70
GI-LOW-06	Aquatic	Naturalized Swale	1,246	$2,118	$1.70
GI-LOW-03	Shelter J	Naturalized Swale	714	$1,214	$1.70
GI-LOW-15	Shelter C	No Mow	94,825	$0.00	$0.00

Site ID	Site	Practice Type	Treatment Surface Area (ft^2)	Cost Opinion	Cost per sq ft of Treatment Area ($/ft^2$)
GI-LOW-17	Walnut Grove Camp	No Mow	29,329	$0.00	$0.00
GI-LOW-02	Shelter J	No Mow	7,029	$0.00	$0.00
GI-LOW-08	Shelter G	Native Prairie	134,760	$157,221	$1.17
GI-LOW-19	Shelter J	Native Prairie	29,970	$34,965	$1.17
GI-LOW-05	Shelter I	Naturalized Swale	19,624	$33,362	$1.70
GI-LOW-07	Shelter G	Naturalized Swale	13,815	$23,486	$1.70
GI-LOW-09	Shelter G	Naturalized Swale	11,448	$19,461	$1.70
GI-LOW-16	Walnut Grove Camp	Naturalized Swale	10,046	$17,078	$1.70
GI-LOW-04	Shelter I	Naturalized Swale	3,980	$6,765	$1.70
GI-LOW-13	Shelter C	Naturalized Swale	3,037	$5,163	$1.70
GI-LOW-12	Shelter C	Naturalized Swale	2,513	$4,272	$1.70
GI-LOW-10	Shelter G	Bioswale	4,691	$37,267	$7.94
GI-LOW-11	Shelter G	Bioswale	4,589	$36,454	$7.94
GI-LOW-14	Shelter C	Pavement Removal	134,189	$696,174	$5.19
GI-LOW-20	Shelter J	Pavement Removal	37,769	$225,859	$5.98
GI-LOW-21	Shelter J	Pavement Removal	23,204	$162,946	$7.02
GI-LOW-27	Walnut Grove Camp	Pavement Removal	21,063	$147,907	$7.02
GI-LOW-23	Shelter J	Pavement Removal	17,471	$122,687	$7.02
GI-LOW-25	Shelter J	Pavement Removal	9,727	$68,303	$7.02
GI-LOW-22	Shelter J	Pavement Removal	8,495	$59,656	$7.02

Site ID	Site	Practice Type	Treatment Surface Area (ft^2)	Cost Opinion	Cost per sq ft of Treatment Area ($/ft^2$)
GI-LOW-26	Walnut Grove Camp	Pavement Removal	6,581	$35,974	$5.47
GI-LOW-24	Shelter J	Pavement Removal	4,907	$34,457	$7.02
GI-LOW-01	South Entrance	Stormwater Treatment Wetland	58,018	$638,205	$11.00
Total:			694,529	$2,573,526	

Table 13. Lower Huron Culvert Repair Priorities

Stream Stabilization Site ID	Length (ft)	Erosion Severity	Recommended Treatment	Unit Cost ($/ft)	Cost Opinion
S3-LOW-003	165.13	High	Coir Block with Live Stakes	$172	$28,000
S3-LOW-006	625.26	Very High	Soil Lifts with Live Stakes	$678	$424,000
S3-LOW-008	623.15	Very High	Soil Lifts with Live Stakes	$678	$422,000
S3-LOW-001	8,612.30	High	Soil Lifts with Live Stakes	$678	$5,839,000
S3-LOW-010	3,228.77	High	Soil Lifts with Live Stakes	$678	$2,189,000
S3-LOW-011	2,937.77	High	Soil Lifts with Live Stakes	$678	$1,992,000
S3-LOW-012	1,382.02	High	Soil Lifts with Live Stakes	$678	$937,000
S3-LOW-005	884.85	High	Soil Lifts with Live Stakes	$678	$600,000
S3-LOW-004	867.60	High	Soil Lifts with Live Stakes	$678	$588,000
S3-LOW-014	729.34	High	Soil Lifts with Live Stakes	$678	$494,000
S3-LOW-002	497.59	High	Soil Lifts with Live Stakes	$678	$337,000
S3-LOW-013	337.11	High	Soil Lifts with Live Stakes	$678	$229,000
S3-LOW-007	302.30	High	Soil Lifts with Live Stakes	$678	$205,000
S3-LOW-009	180.21	High	Soil Lifts with Live Stakes	$678	$122,000
Total:					