



HURON-CLINTON
metroparks

Lake St. Clair Metropark
Stormwater Management Plan

September 2019



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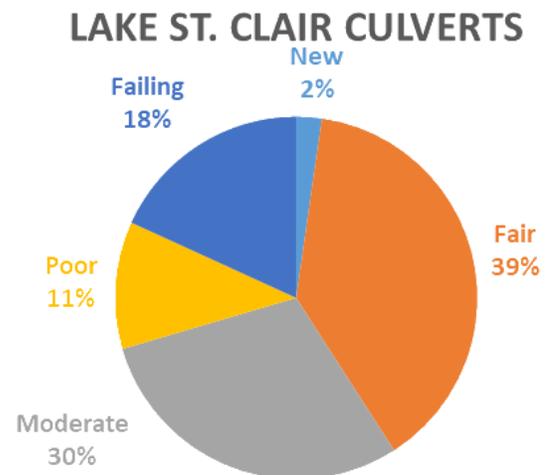
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Lake St. Clair Metropark Stormwater Structure Recommendations

Table 1. Summary of Lake St. Clair 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	17	0	2	0
Moderate	13	0	5	0
Poor	5	3*	1*	5
Failing	8	3*	0	8
Total:	44	6*	8*	13
Repair Cost:		\$0	\$1,147	\$79,912

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



Left: Failing culvert in Lake St. Clair Metropark. 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-LSC-001	12	37	Moderate	Future Cleanout	\$129
CUL-LSC-002*	18	50	Failing	Replacement	\$7,425
CUL-LSC-004	18	19	Moderate	Future Cleanout	\$75
CUL-LSC-007	24	24	Fair	Future Cleanout	\$118
CUL-LSC-008	24	64	Moderate	Future Cleanout	\$322
CUL-LSC-009*	18	55	Failing	Replacement	\$8,260

Culvert ID	Diameter (in)	Length (ft)	Condition	Maintenance Need	Cost Opinion
CUL-LSC-010*	18	49	Poor	Replacement	\$7,295
CUL-LSC-011	18	48	Moderate	Future Cleanout	\$193
CUL-LSC-013	16	55	Failing	Replacement	\$6,926
CUL-LSC-014	10	12	Failing	Replacement	\$1,244
CUL-LSC-015	10	22	Failing	Replacement	\$2,212
CUL-LSC-027*	12	37	Poor	Replacement	\$4,675
CUL-LSC-028*	12	50	Poor	Replacement	\$6,203
CUL-LSC-029*	20	70	Failing	Replacement	\$10,506
CUL-LSC-032*	18	49	Poor	Replacement	\$7,414
CUL-LSC-033	18	49	Poor	Replacement	\$7,345
CUL-LSC-037	24	18	Failing	Replacement	\$3,564
CUL-LSC-038	24	34	Failing	Replacement	\$6,843
CUL-LSC-039	12	37	Moderate	Future Cleanout	\$128
CUL-LSC-044	18	45	Fair	Future Cleanout	\$182
Total:					\$81,059

*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-LSC-0001!^	12	18	Cutting and Grouting	\$482
STG-LSC-0002^	12	237	Full Liner	\$11,845
STG-LSC-0003^	12	180	Full Liner	\$8,980
STG-LSC-0004^	12	155	Re-Inspect	\$194
STG-LSC-0005!^	12	22	Complete Replacement	\$3,764
STG-LSC-0006^	18	234	Full Liner	\$22,249
STG-LSC-0007!^	18	249	Full Liner	\$23,608
STG-LSC-0008^	24	109	Full Liner	\$16,305
STG-LSC-0009^	12	115	Full Liner	\$5,740
STG-LSC-0010^	18	230	Full Liner	\$21,879
STG-LSC-0011^	24	174	Full Liner	\$26,145
STG-LSC-0013^	12	244	Full Liner	\$12,205
STG-LSC-0014^	18	234	Grouting	\$9,924
STG-LSC-0015^	18	237	Full Liner	\$22,506
STG-LSC-0016^	30	234	Full Liner	\$46,880
STG-LSC-0017^	30	236	Cutting and Grouting	\$22,029
STG-LSC-0019^	8	100	Partial Replacement	\$4,875
STG-LSC-0021^	18	89	Spot Liner(s)	\$6,000
STG-LSC-0022!^	18	184	Full Liner	\$17,480
STG-LSC-0023^	18	148	Full Liner	\$14,079
STG-LSC-0024^	15	232	Full Liner	\$17,415
STG-LSC-0031^	12	160	Monitor Closely	\$0

Stormwater Gravity Main ID	Diameter (in)	Length (ft)	Maintenance Need	Cost Opinion
STG-LSC-0032^	12	123	Cutting and Grouting	\$3,372
STG-LSC-0034^	12	93	Cutting and Grouting	\$2,558
STG-LSC-0035^	8	50	Spot Liner(s)	\$2,500
STG-LSC-0043^	10	205	Cutting and Grouting	\$4,499
STG-LSC-0044^	30	178	Full Liner	\$35,600
STG-LSC-0046^	12	37	Monitor Closely	\$0
STG-LSC-0049^	18	162	Cutting and Grouting	\$7,565
STG-LSC-0051^	12	40	Cutting and Grouting	\$1,111
STG-LSC-0052^	12	42	Cutting and Grouting	\$1,166
STG-LSC-0058^	8	334	Full Liner	\$13,376
STG-LSC-0064^	15	140	Full Liner	\$10,493
STG-LSC-0065^	10	80	Re-Inspect	\$100
STG-LSC-0066^	18	233	Full Liner	\$22,145
STG-LSC-0067!^	18	56	Full Liner	\$5,325
STG-LSC-0068^	18	174	Full Liner	\$16,530
STG-LSC-0069^	12	21	Full Liner	\$1,030
STG-LSC-0070^	12	104	Full Liner	\$5,180
STG-LSC-0071^	12	198	Full Liner	\$9,910
STG-LSC-0076!^	12	94	Partial Replacement	\$5,600
STG-LSC-0083^	18	276	Full Liner	\$26,201
STG-LSC-0091^	12	93	Cutting and Grouting	\$2,547
STG-LSC-0099^	8	81	Lateral Cutting	\$500
STG-LSC-0101^	8	126	Cutting and Grouting	\$2,426
STG-LSC-0106^	10	298	Cutting and Grouting	\$6,554
STG-LSC-0108^	12	118	Spot Liner(s), Cutting and Grouting	\$7,254
STG-LSC-0110^	8	50	Full Liner	\$2,008
STG-LSC-0156^	12	156	Monitor Closely	\$0
STG-LSC-0158^	18	37	Full Liner	\$3,553
STG-LSC-0169^	18	25	Monitor Closely	\$0
STG-LSC-0170^	8	113	Spot Liner(s)	\$2,500
STG-LSC-0171^	15	53	Full Liner	\$3,945
STG-LSC-0172!^	18	18	Spot Liner(s)	\$6,000
STG-LSC-0174^	18	136	Cutting and Grouting	\$6,373
STG-LSC-0180^	12	147	Full Liner	\$7,370
STG-LSC-0181^	12	67	Cutting and Grouting	\$1,854
STG-LSC-0184^	18	239	Full Liner	\$22,724
STG-LSC-0185^	18	233	Spot Liner(s)	\$6,000
STG-LSC-0186^	12	14	Monitor Closely	\$0
Total:				\$570,453

^Televised

! High Priority

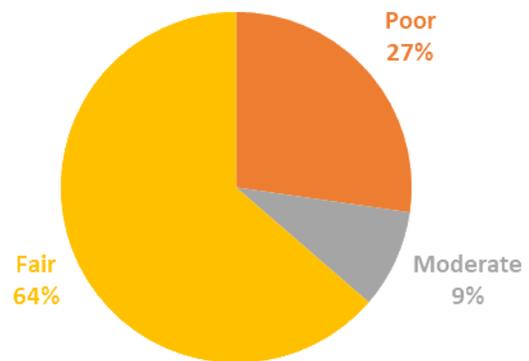
Table 4. Summary of Lake St. Clair Outfall Inspection and Maintenance Needs

Outfall Rating	Number of Outfalls	Outfalls Needing Immediate Cleanout	Outfalls Needing Future Cleanout	Outfalls Needing Replacement or Repair
New	0	0	0	0
Fair	7	0	0	0
Good	1	0	0	0
Poor	3	1*	0	3
Failing	0	0	0	0
Total:	11	1*	0	3
Repair Cost:		\$0	\$0	\$17,500

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



LAKE ST. CLAIR OUTFALLS



Left: Proportion of outfalls in each condition category. Right: Blocked outfall in poor condition in Lake St. Clair Metropark.

Table 5. Individual Outfall Replacement Costs

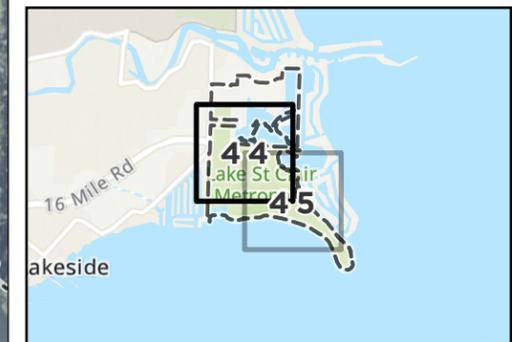
Outfall ID	Diameter (in)	Condition	Maintenance Need	Cost Opinion
SDC-LSC-004*	12	Poor	Replacement	\$6,250
SDC-LSC-003	10	Poor	Replacement	\$5,000
SDC-LSC-008	12	Poor	Replacement	\$6,250
Total:				\$17,500

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

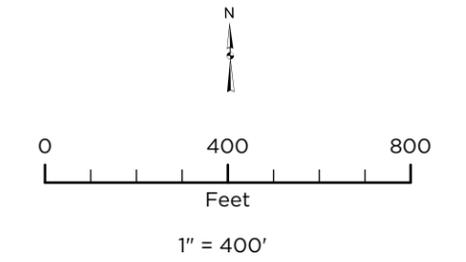
Stormwater Structure Ratings

Lake St. Clair Metropark

Map Sheet: 44 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.

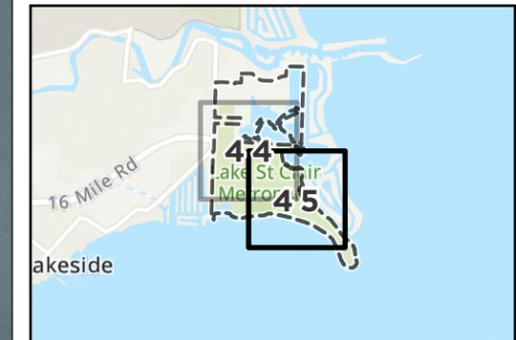
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Map Published: October 23, 2019

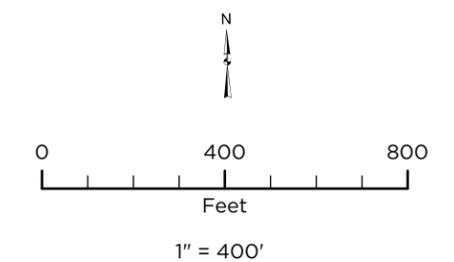
Stormwater Structure Ratings

Lake St. Clair Metropark

Map Sheet: 45 of 48



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



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Map Published: October 23, 2019

Lake St. Clair Metropark Streambank Summary and Recommendations

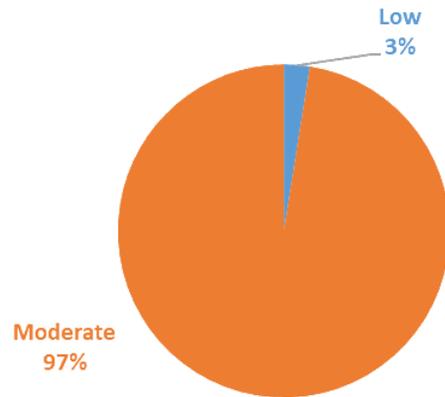
Table 6. Lake St. Clair Erosion Severity Summary

Erosion Condition	Feet of Streambank (miles)	Cost of Restoration
Very High	0.0 (0.0)	
High	0.0 (0.0)	
Moderate	2,907.21 (0.55)	
Low	74.98 (0.01)	
Very Low	0.0 (0.0)	
Total:	2,982.2 (0.56)	\$0*

*No restoration recommended at this time.



LAKE ST. CLAIR EROSION SEVERITY



Left: Proportion of stream in each erosion severity category. Right: Low erosion on a small stream in Lake St. Clair Metropark.

Lake St. Clair Metropark Shoreline Summary and Recommendations



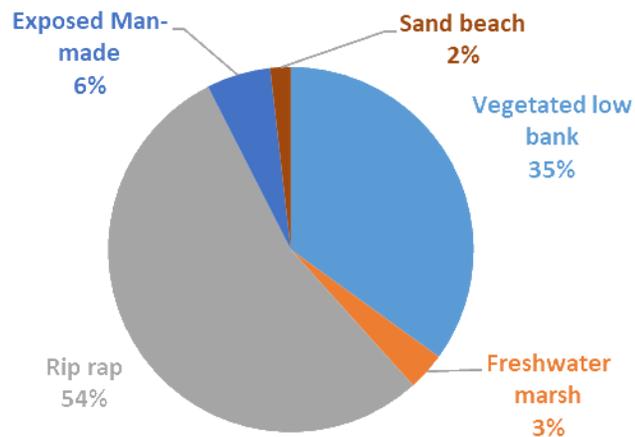
Minor slumping in Lake St. Clair Metropark.

Table 7. Shoreline Slumping Severity Summary

Erosion Condition	Length of Shoreline (feet)
Major	662.4
Minor	5,597.1
None	9,298.9
Total:	15,558.4
Restoration Cost:	\$22,940

Lake St. Clair Metropark has a large proportion of shoreline. Recommended restoration activity is largely invasive species related, with some shoreline stabilization plantings.

LAKE ST. CLAIR SHORELINE TYPE



Proportion of each shoreline type present in Lake St. Clair Metropark.

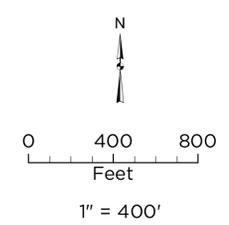
Lake St. Clair Metropark

Shoreline Rehab Siting



◆ Shoreline Rehab Site
Invasive Vegetation Pt
Invasive Type
● Black Alder
● Cattail
● Multiple
● Other
● Phragmites
Invasive Density
 1 - IND/FEW/SEV
 2 - < 1000 SF
 3 - > 1000 SF
 4 - 0.5 - 1 AC
 5 - > 1 AC
Shoreline Condition
Slumping Severity
 Major
 Minor
 None
 HCMA Park Boundary
 Municipal Boundary
 County Boundary
 Roads

Site	Length, Ft	Recommended Treatment	Unit Price	Cost
001	70	E	\$3,000/acre	NA
002	112	E	\$3,000/acre	NA
003	600	A	\$ 19.00	\$ 11,400.00
004	521	E	\$3,000/acre	NA
005	900	E	\$3,000/acre	NA
006	1726	E	\$3,000/acre	NA
007	1116	E	\$3,000/acre	NA
008	1000	E	\$3,000/acre	NA
009	325	E	\$3,000/acre	NA
TOTAL				\$ 11,400.00



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 Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
 Map Published: July 3, 2019

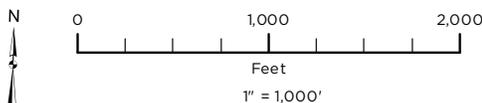


Lake St. Clair Metropark Shoreline Rehabilitation Siting

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

Map Published: October 22, 2019



SLR-LSC-003
 Length: 600 Ft
 Recommended Treatment: Detail A
 Construction Cost: \$11,400

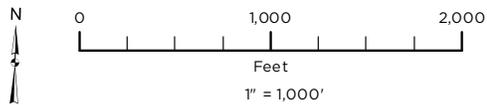


SLR-LSC-003

- Shoreline Rehab Site
- Invasive Vegetation Pt**
- Invasive Type**
 - Black Alder
 - Cattail
 - Multiple
 - Other
 - Phragmites
- Shoreline Condition**
- Stumping Severity**
 - Major
 - Minor
 - None
- HCMA Park Boundary
- Roads
- Hydrology

Lake St. Clair Metropark Shoreline Rehabilitation Siting

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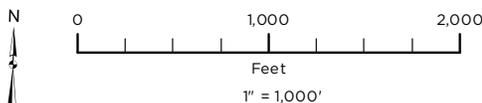


Lake St. Clair Metropark Shoreline Rehabilitation Siting

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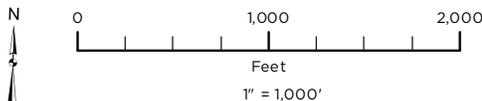


Lake St. Clair Metropark Shoreline Rehabilitation Siting

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

Map Published: October 22, 2019



Lake St. Clair Metropark Green Infrastructure Recommendations

In Lake St. Clair, 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.

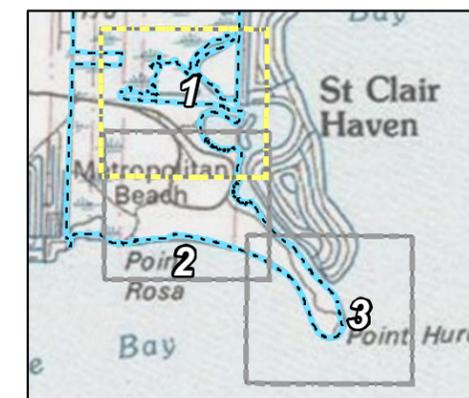
Table 8. Lake St. Clair Green Infrastructure Recommendations

Site ID	Site	Practice Type	Treatment Surface Area (ft ²)	Cost Opinion	Cost per sq ft of Treatment Area (\$/ft ²)
GI-LSC-01	Boat Launch	Native Landscaping	22,625	\$95,024	\$4.20
GI-LSC-02	Shelter B	Naturalized Swale	2,424	\$4,121	\$1.70
GI-LSC-03	Service Area	Native Prairie	65,093	\$75,942	\$1.17
GI-LSC-04	Shelter J	No Mow	161,460	\$0.00	\$0.00
GI-LSC-05	Beach	Native Landscaping	15,245	\$64,029	\$4.20
Total:			266,847	\$239,116	

Lake St. Clair Metropark

Green Infrastructure Recommendation Areas

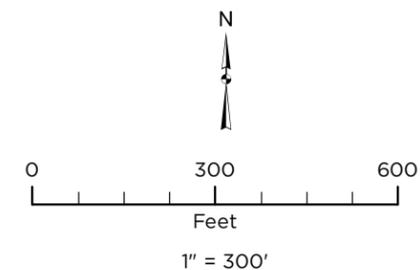
Area: 1 of 3



Recommendation Area

GSI Type

- Native Landscaping (1)
- Native Prairie (1)
- Stormwater Gravity Main
- Culvert (22)
- HCMA Park Boundary
- Roads



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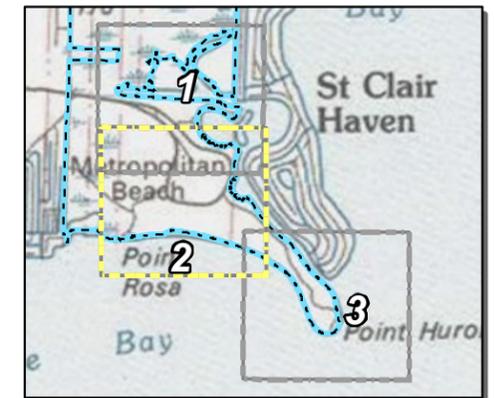
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Map Published: October 1, 2019

Lake St. Clair Metropark

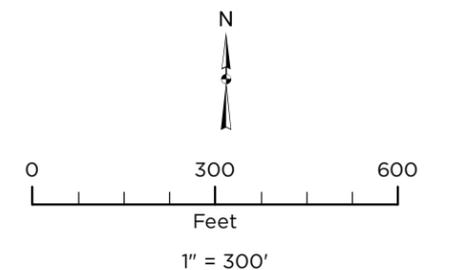
Green Infrastructure Recommendation Areas

Area: 1 of 3



Recommendation Area

- GSI Type**
- Native Landscaping (1)
 - Naturalized Swale (1)
 - Stormwater Gravity Main
 - Culvert (26)
 - HCMA Park Boundary
 - Roads



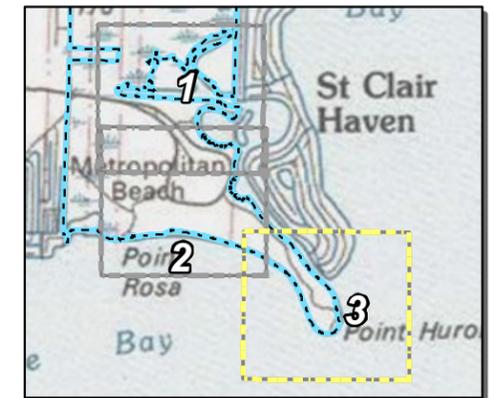
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Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 IntlFeet

Map Published: October 1, 2019



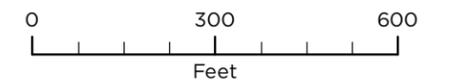
Lake St. Clair
Metropark
Green Infrastructure
Recommendation Areas
Area: 1 of 3



Recommendation Area

GSI Type

- No-Mow (1)
- Stormwater Gravity Main
- Culvert (1)
- HCMA Park Boundary
- Roads



1" = 300'

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



Lake St. Clair 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. Lake St. Clair Culvert Repair Priorities

Culvert ID	Diameter (in)	Length (ft)	Condition	Maintenance Need	Cost Opinion
CUL-LSC-029	20	70	Failing	Replacement	\$10,506
CUL-LSC-038	24	34	Failing	Replacement	\$6,843
CUL-LSC-009	18	55	Failing	Replacement	\$8,260
CUL-LSC-002	18	50	Failing	Replacement	\$7,425
CUL-LSC-013	16	55	Failing	Replacement	\$6,926
CUL-LSC-037	24	18	Failing	Replacement	\$3,564
CUL-LSC-015	10	22	Failing	Replacement	\$2,212
CUL-LSC-014	10	12	Failing	Replacement	\$1,244
CUL-LSC-010	18	49	Poor	Replacement	\$7,295
CUL-LSC-032	18	49	Poor	Replacement	\$7,414
CUL-LSC-033	18	49	Poor	Replacement	\$7,345
CUL-LSC-028	12	50	Poor	Replacement	\$6,203
CUL-LSC-027	12	37	Poor	Replacement	\$4,675
CUL-LSC-008	24	64	Moderate	Future Cleanout	\$322
CUL-LSC-011	18	48	Moderate	Future Cleanout	\$193
CUL-LSC-004	18	19	Moderate	Future Cleanout	\$75
CUL-LSC-001	12	37	Moderate	Future Cleanout	\$129
CUL-LSC-039	12	37	Moderate	Future Cleanout	\$128
CUL-LSC-044	18	45	Fair	Future Cleanout	\$182
CUL-LSC-007	24	24	Fair	Future Cleanout	\$118
Total:					\$81,059

Table 10. Lake St. Clair Outfall Repair Priorities

Outfall ID	Diameter (in)	Condition	Maintenance Need	Cost Opinion
SDC-LSC-004	12	Poor	Replacement	\$6,250
SDC-LSC-008	12	Poor	Replacement	\$6,250
SDC-LSC-003	10	Poor	Replacement	\$5,000
Total:				\$17,500

Table 11. Lake St. Clair Stormwater Gravity Main Repair Priorities

Stormwater Gravity Main ID	Diameter (in)	Length (ft)	Maintenance Need	Cost Opinion
STG-LSC-0007	18	249	Full Liner	\$23,608
STG-LSC-0022	18	184	Full Liner	\$17,480
STG-LSC-0067	18	56	Full Liner	\$5,325
STG-LSC-0076	12	94	Partial Replacement	\$5,600
STG-LSC-0172	18	18	Spot Liner(s)	\$6,000
STG-LSC-0005	12	22	Complete Replacement	\$3,764
STG-LSC-0001	12	18	Cutting and Grouting	\$482
STG-LSC-0016	30	234	Full Liner	\$46,880
STG-LSC-0044	30	178	Full Liner	\$35,600
STG-LSC-0011	24	174	Full Liner	\$26,145
STG-LSC-0083	18	276	Full Liner	\$26,201
STG-LSC-0184	18	239	Full Liner	\$22,724
STG-LSC-0015	18	237	Full Liner	\$22,506
STG-LSC-0006	18	234	Full Liner	\$22,249
STG-LSC-0066	18	233	Full Liner	\$22,145
STG-LSC-0010	18	230	Full Liner	\$21,879
STG-LSC-0008	24	109	Full Liner	\$16,305
STG-LSC-0068	18	174	Full Liner	\$16,530
STG-LSC-0024	15	232	Full Liner	\$17,415
STG-LSC-0023	18	148	Full Liner	\$14,079
STG-LSC-0013	12	244	Full Liner	\$12,205
STG-LSC-0002	12	237	Full Liner	\$11,845
STG-LSC-0064	15	140	Full Liner	\$10,493
STG-LSC-0071	12	198	Full Liner	\$9,910
STG-LSC-0003	12	180	Full Liner	\$8,980
STG-LSC-0058	8	334	Full Liner	\$13,376
STG-LSC-0180	12	147	Full Liner	\$7,370
STG-LSC-0009	12	115	Full Liner	\$5,740
STG-LSC-0070	12	104	Full Liner	\$5,180
STG-LSC-0158	18	37	Full Liner	\$3,553
STG-LSC-0171	15	53	Full Liner	\$3,945
STG-LSC-0110	8	50	Full Liner	\$2,008
STG-LSC-0069	12	21	Full Liner	\$1,030
STG-LSC-0185	18	233	Spot Liner(s)	\$6,000
STG-LSC-0021	18	89	Spot Liner(s)	\$6,000
STG-LSC-0108	12	118	Spot Liner(s), Cutting and Grouting	\$7,254
STG-LSC-0170	8	113	Spot Liner(s)	\$2,500
STG-LSC-0019	8	100	Partial Replacement	\$4,875

Stormwater Gravity Main ID	Diameter (in)	Length (ft)	Maintenance Need	Cost Opinion
STG-LSC-0035	8	50	Spot Liner(s)	\$2,500
STG-LSC-0017	30	236	Cutting and Grouting	\$22,029
STG-LSC-0014	18	234	Grouting	\$9,924
STG-LSC-0049	18	162	Cutting and Grouting	\$7,565
STG-LSC-0174	18	136	Cutting and Grouting	\$6,373
STG-LSC-0106	10	298	Cutting and Grouting	\$6,554
STG-LSC-0043	10	205	Cutting and Grouting	\$4,499
STG-LSC-0032	12	123	Cutting and Grouting	\$3,372
STG-LSC-0034	12	93	Cutting and Grouting	\$2,558
STG-LSC-0091	12	93	Cutting and Grouting	\$2,547
STG-LSC-0181	12	67	Cutting and Grouting	\$1,854
STG-LSC-0101	8	126	Cutting and Grouting	\$2,426
STG-LSC-0052	12	42	Cutting and Grouting	\$1,166
STG-LSC-0051	12	40	Cutting and Grouting	\$1,111
STG-LSC-0099	8	81	Lateral Cutting	\$500
STG-LSC-0031	12	160	Monitor Closely	\$0
STG-LSC-0156	12	156	Monitor Closely	\$0
STG-LSC-0004	12	155	Re-Inspect	\$194
STG-LSC-0169	18	25	Monitor Closely	\$0
STG-LSC-0065	10	80	Re-Inspect	\$100
STG-LSC-0046	12	37	Monitor Closely	\$0
STG-LSC-0186	12	14	Monitor Closely	\$0
Total:				\$570,453

Table 12. Lake St. Clair 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-LSC-04	Shelter J	No Mow	161,460	\$0.00	\$0.00
GI-LSC-03	Service Area	Native Prairie	65,093	\$75,942	\$1.17
GI-LSC-02	Shelter B	Naturalized Swale	2,424	\$4,121	\$1.70
GI-LSC-01	Boat Launch	Native Landscaping	22,625	\$95,024	\$4.20
GI-LSC-05	Beach	Native Landscaping	15,245	\$64,029	\$4.20
Total:			266,847	\$239,116	

Table 13. Lake St. Clair Shoreline Rehabilitation Priorities

Shoreline Restoration Site ID	Length (ft)	Recommended Treatment	Unit Cost (\$/ft)	Cost Opinion
SLR-LSC-001	70	E (Invasive Species Removal)	\$3,000/acre	NA
SLR-LSC-002	112	E (Invasive Species Removal)	\$3,000/acre	NA
SLR-LSC-004	521	E (Invasive Species Removal)	\$3,000/acre	NA
SLR-LSC-005	900	E (Invasive Species Removal)	\$3,000/acre	NA
SLR-LSC-006	1,726	E (Invasive Species Removal)	\$3,000/acre	NA
SLR-LSC-007	1,116	E (Invasive Species Removal)	\$3,000/acre	NA
SLR-LSC-008	1,000	E (Invasive Species Removal)	\$3,000/acre	NA
SLR-LSC-009	325	E (Invasive Species Removal)	\$3,000/acre	NA
SLR-LSC-003	600	A (Tree Removal, Excavation, and Plant Restoration)	\$19	\$11,400