



HURON-CLINTON
metroparks

Kensington Metropark
Stormwater Management Plan

September 2019

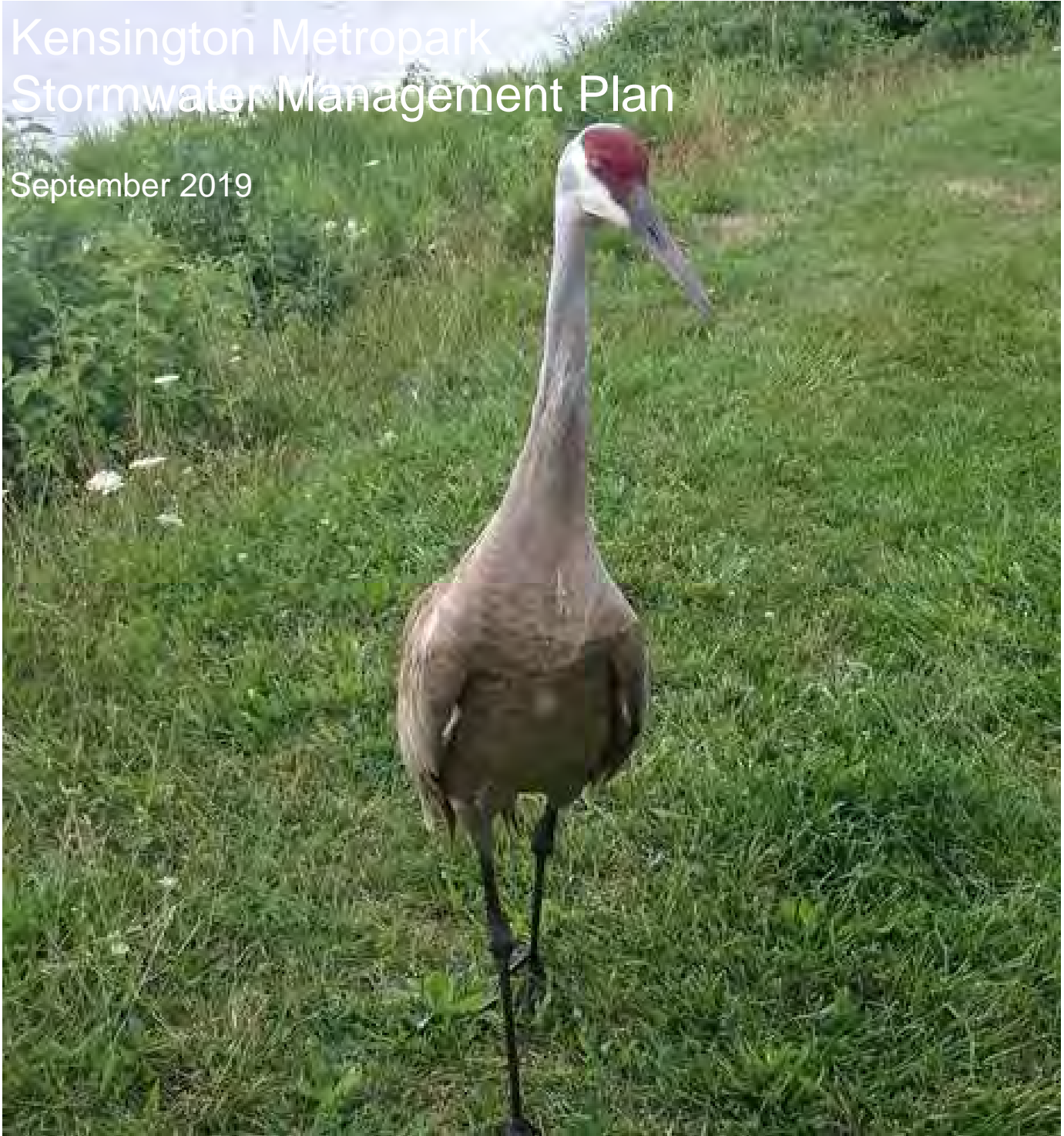


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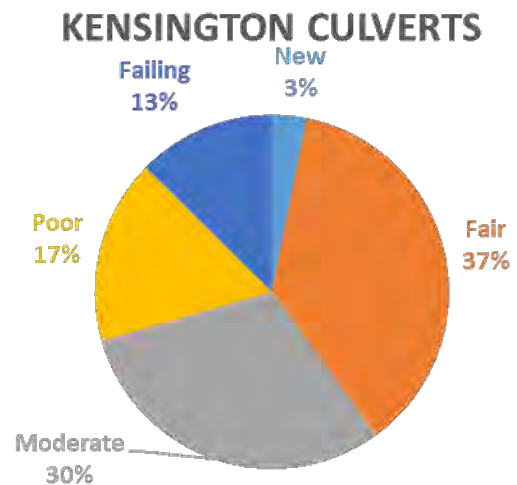
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Kensington Metropark Stormwater Structure Recommendations

Table 1. Summary of Kensington Culvert Inspection and Maintenance Needs

Culvert Rating	Number of Culverts	Culverts Needing Immediate Cleanout	Culverts Needing Future Cleanout	Culverts Needing Replacement or Repair
New	3	0	0	0
Fair	38	1	6	0
Moderate	27	4	9	0
Poor	17	11*	4*	17
Failing	12	8*	2*	12
Total:	97	24*	21*	29
Repair Cost:		\$914	\$2,052	\$151,204

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



Left: Failing culvert in Kensington 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-KEN-003	12	16	Fair	Future Cleanout	\$57
CUL-KEN-005*	20	73	Poor	Replacement	\$10,913
CUL-KEN-007	12	55	Moderate	Immediate Cleanout	\$192
CUL-KEN-009	14	100	Moderate	Future Cleanout	\$349
CUL-KEN-010	12	17	Moderate	Future Cleanout	\$59
CUL-KEN-013*	12	39	Poor	Replacement	\$4,826
CUL-KEN-014*	24	65	Failing	Replacement	\$13,078
CUL-KEN-015*	24	67	Failing	Replacement	\$13,344
CUL-KEN-016	8	26	Moderate	Future Cleanout	\$92
CUL-KEN-018	14	40	Moderate	Future Cleanout	\$139
CUL-KEN-020	18	60	Fair	Future Cleanout	\$242
CUL-KEN-023	18	68	Fair	Future Cleanout	\$274
CUL-KEN-024	10	17	Failing	Replacement	\$1,715
CUL-KEN-026*	24	45	Poor	Replacement	\$9,027
CUL-KEN-027*	12	21	Poor	Replacement	\$2,572
CUL-KEN-032*	14	26	Poor	Replacement	\$3,303
CUL-KEN-033*	18	36	Poor	Replacement	\$5,452
CUL-KEN-034	18	36	Poor	Replacement	\$5,338
CUL-KEN-035*	12	17	Poor	Replacement	\$2,082
CUL-KEN-036*	12	19	Failing	Replacement	\$2,378
CUL-KEN-039*	24	17	Poor	Replacement	\$3,495
CUL-KEN-040	18	40	Moderate	Future Cleanout	\$160
CUL-KEN-041*	12	73	Poor	Replacement	\$9,139
CUL-KEN-042*	12	18	Poor	Replacement	\$2,215
CUL-KEN-043	12	20	Moderate	Future Cleanout	\$68
CUL-KEN-044	12	20	Fair	Future Cleanout	\$68
CUL-KEN-048*	12	50	Poor	Replacement	\$6,285
CUL-KEN-050	6	20	Moderate	Future Cleanout	\$69
CUL-KEN-051	16	40	Moderate	Future Cleanout	\$160
CUL-KEN-052*	14	17	Failing	Replacement	\$2,141
CUL-KEN-053*	14	29	Failing	Replacement	\$3,644
CUL-KEN-054*	14	18	Failing	Replacement	\$2,249
CUL-KEN-055*	14	23	Failing	Replacement	\$2,931
CUL-KEN-060*	10	16	Poor	Replacement	\$1,568
CUL-KEN-063*	10	10	Failing	Replacement	\$1,049
CUL-KEN-064	12	12	Fair	Future Cleanout	\$43
CUL-KEN-065*	18	37	Poor	Replacement	\$5,558
CUL-KEN-066	12	31	Moderate	Future Cleanout	\$107
CUL-KEN-068	12	49	Fair	Immediate Cleanout	\$173
CUL-KEN-069	12	48	Moderate	Immediate Cleanout	\$168

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

Culvert ID	Diameter (in)	Length (ft)	Condition	Maintenance Need	Cost Opinion
CUL-KEN-074	18	42	Moderate	Immediate Cleanout	\$170
CUL-KEN-075*	18	41	Poor	Replacement	\$6,153
CUL-KEN-076	18	41	Fair	Future Cleanout	\$164
CUL-KEN-078*	18	13	Failing	Replacement	\$1,903
CUL-KEN-079*	10	19	Failing	Replacement	\$1,864
CUL-KEN-080	18	53	Moderate	Immediate Cleanout	\$210
CUL-KEN-085	12	8	Failing	Replacement	\$938
CUL-KEN-089*	18	51	Poor	Replacement	\$7,595
CUL-KEN-098	18	123	Poor	Replacement	\$18,450
Total:					\$154,170

*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-KEN-0005 [^]	12	15	Partial Replacement, Re-inspection	\$22,419
STG-KEN-0009 [^]	15	78	Full Liner	\$5,850
STG-KEN-0027 [^]	12	76	Cutting and Grouting	\$2,079
STG-KEN-0029 [^]	12	75	Grouting	\$1,878
STG-KEN-0052 [^]	12	106	Partial Replacement	\$11,200
STG-KEN-0058 [^]	12	175	Partial Replacement, Grouting	\$15,180
STG-KEN-0071 [^]	12	128	Full Liner	\$6,400
STG-KEN-0082 [^]	12	182	Spot Liner(s)	\$8,000
STG-KEN-0100 [^]	12	58	Complete Replacement	\$10,115
STG-KEN-0103 [^]	12	44	Complete Replacement	\$7,649
STG-KEN-0109! [^]	24	98	Complete Replacement	\$27,300
STG-KEN-0110 [^]	24	250	Cutting and Grouting	\$17,883
STG-KEN-0135! [^]	12	44	Complete Replacement	\$7,649
STG-KEN-0140 [^]	18	131	Full Liner	\$12,464
STG-KEN-0145 [^]	8	159	Full Liner	\$6,368
Total:				\$162,434

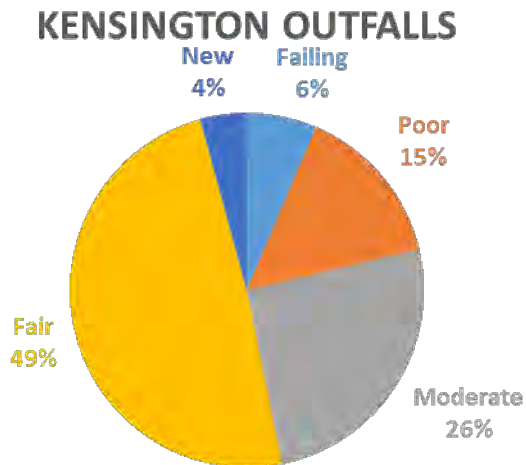
[^]Televised

! High Priority

Table 4. Summary of Kensington Outfall Inspection and Maintenance Needs

Outfall Rating	Number of Outfalls	Outfalls Needing Immediate Cleanout	Outfalls Needing Future Cleanout	Outfalls Needing Replacement or Repair
New	2	0	0	0
Fair	23	0	0	0
Good	12	1	4	0
Poor	7	3*	0	7
Failing	3	1*	0	3
Total:	47	5*	4	10
Repair Cost:		\$175	\$775	\$62,500

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



Proportion of outfalls in each condition category. Right: Blocked outfall in failing condition in Kensington Metropark.

Table 5. Individual Outfall Replacement Costs

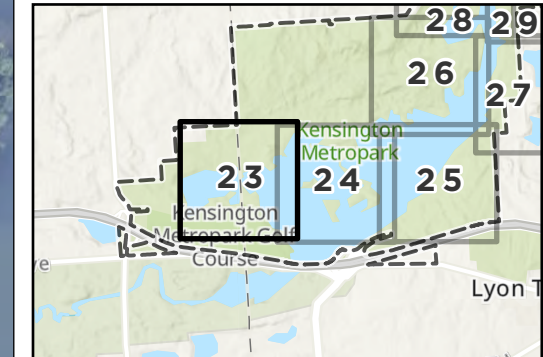
Outfall ID	Diameter (in)	Condition	Maintenance Need	Cost Opinion
SDC-KEN-009	6	Poor	Replacement	\$5,000
SDC-KEN-037	6	Failing	Replacement	\$5,000
SDC-KEN-015	10	Poor	Replacement	\$5,000
SDC-KEN-001	12	Poor	Replacement	\$6,250
SDC-KEN-030	12	Moderate	Immediate Cleanout	\$175
SDC-KEN-010	18	Failing	Replacement	\$7,500
SDC-KEN-022*	20	Poor	Replacement	\$7,500
SDC-KEN-032*	20	Poor	Replacement	\$7,500
SDC-KEN-021	21	Moderate	Future Cleanout	\$200
SDC-KEN-033	21	Moderate	Future Cleanout	\$200
SDC-KEN-041	21	Moderate	Future Cleanout	\$200
SDC-KEN-003*	12	Failing	Replacement	\$6,250
SDC-KEN-004*	12	Poor	Replacement	\$6,250
SDC-KEN-029	12	Moderate	Future Cleanout	\$175
SDC-KEN-044	12	Poor	Replacement	\$6,250
Total:				\$63,450

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

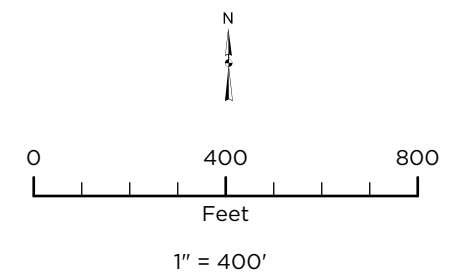
Stormwater Structure Ratings

Kensington Metropark

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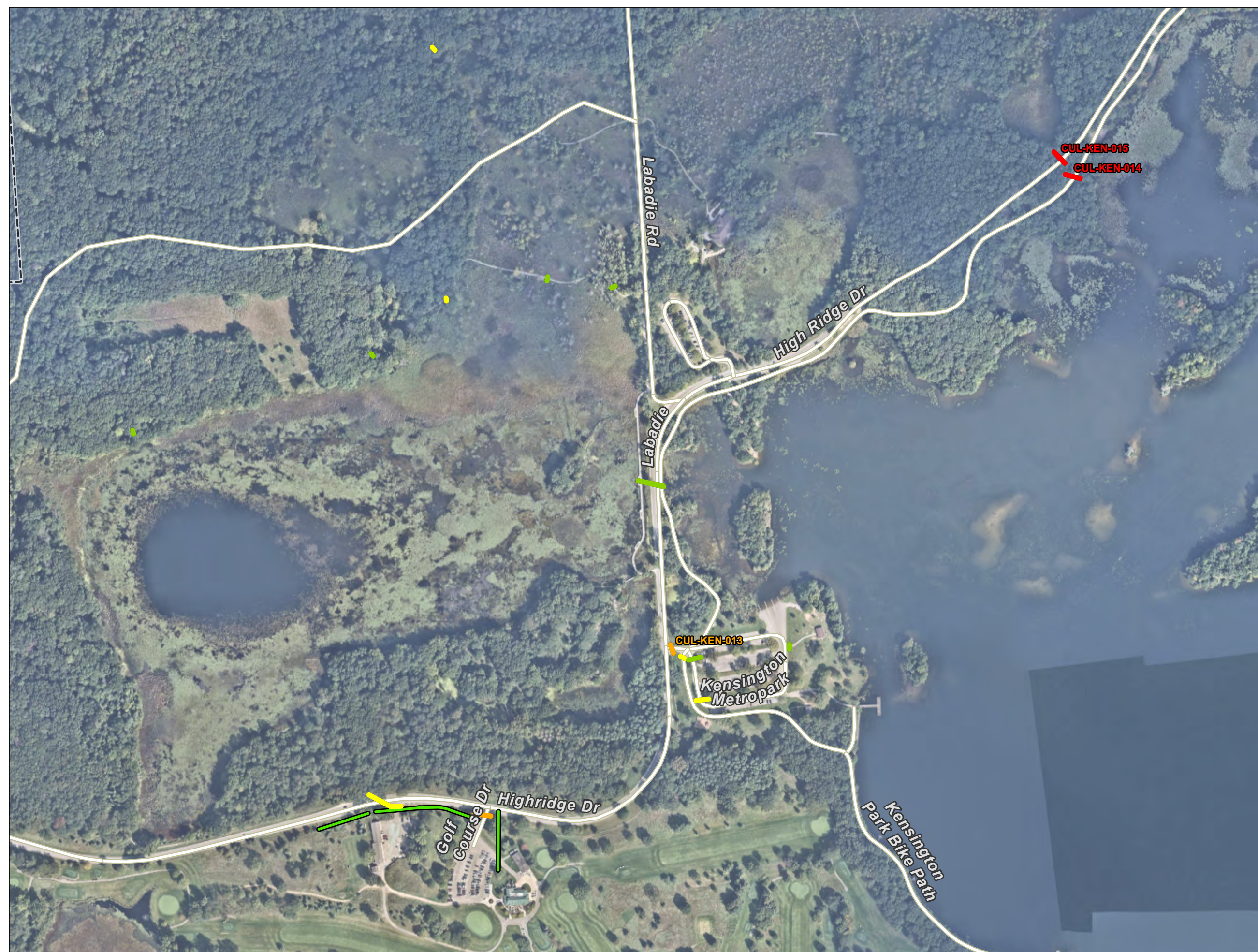
- | | |
|-----------------------------------|--|
| Outfalls
(Field Rating) | Gravity Main
(Pipe Rating Index) |
| Failing | 1 |
| Poor | 2 |
| Moderate | 3 |
| Fair | 4 |
| New | 5 |
| Culverts
(Field Rating) | Gravity Main (Other) |
| Failing | Culvert (Other) |
| Poor | Roads |
| Moderate | Roads |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



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

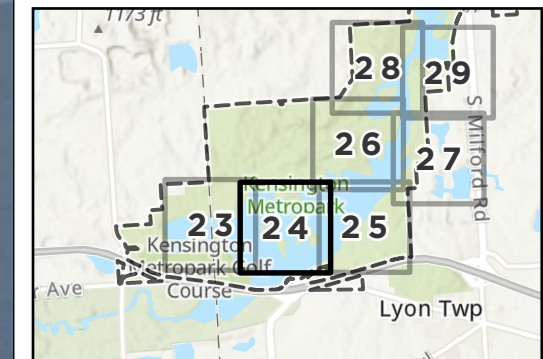
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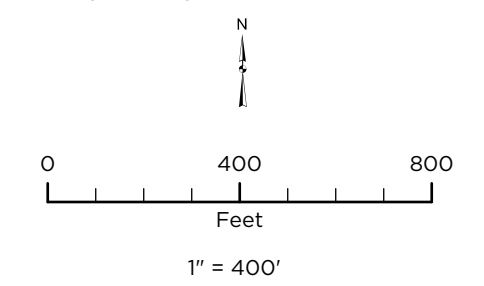
Stormwater Structure Ratings

Kensington Metropark

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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)	



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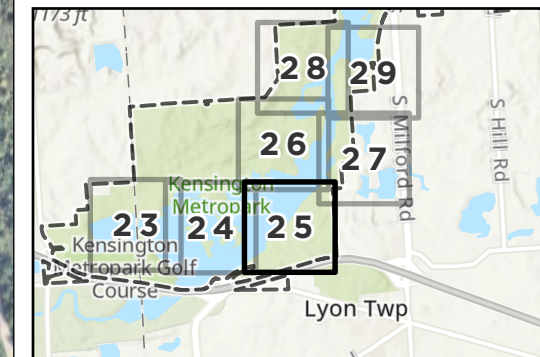
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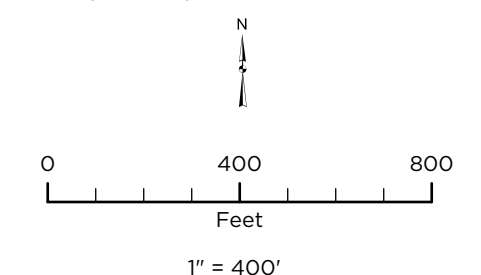
Stormwater Structure Ratings

Kensington Metropark

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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)	



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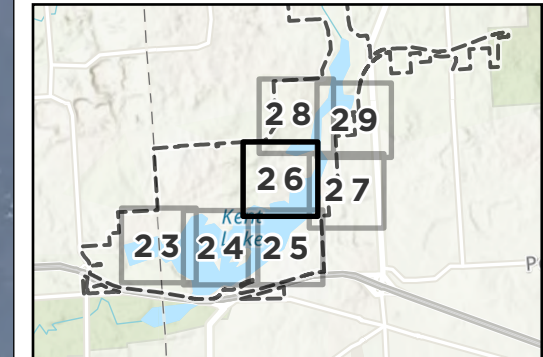
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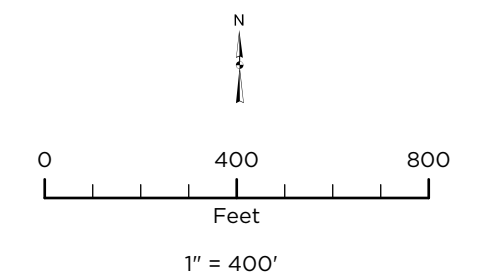
Stormwater Structure Ratings

Kensington Metropark

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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)	



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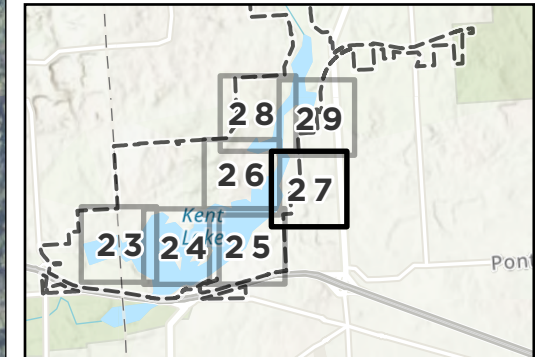
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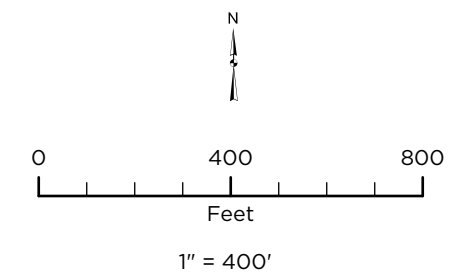
Stormwater Structure Ratings

Kensington Metropark

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- | | |
|-----------------------------------|--|
| 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) | |



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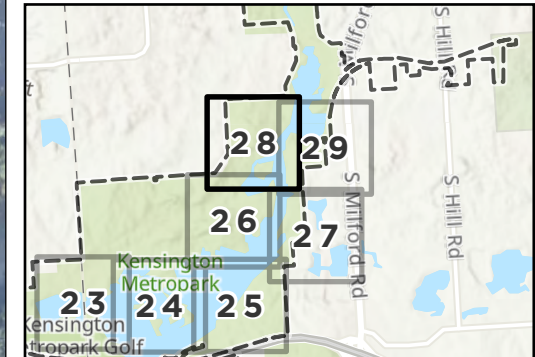
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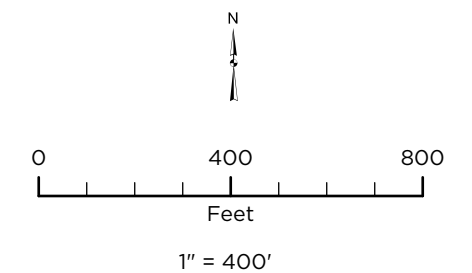
Stormwater Structure Ratings

Kensington Metropark

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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)	



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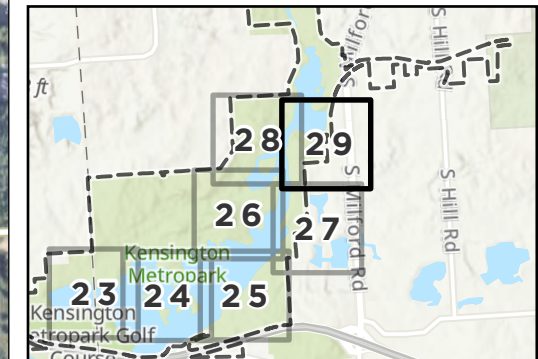
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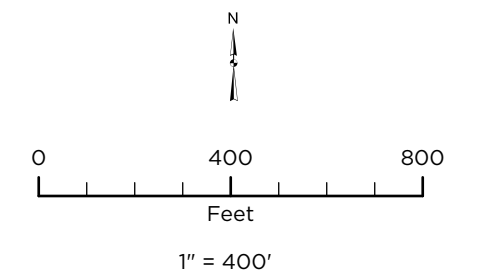
Stormwater Structure Ratings

Kensington Metropark

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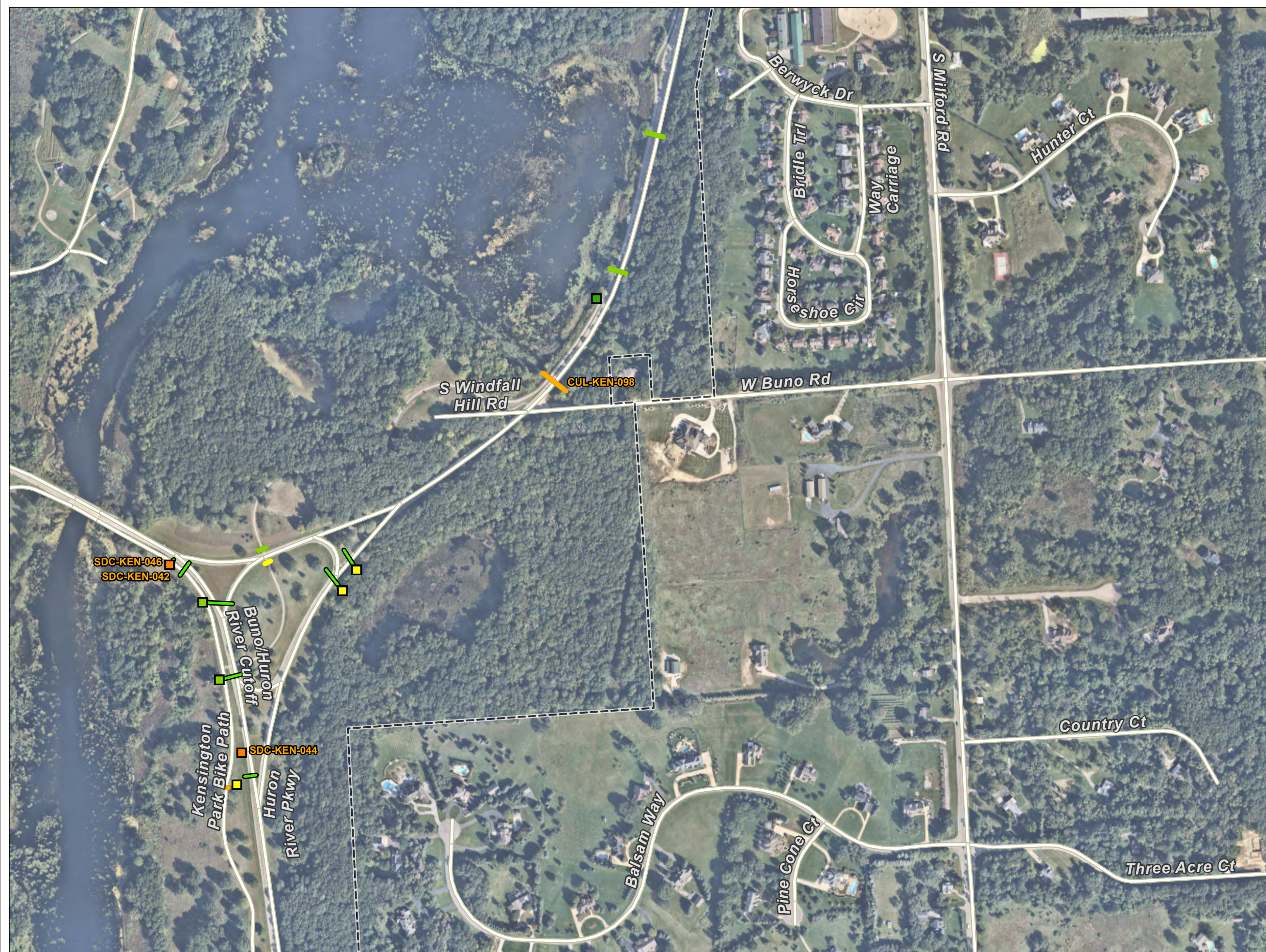
Outfalls (Field Rating)	Gravity Main (Pipe Rating Index)
Failing	1
Poor	2
Moderate	3
Fair	4
New	5
Culverts (Field Rating)	Gravity Main (Other)
Failing	Culvert (Other)
Poor	Roads
Moderate	Roads
Fair	Park Boundary
New	
(Not Rated)	



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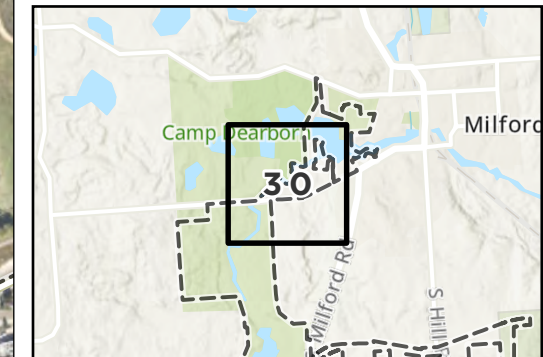
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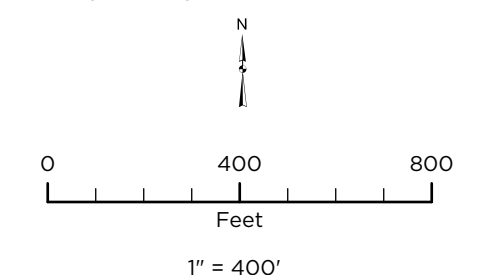
Stormwater Structure Ratings

Kensington Metropark

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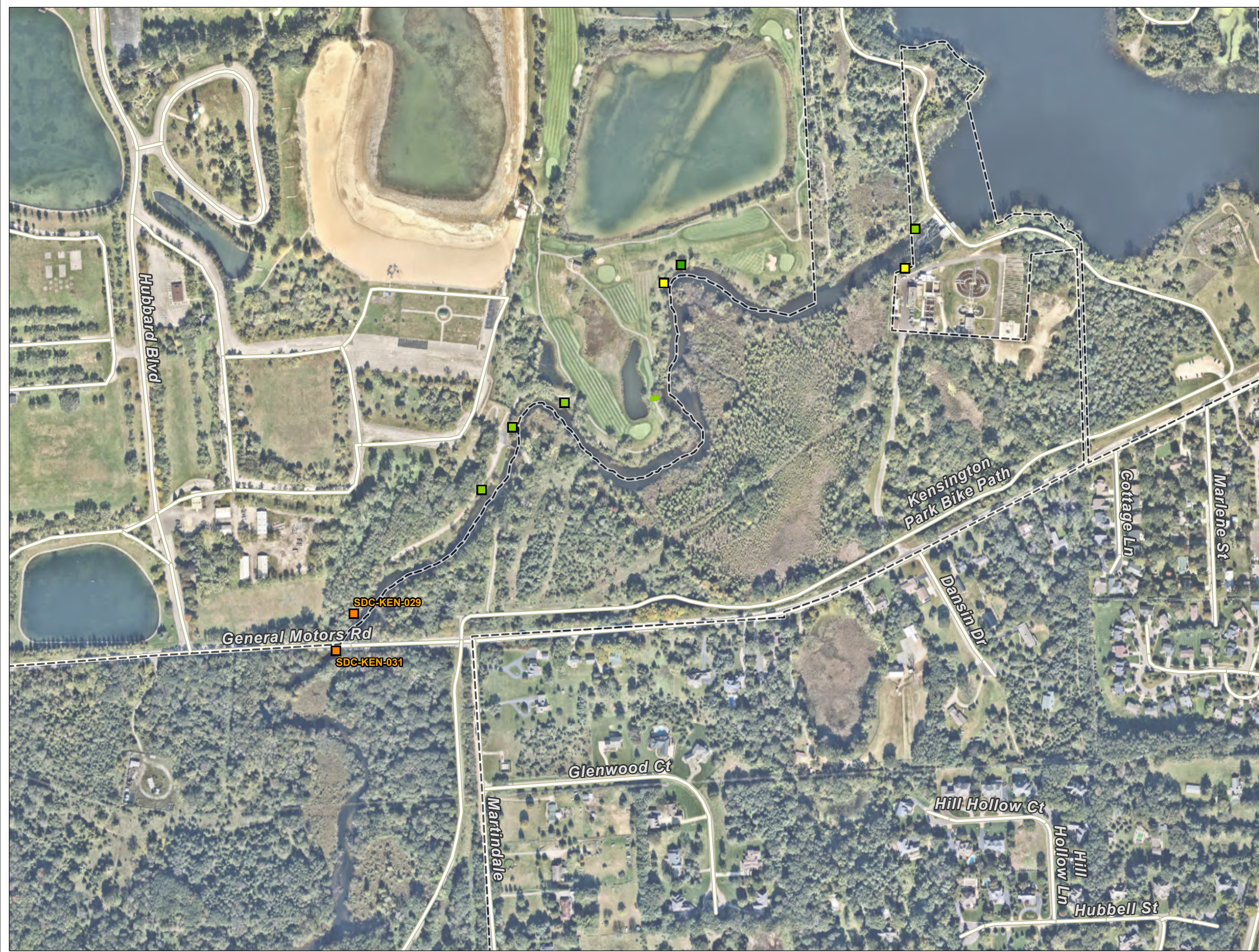
Outfalls (Field Rating)	Gravity Main (Pipe Rating Index)
Failing	1
Poor	2
Moderate	3
Fair	4
New	5
Culverts (Field Rating)	Gravity Main (Other)
Failing	Culvert (Other)
Poor	Roads
Moderate	Roads
Fair	Park Boundary
New	
(Not Rated)	



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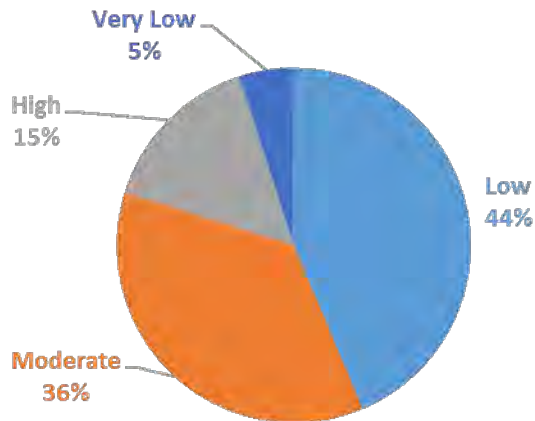


Kensington Metropark Streambank Summary and Recommendations

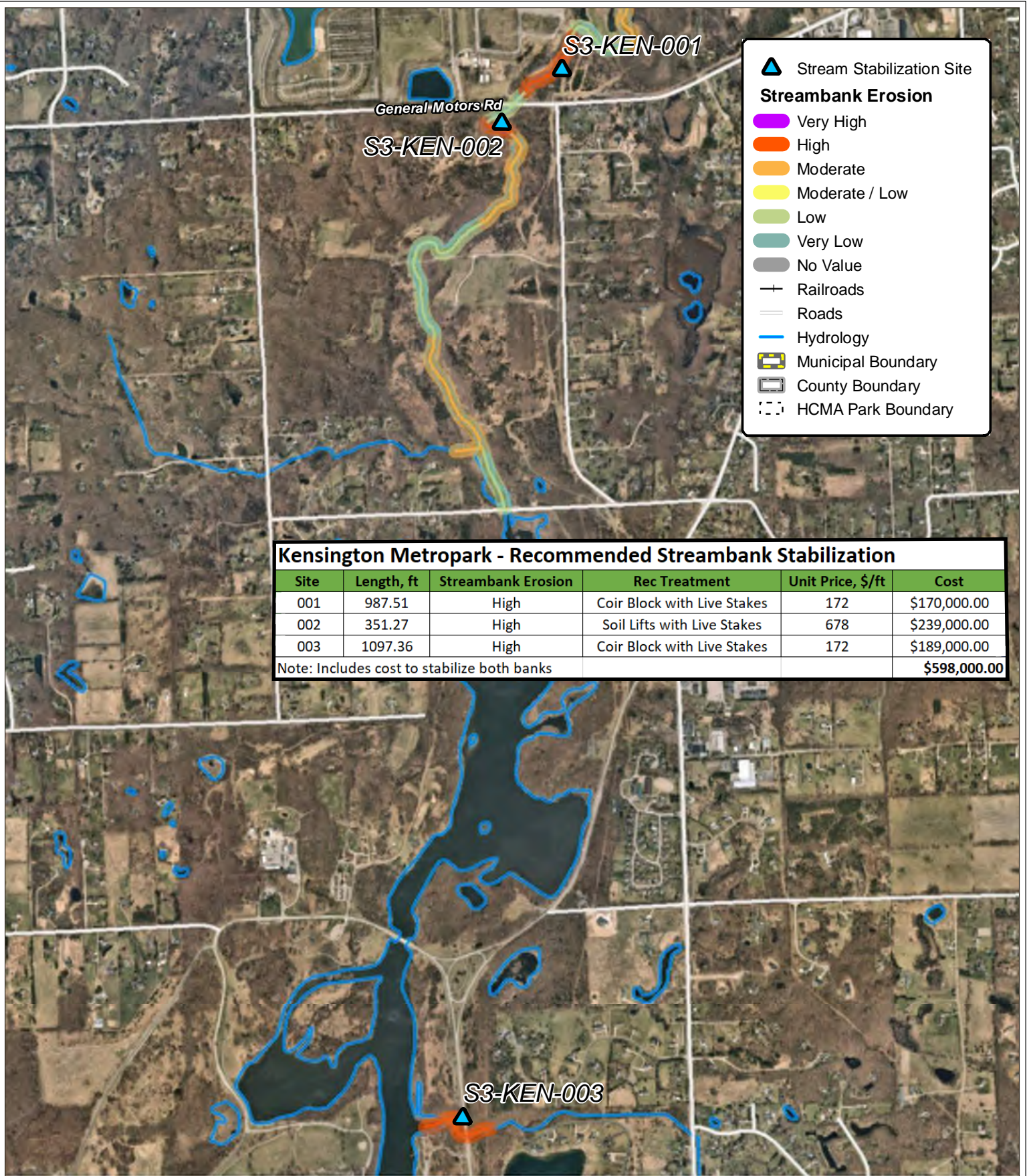
Table 6. Kensington Erosion Severity Summary

Erosion Condition	Feet of Streambank (miles)	Cost of Restoration
Very High	0.0 (0.0)	
High	2,436 (0.46)	\$598,000
Moderate	5,805 (1.10)	
Low	7,003 (1.33)	
Very Low	802 (0.15)	
Total:	16,047 (3.03)	\$598,000

KENSINGTON EROSION SEVERITY



Left: Proportion of stream bank in each erosion severity category. Right: High erosion on a bank in Kensington Metropark.

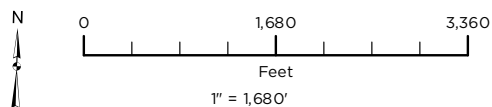


Kensington Metropark Streambank Stabilization Siting

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: June 27, 2019



S3-KEN-001

Length: 987.51 ft

Recommended Treatment: Coir Block with Live Stakes

Construction Cost: \$170,000



S3-KEN-001

▲ Stream Stabilization Site

⋮ HCMA Park Boundary

Streambank Erosion

Very High

High

Moderate

Moderate / Low

Low

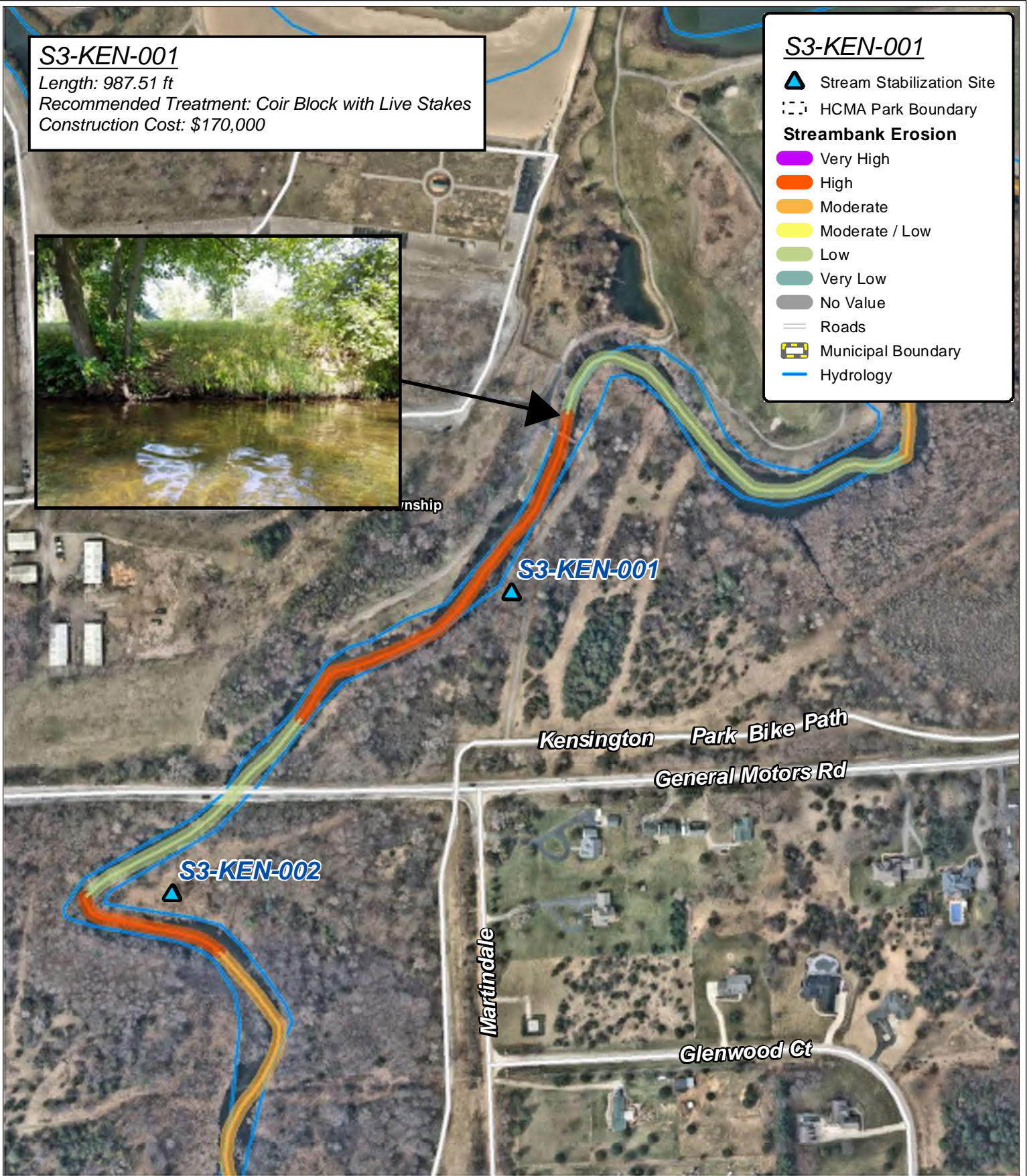
Very Low

No Value

Roads

Municipal Boundary

Hydrology

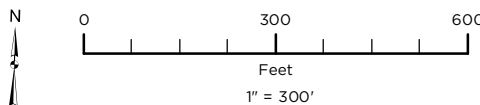


Kensington Metropark Streambank Stabilization Siting

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










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

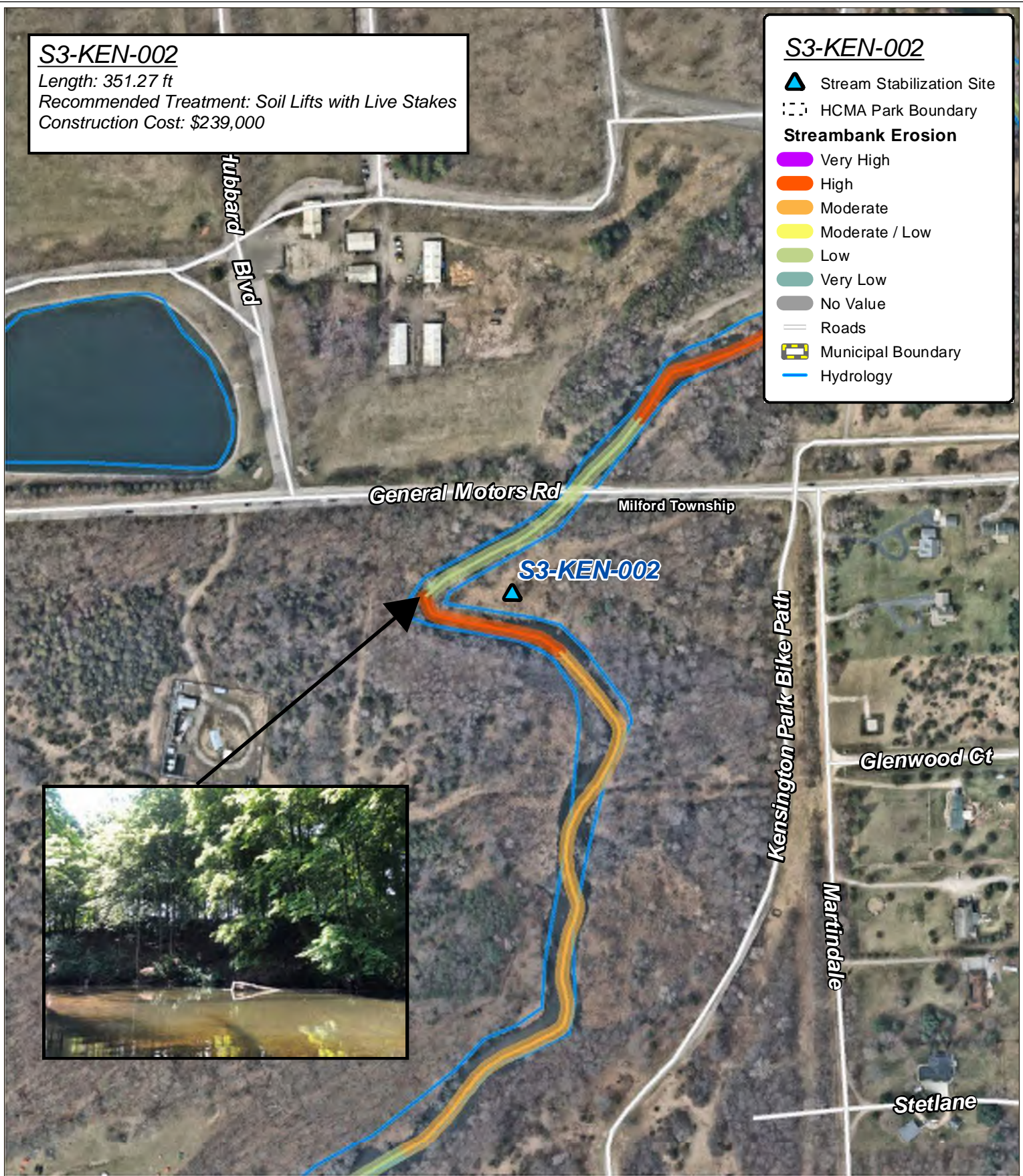
Map Published: June 25, 2019



S3-KEN-002
 Length: 351.27 ft
 Recommended Treatment: Soil Lifts with Live Stakes
 Construction Cost: \$239,000

S3-KEN-002

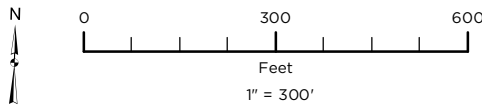
-  Stream Stabilization Site
-  HCMA Park Boundary
- Streambank Erosion**
-  Very High
-  High
-  Moderate
-  Moderate / Low
-  Low
-  Very Low
-  No Value
-  Roads
-  Municipal Boundary
-  Hydrology



Kensington Metropark Streambank Stabilization Siting

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



S3-KEN-003

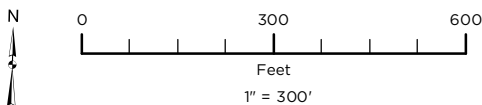
Length: 1,097.36 ft
Recommended Treatment: Coir Block with Live Stakes
Construction Cost: \$189,000

S3-KEN-003

-  Stream Stabilization Site
-  HCMA Park Boundary
- Streambank Erosion**
-  Very High
-  High
-  Moderate
-  Moderate / Low
-  Low
-  Very Low
-  No Value
-  Roads
-  Municipal Boundary
-  Hydrology



Kensington 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: June 25, 2019



Kensington Metropark Shoreline Summary and Recommendations

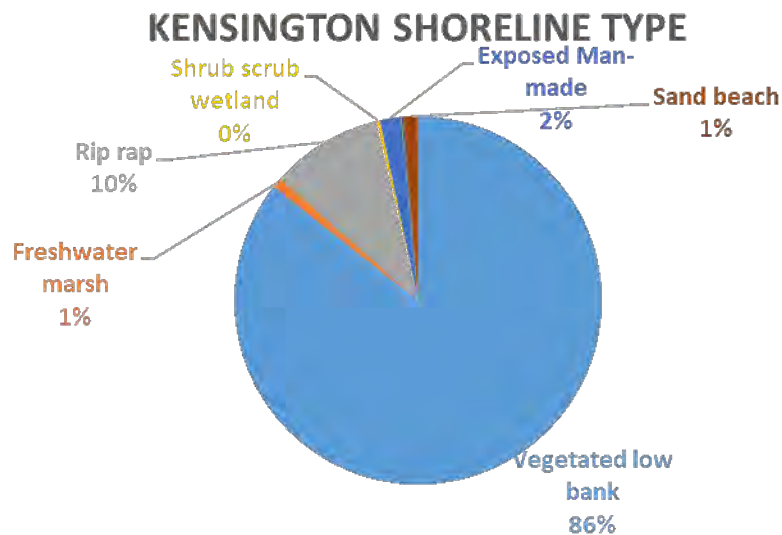


Major slumping in Kensington Metropark.

Table 7. Shoreline Inspection Summary

Erosion Condition	Length of Shoreline (ft)
Major	9,503.1
Minor	86,153.4
None	52,464.2
Total:	148,120.7
Restoration Cost:	\$151,777

Most of the shoreline in Kensington Metropark is part of Kent Lake. The rest is occasional small ponds which don't require restoration.



Proportion of each shoreline type present in Kensington Metropark.

Kensington Metropark

Shoreline Rehab Siting

- ◆ Shoreline Rehab Site
- Invasive Vegetation Pt**
- Invasive Type**

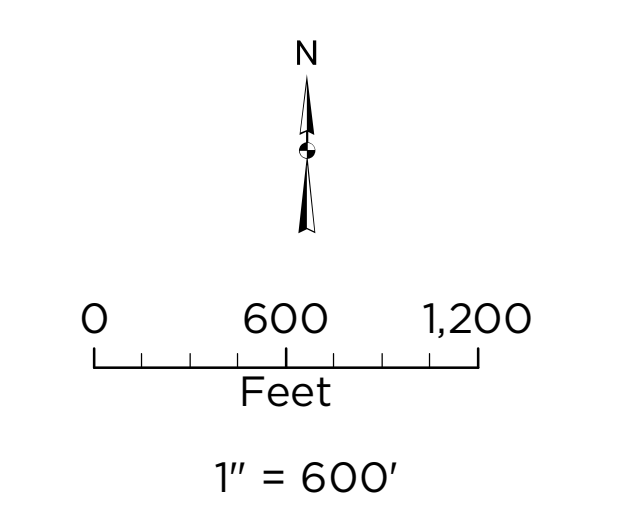
 - Black Alder
 - Cattail
 - Multiple
 - Other
 - Phragmites

- Invasive Density**

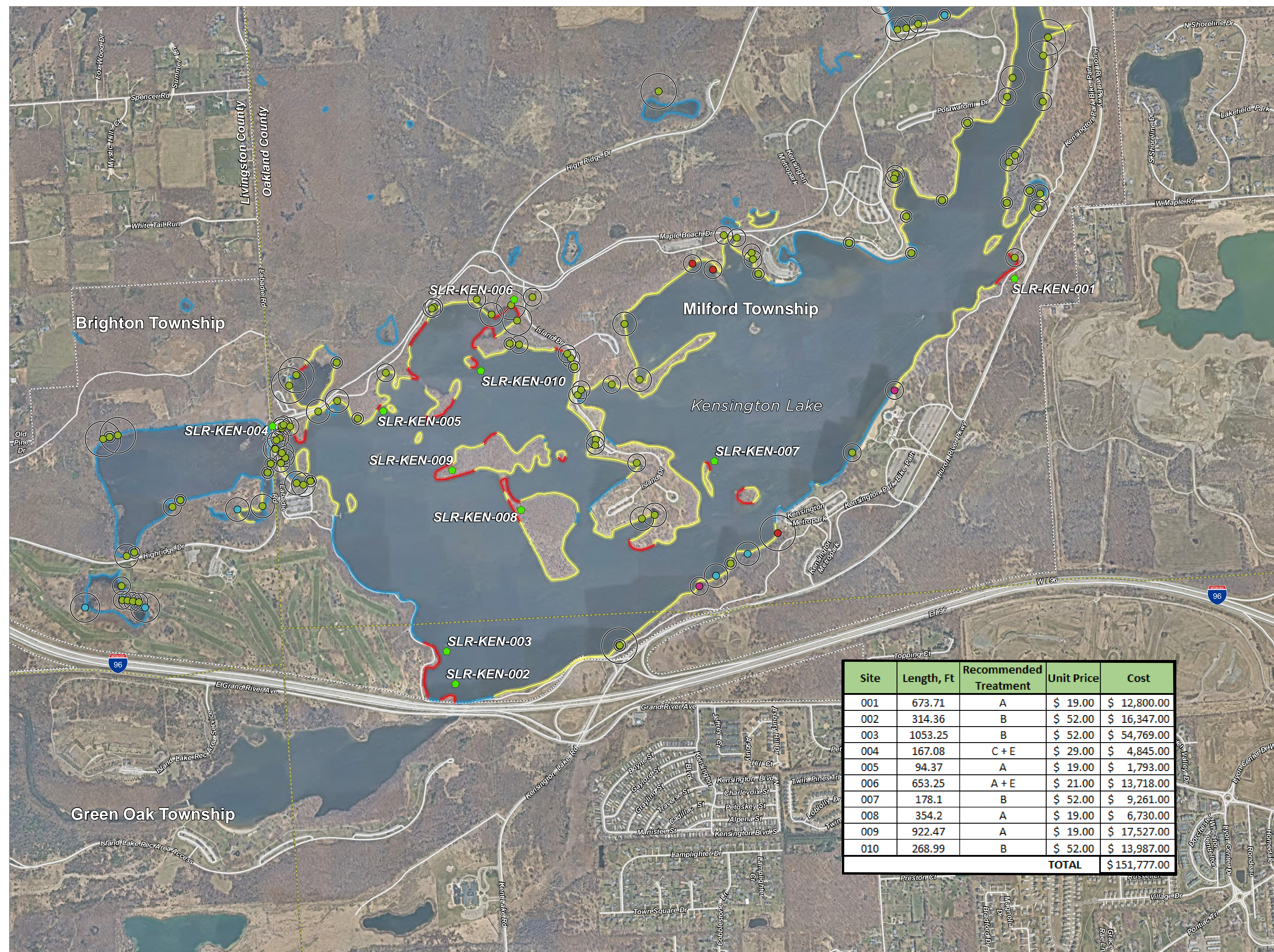
 - 1 - IND/FEW/SEV
 - 2 - < 1000 SF
 - 3 - > 1000 SF
 - 4 - 0.5 - 1 AC
 - 5 - > 1 AC

- Shoreline Condition**
- Slumping Severity**

 - Major
 - Minor
 - None
 - HCMA Park Boundary
 - Municipal Boundary
 - County Boundary
 - Roads

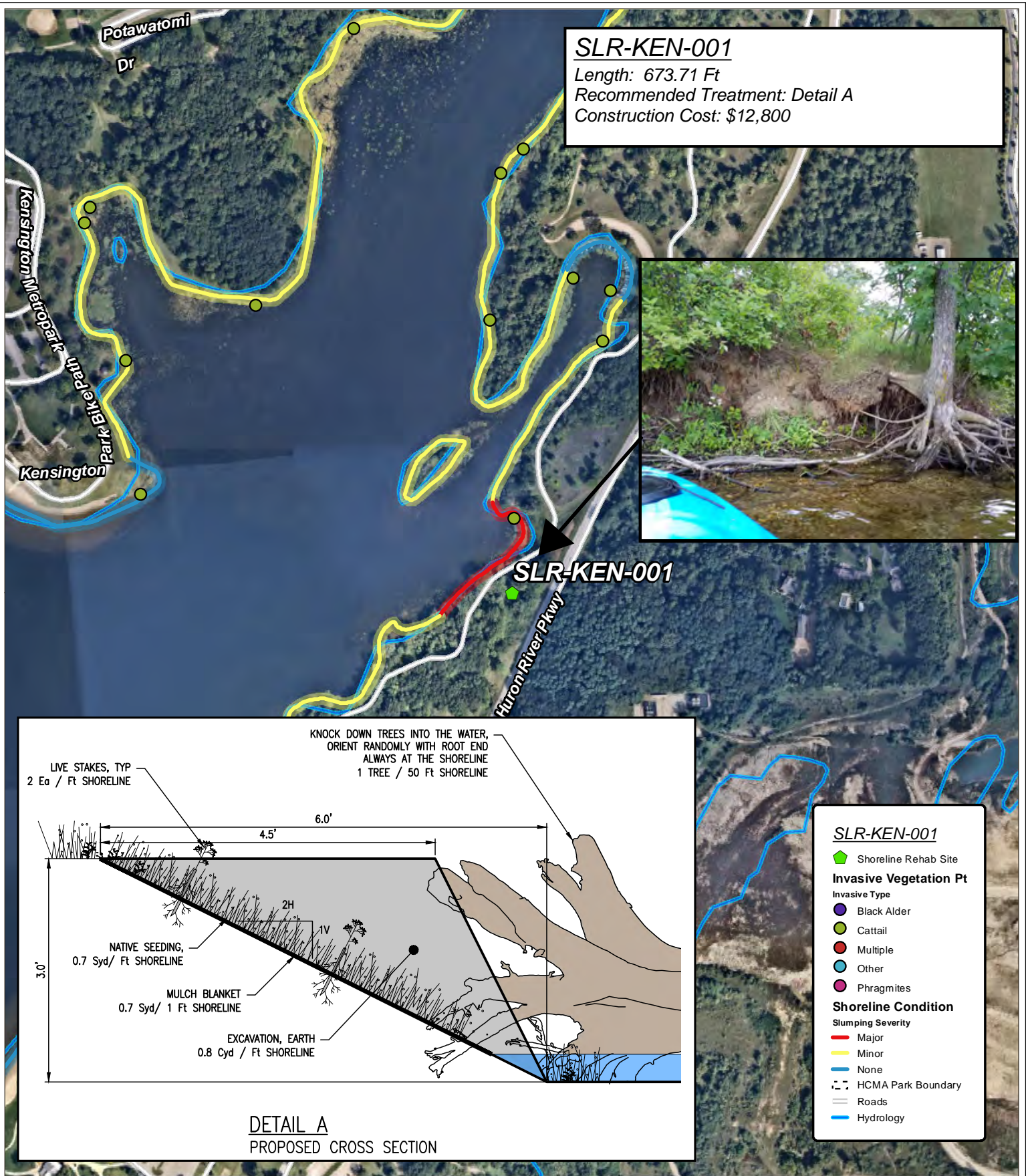


Site	Length, Ft	Recommended Treatment	Unit Price	Cost
001	673.71	A	\$ 19.00	\$ 12,800.00
002	314.36	B	\$ 52.00	\$ 16,347.00
003	1053.25	B	\$ 52.00	\$ 54,769.00
004	167.08	C + E	\$ 29.00	\$ 4,845.00
005	94.37	A	\$ 19.00	\$ 1,793.00
006	653.25	A + E	\$ 21.00	\$ 13,718.00
007	178.1	B	\$ 52.00	\$ 9,261.00
008	354.2	A	\$ 19.00	\$ 6,730.00
009	922.47	A	\$ 19.00	\$ 17,527.00
010	268.99	B	\$ 52.00	\$ 13,987.00
TOTAL				\$ 151,777.00

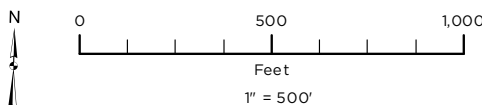


Source: Data provided by OHM Advisors, Huron Clinton Metroparks and Near Map. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own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

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 Map Published: June 24, 2019



Kensington Metropark Shoreline Rehabilitation Siting

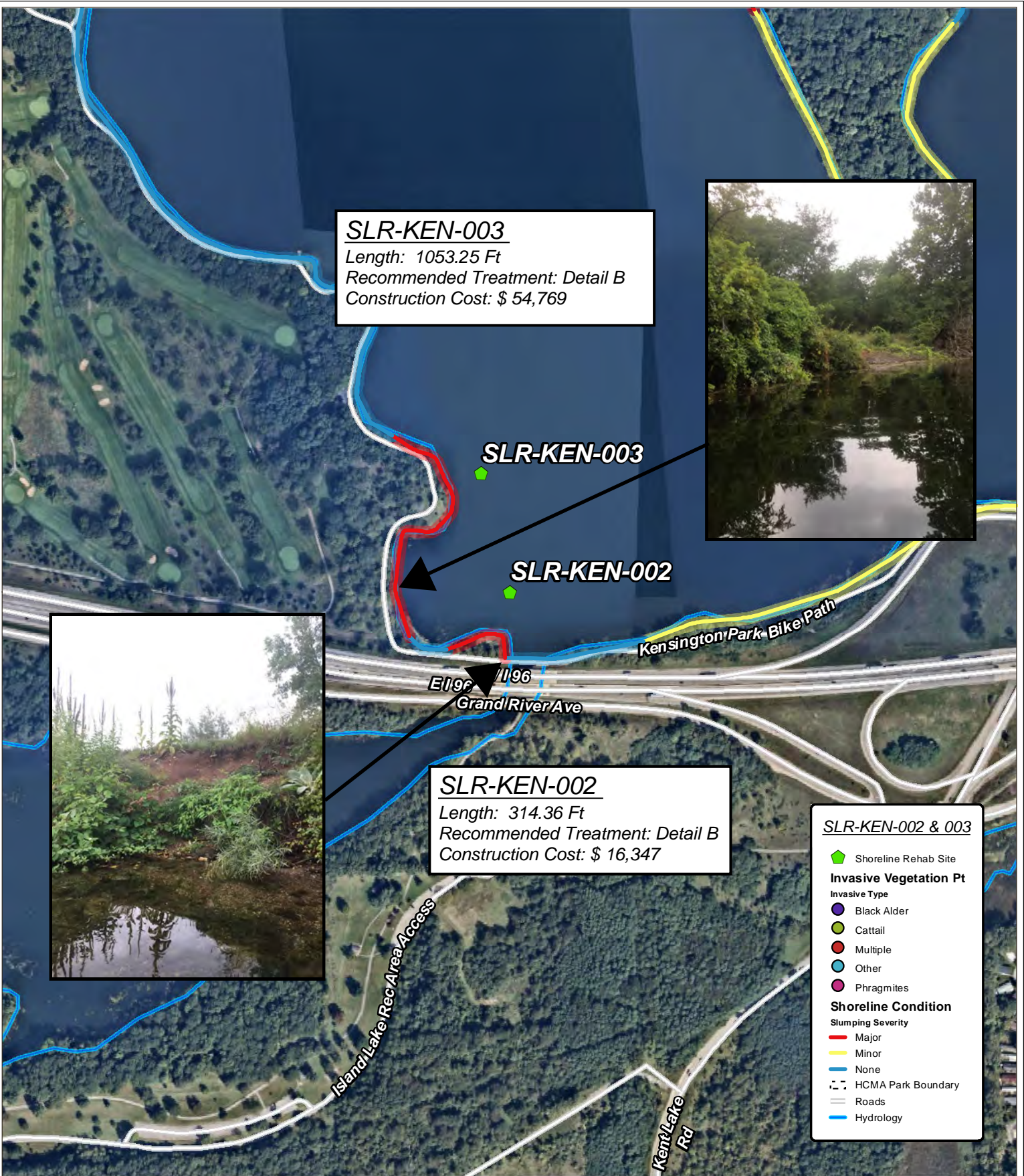


Source: Data provided by OHM Advisors, Huron Clinton Metroparks and Near Map. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own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

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

Map Published: October 22, 2019



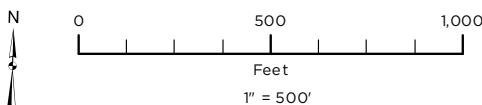


Kensington Metropark Shoreline Rehabilitation Siting

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: October 22, 2019

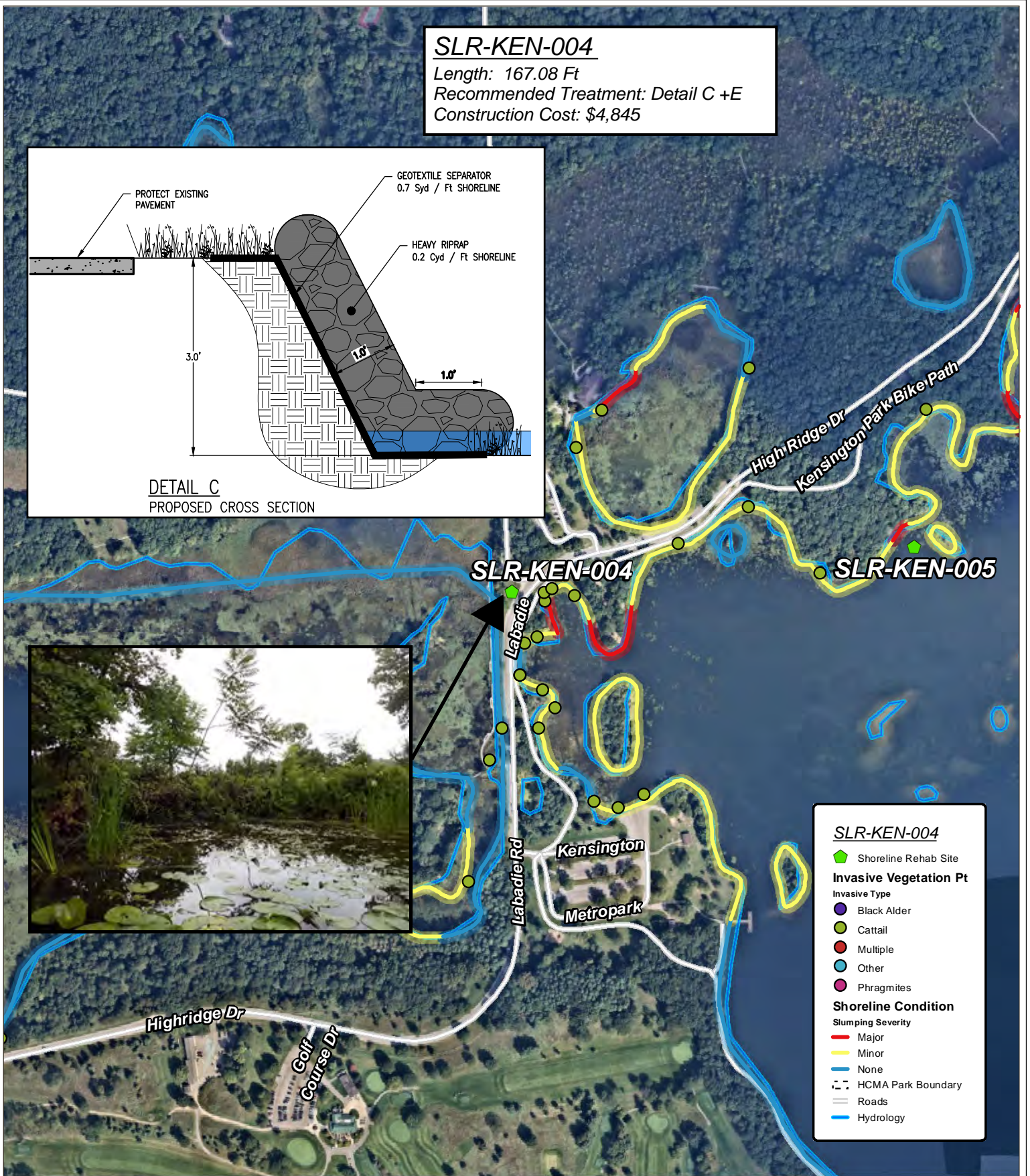
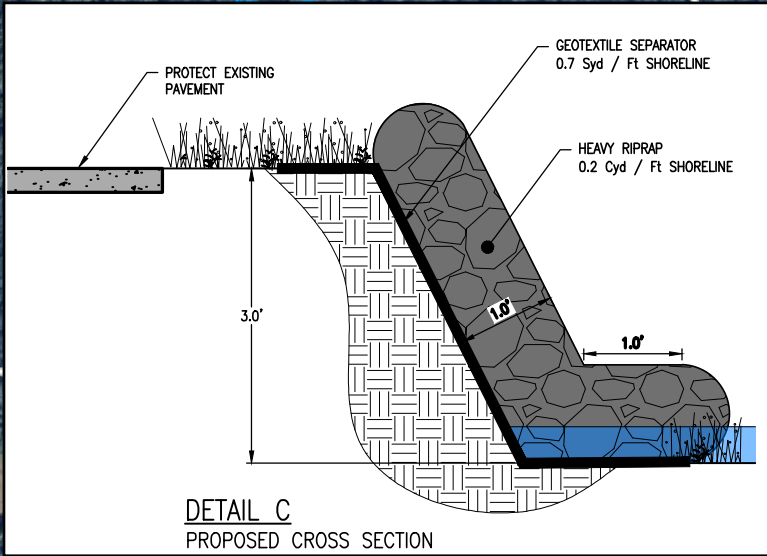


SLR-KEN-004

Length: 167.08 Ft

Recommended Treatment: Detail C +E

Construction Cost: \$4,845



SLR-KEN-004

- Shoreline Rehab Site

Invasive Vegetation Pt

Invasive Type

- Black Alder
- Cattail
- Multiple
- Other
- Phragmites

Shoreline Condition

Slumping Severity

- Major
- Minor
- None

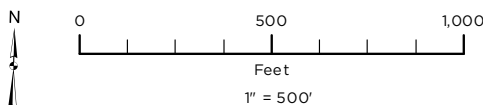
- HCMA Park Boundary
- Roads
- Hydrology

**Kensington Metropark
Shoreline Rehabilitation 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.

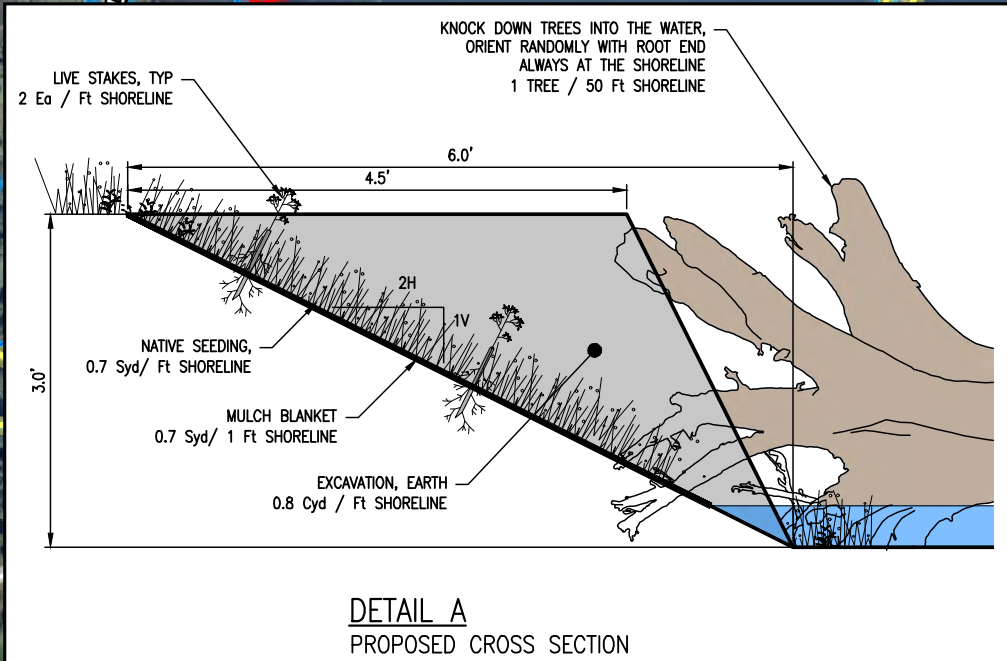
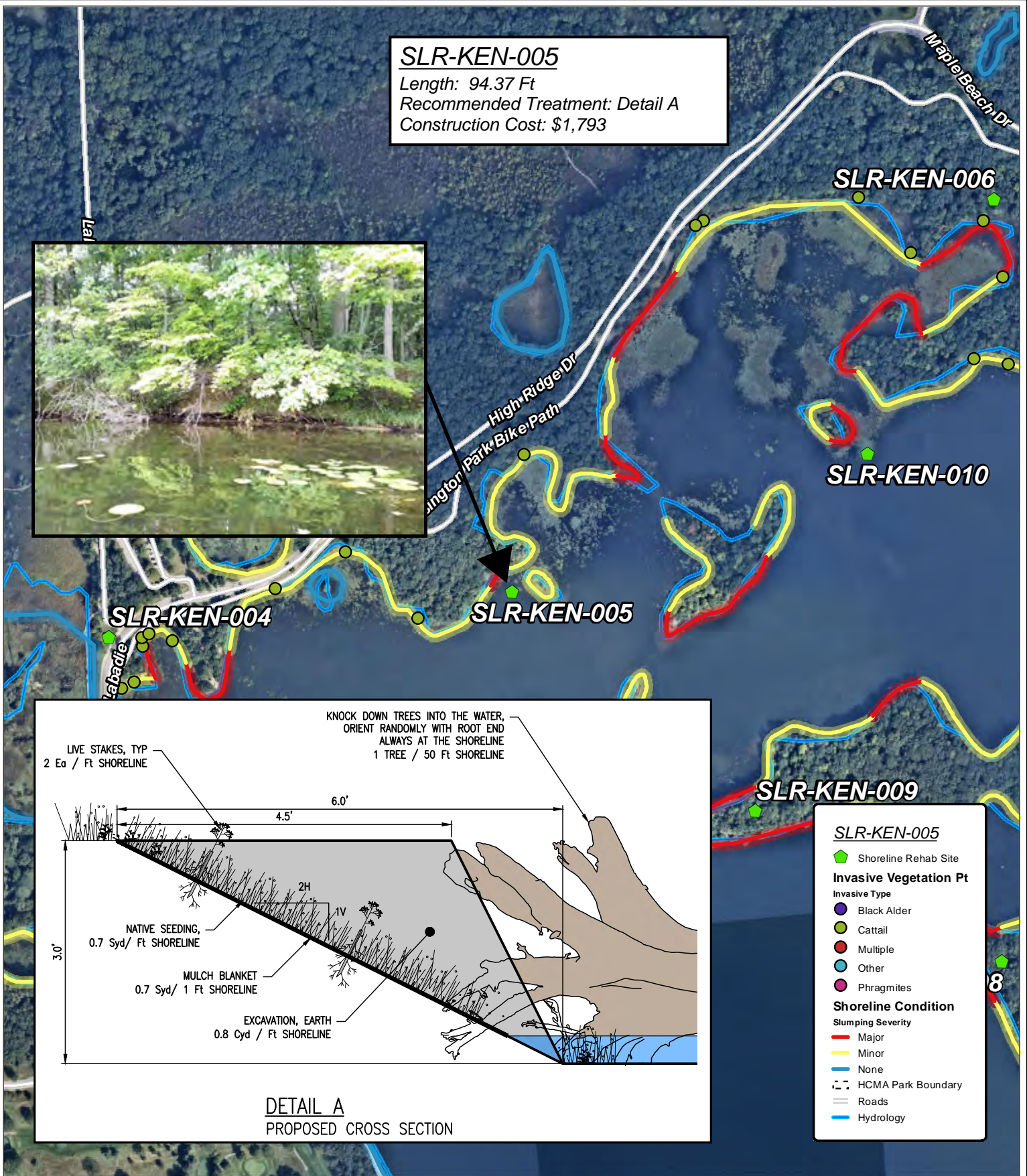
Coordinate System: NAD 1983 StatePlane: Michigan South FIPS 2113 Feet Intl

Map Published: October 22, 2019



SLR-KEN-005

Length: 94.37 Ft
 Recommended Treatment: Detail A
 Construction Cost: \$1,793



SLR-KEN-005

- Shoreline Rehab Site

Invasive Vegetation Pt

Invasive Type

- Black Alder
- Cattail
- Multiple
- Other
- Phragmites

Shoreline Condition

Slumping Severity

- Major
- Minor
- None

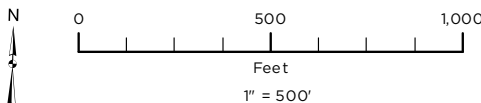
- HCMA Park Boundary
- Roads
- Hydrology

**Kensington Metropark
 Shoreline Rehabilitation 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.

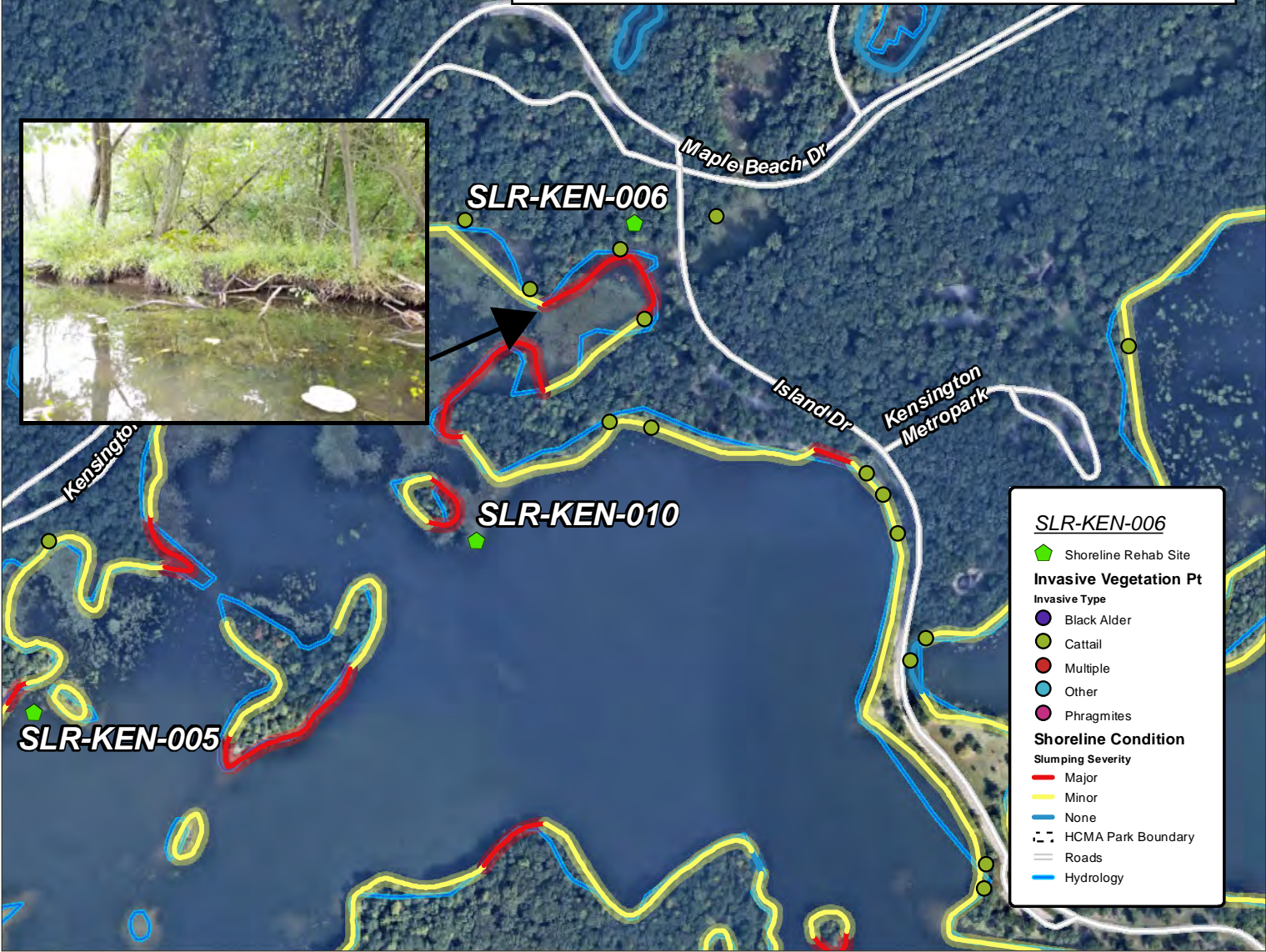
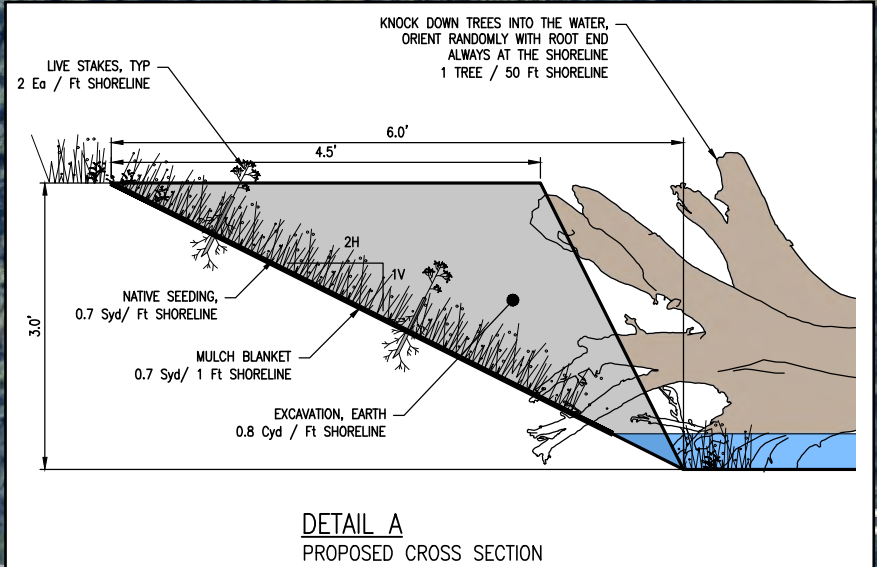
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Map Published: October 22, 2019



SLR-KEN-006

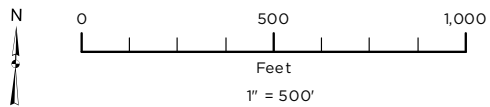
Length: 653.25 Ft
 Recommended Treatment: Detail A + E
 Construction Cost: \$ 13,718



Kensington Metropark Shoreline Rehabilitation 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: October 22, 2019

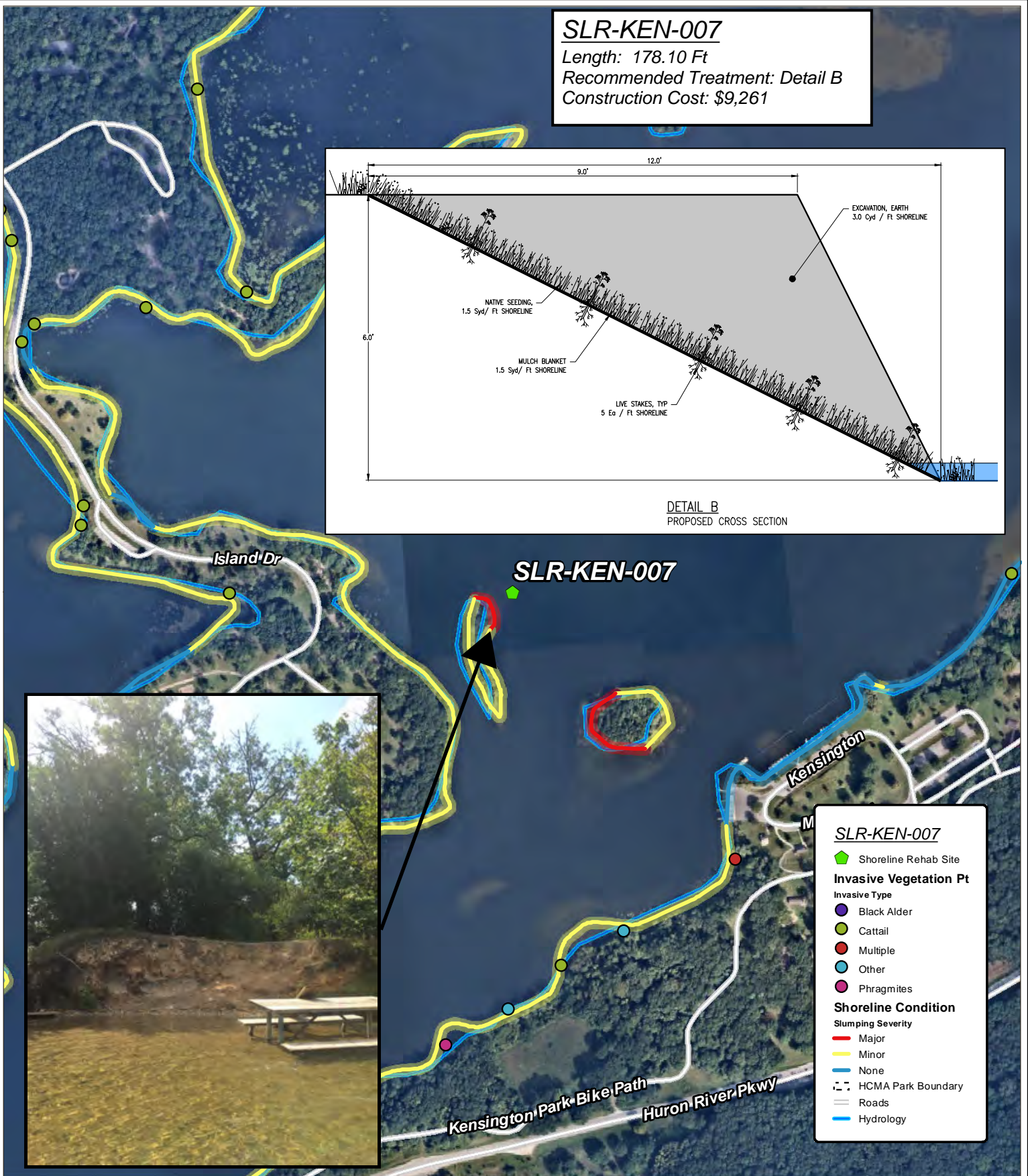
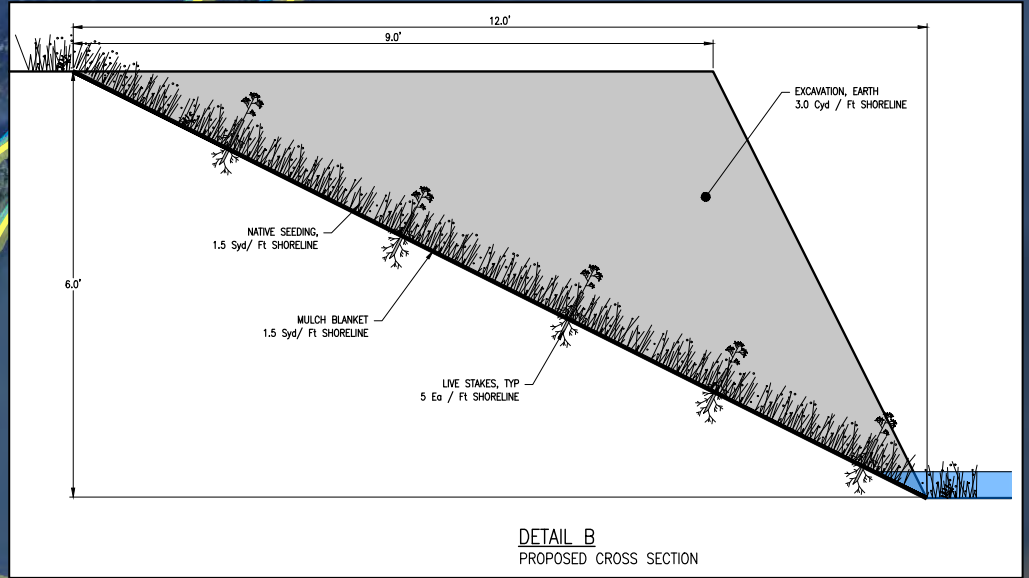


SLR-KEN-007

Length: 178.10 Ft

Recommended Treatment: Detail B

Construction Cost: \$9,261

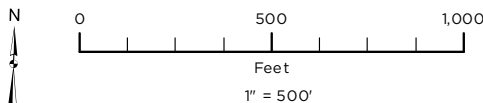


**Kensington Metropark
Shoreline Rehabilitation Siting**

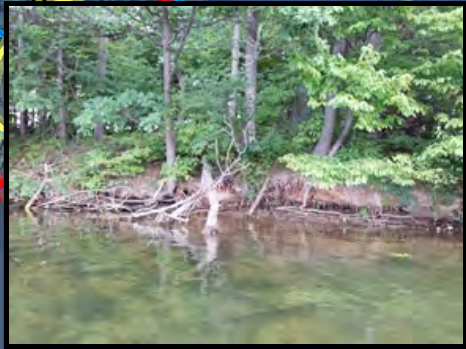
Source: Data provided by OHM Advisors, Huron Clinton Metroparks and Near Map. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own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

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Map Published: October 22, 2019



SLR-KEN-009
 Length: 922.47 Ft
 Recommended Treatment: Detail A
 Construction Cost: \$17,527

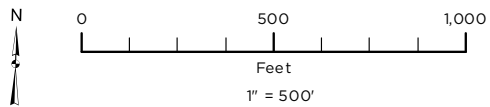


SLR-KEN-008
 Length: 354.20 Ft
 Recommended Treatment: Detail A
 Construction Cost: \$ 6,730

SLR-KEN-008 & 009

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

Kensington Metropark Shoreline Rehabilitation Siting



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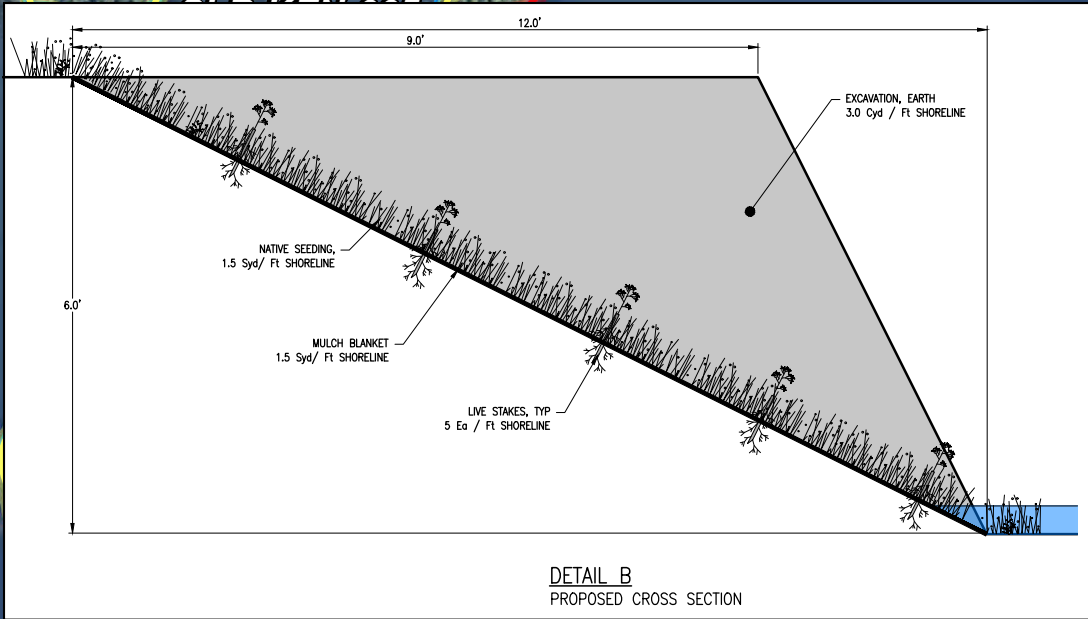
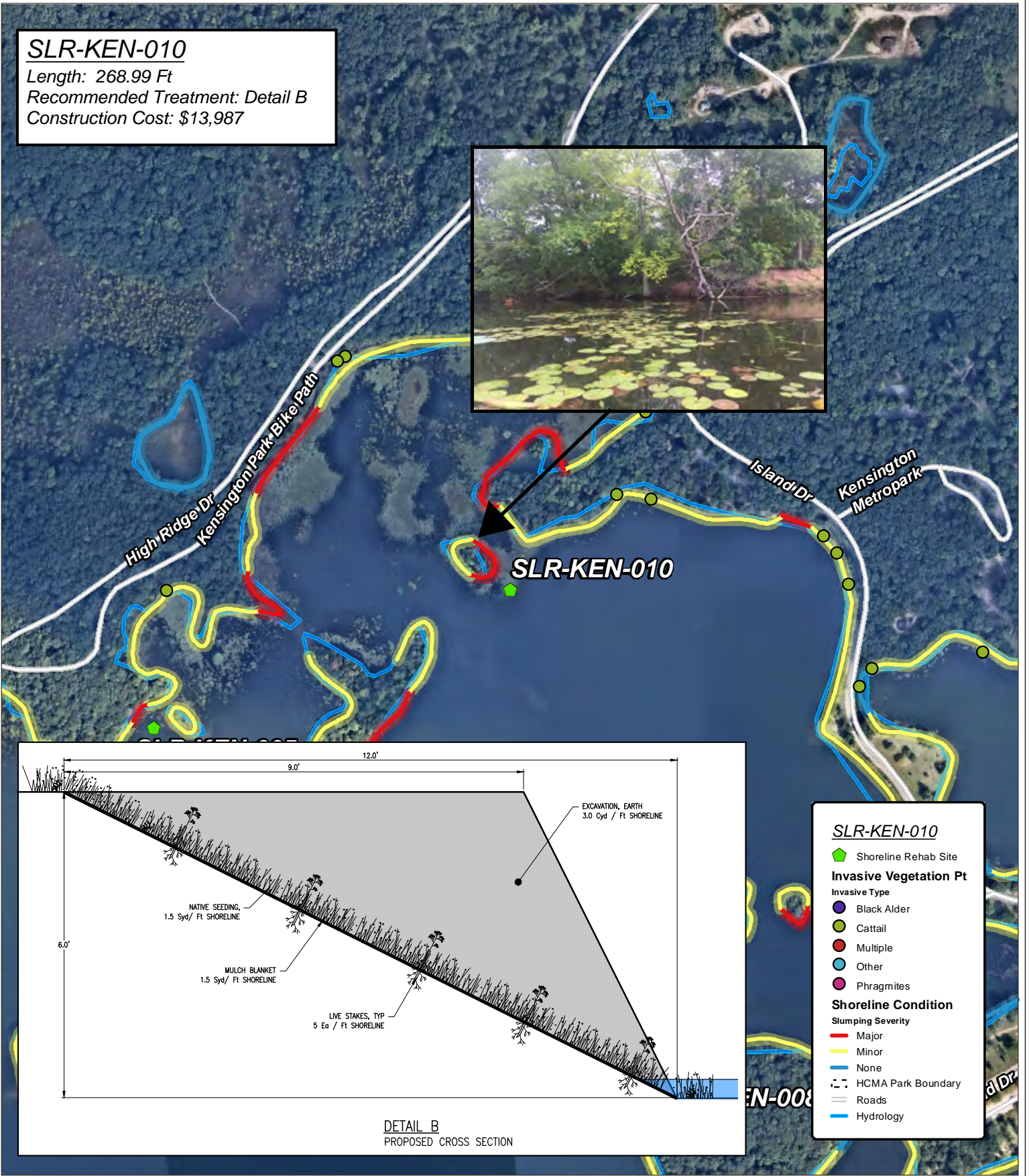


SLR-KEN-010

Length: 268.99 Ft

Recommended Treatment: Detail B

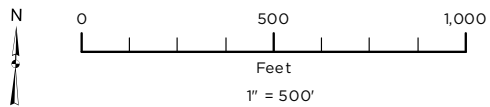
Construction Cost: \$13,987



SLR-KEN-010

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

Kensington Metropark Shoreline Rehabilitation Siting



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Map Published: October 22, 2019



Kensington Metropark Green Infrastructure Recommendations

In Kensington, 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. Kensington Green Infrastructure Recommendations

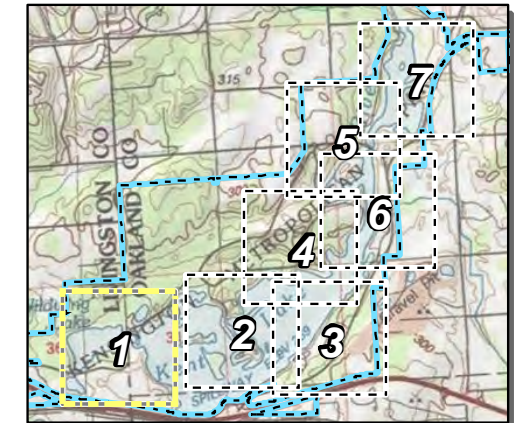
Site ID	Site	Practice Type	Treatment Surface Area (ft ²)	Cost Opinion	Cost per sq ft of Treatment Area (\$/ft ²)
GI-KEN-01	Shelter A	No Mow	23,535	\$0.00	\$0.00
GI-KEN-02	Shelter B	Naturalized Swale	2,592	\$4,406	\$1.70
GI-KEN-03	Shelter B	Naturalized Swale	7,547	\$12,830	\$1.70
GI-KEN-04	Martindale Beach/Splash	Bioswale	6,300	\$50,050	\$7.94
GI-KEN-05	Martindale Beach/Splash	Naturalized Swale	11,911	\$20,249	\$1.70
GI-KEN-06	Martindale Beach/Splash	Bioswale	6,780	\$53,863	\$7.94
GI-KEN-07	Martindale Beach/Splash	Bioswale	4,612	\$36,640	\$7.94
GI-KEN-08	Martindale Beach/Splash	Naturalized Swale	5,637	\$9,583	\$1.70
GI-KEN-09	Mitten Bay Docking	Naturalized Swale	5,996	\$10,193	\$1.70
GI-KEN-10	Mitten Bay Docking	Naturalized Swale	9,649	\$16,403	\$1.70
GI-KEN-11	Mitten Bay Docking	Bioswale	7,350	\$58,392	\$7.94
GI-KEN-12	Shelter D	Naturalized Swale	2,199	\$3,738	\$1.70
GI-KEN-13	Shelter D	Pavement Removal	26,280	\$121,472	\$4.62
GI-KEN-14	Farm Center	Naturalized Swale	4,134	\$7,028	\$1.70
GI-KEN-15	Farm Center	Naturalized Swale	4,058	\$6,899	\$1.70
GI-KEN-16	Shelter D	Naturalized Swale	3,015	\$5,126	\$1.70

Site ID	Site	Practice Type	Treatment Surface Area (ft ²)	Cost Opinion	Cost per sq ft of Treatment Area (\$/ft ²)
GI-KEN-17	Park Office	Naturalized Swale	6,534	\$11,108	\$1.70
GI-KEN-18	Maple Beach Drive	Naturalized Swale	2,465	\$4,191	\$1.70
GI-KEN-19	Shelter F	Bioswale	5,900	\$46,872	\$7.94
GI-KEN-20	Shelter I	Bioswale	6,050	\$48,064	\$7.94
GI-KEN-21	Shelter J	Bioswale	2,270	\$18,034	\$7.94
GI-KEN-22	Shelter J	Bioswale	1,850	\$14,697	\$7.94
GI-KEN-23	Maple Beach	Stormwater Treatment Wetland	4,200	\$47,407	\$11.29
GI-KEN-24	Maple Beach	Bioswale	11,333	\$90,034	\$7.94
GI-KEN-25	Maple Beach	Pavement Removal	93,450	\$656,227	\$7.02
GI-KEN-26	Boat Rental	Porous Pavement	16,827	\$419,678	\$24.94
GI-KEN-27	Shelter L	Pavement Removal	61,599	\$432,562	\$7.02
GI-KEN-28	Turtle Head	Bioswale	1,980	\$15,730	\$7.94
GI-KEN-29	Turtle Head	Bioswale	2,010	\$15,968	\$7.94
GI-KEN-30	Nature Center	Bioswale	6,030	\$47,905	\$7.94
GI-KEN-31	Golf Course	Bioswale	6,100	\$48,461	\$7.94
GI-KEN-32	Golf Course	Rain Garden	3,526	\$35,015	\$9.93
GI-KEN-33	Shelter J	Pavement Removal	10,444	\$73,340	\$7.02
GI-KEN-34	Maple Beach	Naturalized Swale	1,520	\$2,584	\$1.70
GI-KEN-35	Shelter K	Pavement Removal	23,937	\$168,091	\$7.02
Total:			399,620	\$2,612,840	

Kensington Metropark

Green Infrastructure Recommendation Areas

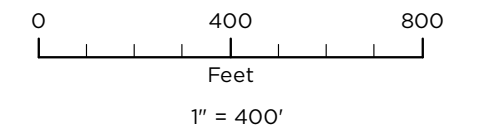
Area: 1 of 7



Recommendation Area

GSI Type

-  Bioswale (2)
-  Rain Garden (1)
-  Stormwater Gravity Main
-  Culvert (17)
-  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

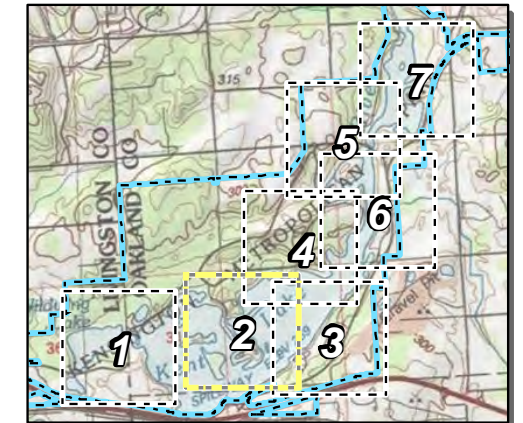
Map Published: October 1, 2019



Kensington Metropark






Green Infrastructure Recommendation Areas

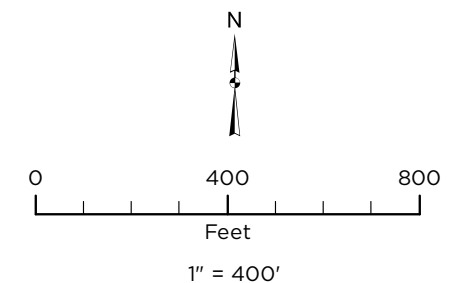
Area: 2 of 7



Recommendation Area

GSI Type

-  Bioswale (2)
-  Stormwater Gravity Main
-  Culvert (5)
-  HCMA Park Boundary
-  Roads



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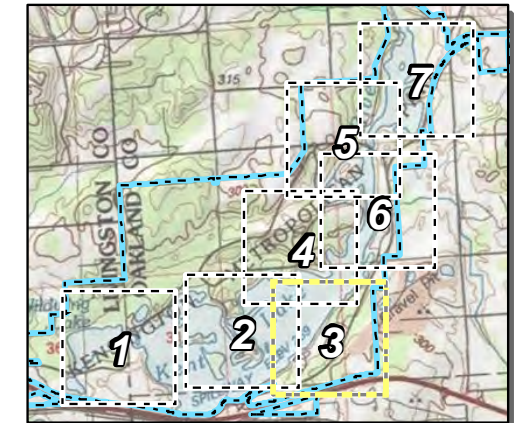
Map Published: October 1, 2019



Kensington Metropark

Green Infrastructure Recommendation Areas

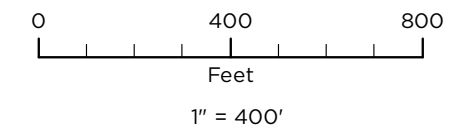
Area: 3 of 7



Recommendation Area

GSI Type

- Bioswale (3)
- Naturalized Swale (4)
- Stormwater Gravity Main
- Culvert (19)
- HCMA Park Boundary
- Roads



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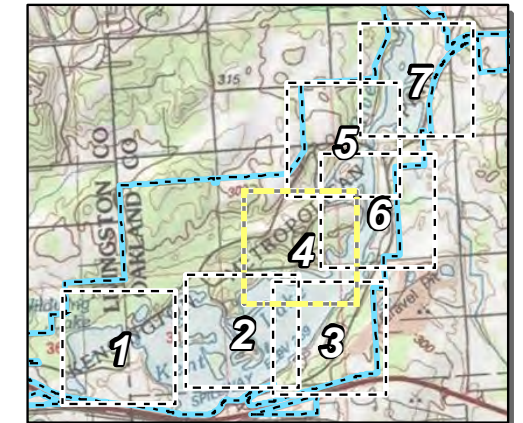
Map Published: October 1, 2019



Kensington Metropark

Green Infrastructure Recommendation Areas

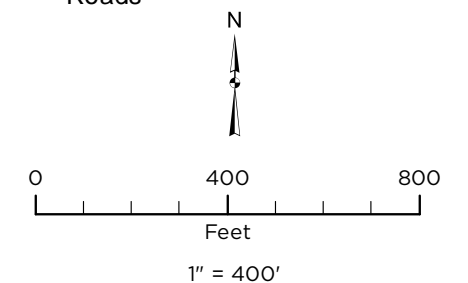
Area: 4 of 7



Recommendation Area

GSI Type

- Bioswale (5)
- Naturalized Swale (1)
- Porous Pavement (1)
- Stormwater Treatment Wetland (1)
- Pavement Removal (4)
- Stormwater Gravity Main
- Culvert (26)
- HCMA Park Boundary
- Roads



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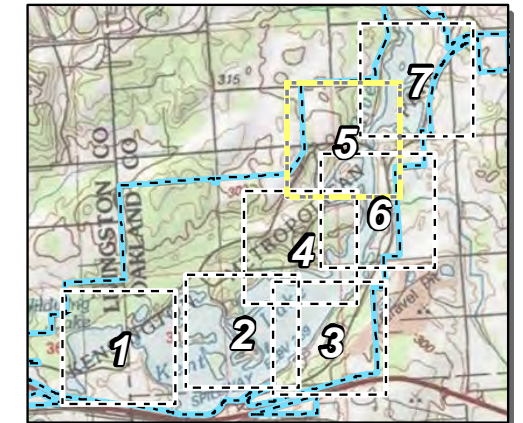
Map Published: October 1, 2019



Kensington Metropark






Green Infrastructure Recommendation Areas

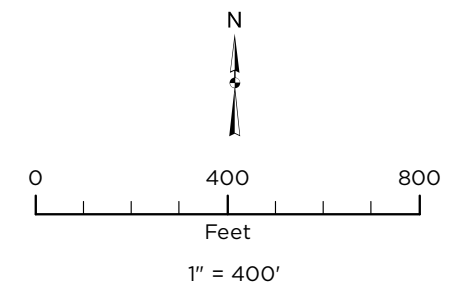
Area: 5 of 7



Recommendation Area

GSI Type

-  Naturalized Swale (4)
-  Stormwater Gravity Main
-  Culvert (17)
-  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

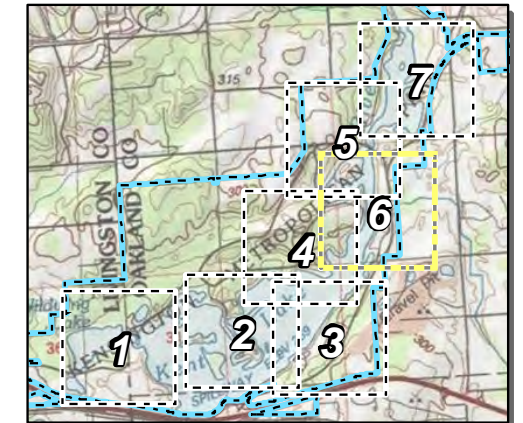
Map Published: October 1, 2019



Kensington Metropark

Green Infrastructure Recommendation Areas

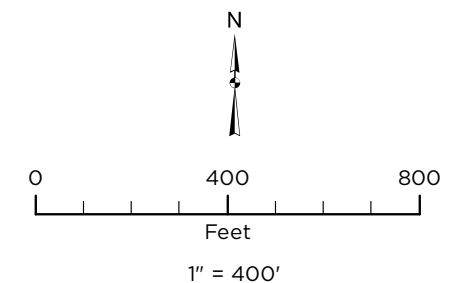
Area: 6 of 7



Recommendation Area

GSI Type

- Bioswale (4)
- Naturalized Swale (2)
- Pavement Removal (1)
- Stormwater Gravity Main
- Culvert (16)
- 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

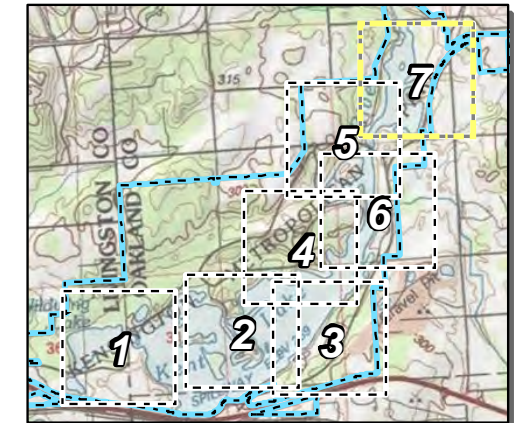
Map Published: October 1, 2019



Kensington Metropark

Green Infrastructure Recommendation Areas

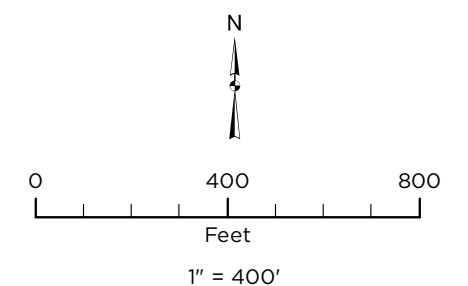
Area: 7 of 7



Recommendation Area

GSI Type

- Naturalized Swale (2)
- Pavement Removal (1)
- Stormwater Gravity Main
- Culvert (2)
- 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

Kensington 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. Kensington Culvert Repair Priorities

Culvert ID	Diameter (in)	Length (ft)	Condition	Maintenance Need	Cost Opinion
CUL-KEN-015	24	67	Failing	Replacement	\$13,344
CUL-KEN-014	24	65	Failing	Replacement	\$13,078
CUL-KEN-053	14	29	Failing	Replacement	\$3,644
CUL-KEN-055	14	23	Failing	Replacement	\$2,931
CUL-KEN-078	18	13	Failing	Replacement	\$1,903
CUL-KEN-054	14	18	Failing	Replacement	\$2,249
CUL-KEN-052	14	17	Failing	Replacement	\$2,141
CUL-KEN-036	12	19	Failing	Replacement	\$2,378
CUL-KEN-079	10	19	Failing	Replacement	\$1,864
CUL-KEN-024	10	17	Failing	Replacement	\$1,715
CUL-KEN-085	12	8	Failing	Replacement	\$938
CUL-KEN-063	10	10	Failing	Replacement	\$1,049
CUL-KEN-098	18	123	Poor	Replacement	\$18,450
CUL-KEN-005	20	73	Poor	Replacement	\$10,913
CUL-KEN-026	24	45	Poor	Replacement	\$9,027
CUL-KEN-089	18	51	Poor	Replacement	\$7,595
CUL-KEN-075	18	41	Poor	Replacement	\$6,153
CUL-KEN-065	18	37	Poor	Replacement	\$5,558
CUL-KEN-033	18	36	Poor	Replacement	\$5,452
CUL-KEN-034	18	36	Poor	Replacement	\$5,338
CUL-KEN-041	12	73	Poor	Replacement	\$9,139
CUL-KEN-039	24	17	Poor	Replacement	\$3,495
CUL-KEN-048	12	50	Poor	Replacement	\$6,285
CUL-KEN-013	12	39	Poor	Replacement	\$4,826
CUL-KEN-032	14	26	Poor	Replacement	\$3,303
CUL-KEN-027	12	21	Poor	Replacement	\$2,572
CUL-KEN-042	12	18	Poor	Replacement	\$2,215
CUL-KEN-035	12	17	Poor	Replacement	\$2,082
CUL-KEN-060	10	16	Poor	Replacement	\$1,568
CUL-KEN-080	18	53	Moderate	Immediate Cleanout	\$210
CUL-KEN-007	12	55	Moderate	Immediate Cleanout	\$192

Culvert ID	Diameter (in)	Length (ft)	Condition	Maintenance Need	Cost Opinion
CUL-KEN-009	14	100	Moderate	Future Cleanout	\$349
CUL-KEN-023	18	68	Fair	Future Cleanout	\$274
CUL-KEN-020	18	60	Fair	Future Cleanout	\$242
CUL-KEN-074	18	42	Moderate	Immediate Cleanout	\$170
CUL-KEN-069	12	48	Moderate	Immediate Cleanout	\$168
CUL-KEN-068	12	49	Fair	Immediate Cleanout	\$173
CUL-KEN-040	18	40	Moderate	Future Cleanout	\$160
CUL-KEN-051	16	40	Moderate	Future Cleanout	\$160
CUL-KEN-018	14	40	Moderate	Future Cleanout	\$139
CUL-KEN-066	12	31	Moderate	Future Cleanout	\$107
CUL-KEN-043	12	20	Moderate	Future Cleanout	\$68
CUL-KEN-010	12	17	Moderate	Future Cleanout	\$59
CUL-KEN-016	8	26	Moderate	Future Cleanout	\$92
CUL-KEN-050	6	20	Moderate	Future Cleanout	\$69
CUL-KEN-076	18	41	Fair	Future Cleanout	\$164
CUL-KEN-044	12	20	Fair	Future Cleanout	\$68
CUL-KEN-003	12	16	Fair	Future Cleanout	\$57
CUL-KEN-064	12	12	Fair	Future Cleanout	\$43
Total:					\$154,170

Table 10. Kensington Outfall Repair Priorities

Outfall ID	Diameter (in)	Condition	Maintenance Need	Cost Opinion
SDC-KEN-037	6	Failing	Replacement	\$5,000
SDC-KEN-003	12	Failing	Replacement	\$6,250
SDC-KEN-010	18	Failing	Replacement	\$7,500
SDC-KEN-009	6	Poor	Replacement	\$5,000
SDC-KEN-015	10	Poor	Replacement	\$5,000
SDC-KEN-001	12	Poor	Replacement	\$6,250
SDC-KEN-004	12	Poor	Replacement	\$6,250
SDC-KEN-044	12	Poor	Replacement	\$6,250
SDC-KEN-022	20	Poor	Replacement	\$7,500
SDC-KEN-032	20	Poor	Replacement	\$7,500
SDC-KEN-030	12	Moderate	Immediate Cleanout	\$175
SDC-KEN-029	12	Moderate	Future Cleanout	\$175
SDC-KEN-021	21	Moderate	Future Cleanout	\$200
SDC-KEN-033	21	Moderate	Future Cleanout	\$200
SDC-KEN-041	21	Moderate	Future Cleanout	\$200
Total:				\$63,450

Table 11. Kensington Stormwater Gravity Main Repair Priorities

Stormwater Gravity Main ID	Diameter (in)	Length (ft)	Maintenance Need	Cost Opinion
STG-KEN-0135	12	44	Complete Replacement	\$7,649
STG-KEN-0109	24	98	Complete Replacement	\$27,300
STG-KEN-0103	12	44	Complete Replacement	\$7,649
STG-KEN-0100	12	58	Complete Replacement	\$10,115
STG-KEN-0145	8	159	Full Liner	\$6,368
STG-KEN-0009	15	78	Full Liner	\$5,850
STG-KEN-0071	12	128	Full Liner	\$6,400
STG-KEN-0140	18	131	Full Liner	\$12,464
STG-KEN-0005	12	15	Partial Replacement, Re-inspection	\$22,419
STG-KEN-0052	12	106	Partial Replacement	\$11,200
STG-KEN-0058	12	175	Partial Replacement, Grouting	\$15,180
STG-KEN-0082	12	182	Spot Liner(s)	\$8,000
STG-KEN-0029	12	75	Grouting	\$1,878
STG-KEN-0027	12	76	Cutting and Grouting	\$2,079
STG-KEN-0110	24	250	Cutting and Grouting	\$17,883
Total:				\$162,434

Table 12. Kensington Stream Restoration Priorities

Stream Stabilization Site ID	Length (ft)	Erosion Severity	Recommended Treatment	Unit Cost (\$/ft)	Cost Opinion
S3-KEN-003	1,097.36	High	Coir Block with Live Stakes	172	\$189,000
S3-KEN-001	987.51	High	Coir Block with Live Stakes	172	\$170,000
S3-KEN-002	351.27	High	Soil Lifts with Live Stakes	678	\$239,000
Total:					\$598,000

Table 13. Kensington Shoreline Restoration Priorities

Shoreline Restoration Site ID	Length (ft)	Recommended Treatment	Unit Cost (\$/ft)	Cost Opinion
SLR-KEN-001	673.71	A (Tree Removal, Excavation, and Plant Restoration)	\$19	\$12,800
SLR-KEN-002	314.36	B (Excavation and Plant Restoration)	\$52	\$16,347
SLR-KEN-003	1,053.25	B (Excavation and Plant Restoration)	\$52	\$54,769
SLR-KEN-004	167.08	C+E (Riprap and Invasive Species Removal)	\$29	\$4,845
SLR-KEN-005	94.37	A (Tree Removal, Excavation, and Plant Restoration)	\$19	\$1,793
SLR-KEN-006	653.25	A+E (Tree Removal, Excavation, Plant Restoration, and Invasive Species Removal)	\$21	\$13,718
SLR-KEN-007	178.1	B (Excavation and Plant Restoration)	\$52	\$9,261
SLR-KEN-008	354.2	A (Tree Removal, Excavation, and Plant Restoration)	\$19	\$6,730
SLR-KEN-009	922.47	A (Tree Removal, Excavation, and Plant Restoration)	\$19	\$17,527
SLR-KEN-010	268.99	B (Excavation and Plant Restoration)	\$52	\$13,987
Total:				\$151,777

Table 14. Kensington 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)
<u>GI-KEN-28</u>	<u>Turtle Head</u>	<u>Bioswale</u>	<u>1,980</u>	<u>\$15,730</u>	<u>\$7.94</u>
<u>GI-KEN-22</u>	<u>Shelter J</u>	<u>Bioswale</u>	<u>1,850</u>	<u>\$14,697</u>	<u>\$7.94</u>
<u>GI-KEN-01</u>	Shelter A	No Mow	23,535	\$0.00	\$0.00
<u>GI-KEN-05</u>	Martindale Beach/Splash	Naturalized Swale	11,911	\$20,249	\$1.70

Site ID	Site	Practice Type	Treatment Surface Area (ft ²)	Cost Opinion	Cost per sq ft of Treatment Area (\$/ft ²)
GI-KEN-10	Mitten Bay Docking	Naturalized Swale	9,649	\$16,403	\$1.70
GI-KEN-03	Shelter B	Naturalized Swale	7,547	\$12,830	\$1.70
GI-KEN-17	Park Office	Naturalized Swale	6,534	\$11,108	\$1.70
GI-KEN-09	Mitten Bay Docking	Naturalized Swale	5,996	\$10,193	\$1.70
GI-KEN-08	Martindale Beach/Splash	Naturalized Swale	5,637	\$9,583	\$1.70
GI-KEN-14	Farm Center	Naturalized Swale	4,134	\$7,028	\$1.70
GI-KEN-15	Farm Center	Naturalized Swale	4,058	\$6,899	\$1.70
GI-KEN-16	Shelter D	Naturalized Swale	3,015	\$5,126	\$1.70
GI-KEN-02	Shelter B	Naturalized Swale	2,592	\$4,406	\$1.70
GI-KEN-18	Maple Beach Drive	Naturalized Swale	2,465	\$4,191	\$1.70
GI-KEN-12	Shelter D	Naturalized Swale	2,199	\$3,738	\$1.70
GI-KEN-34	Maple Beach	Naturalized Swale	1,520	\$2,584	\$1.70
GI-KEN-24	Maple Beach	Bioswale	11,333	\$90,034	\$7.94
GI-KEN-11	Mitten Bay Docking	Bioswale	7,350	\$58,392	\$7.94
GI-KEN-06	Martindale Beach/Splash	Bioswale	6,780	\$53,863	\$7.94
GI-KEN-04	Martindale Beach/Splash	Bioswale	6,300	\$50,050	\$7.94
GI-KEN-31	Golf Course	Bioswale	6,100	\$48,461	\$7.94
GI-KEN-20	Shelter I	Bioswale	6,050	\$48,064	\$7.94
GI-KEN-30	Nature Center	Bioswale	6,030	\$47,905	\$7.94
GI-KEN-19	Shelter F	Bioswale	5,900	\$46,872	\$7.94

Site ID	Site	Practice Type	Treatment Surface Area (ft ²)	Cost Opinion	Cost per sq ft of Treatment Area (\$/ft ²)
GI-KEN-07	Martindale Beach/Splash	Bioswale	4,612	\$36,640	\$7.94
GI-KEN-21	Shelter J	Bioswale	2,270	\$18,034	\$7.94
GI-KEN-29	Turtle Head	Bioswale	2,010	\$15,968	\$7.94
GI-KEN-32	Golf Course	Rain Garden	3,526	\$35,015	\$9.93
GI-KEN-23	Maple Beach	Stormwater Treatment Wetland	4,200	\$47,407	\$11.29
GI-KEN-25	Maple Beach	Pavement Removal	93,450	\$656,227	\$7.02
GI-KEN-27	Shelter L	Pavement Removal	61,599	\$432,562	\$7.02
GI-KEN-13	Shelter D	Pavement Removal	26,280	\$121,472	\$4.62
GI-KEN-35	Shelter K	Pavement Removal	23,937	\$168,091	\$7.02
GI-KEN-26	Boat Rental	Porous Pavement	16,827	\$419,678	\$24.94
GI-KEN-33	Shelter J	Pavement Removal	10,444	\$73,340	\$7.02
Total:			399,620	\$2,612,840	