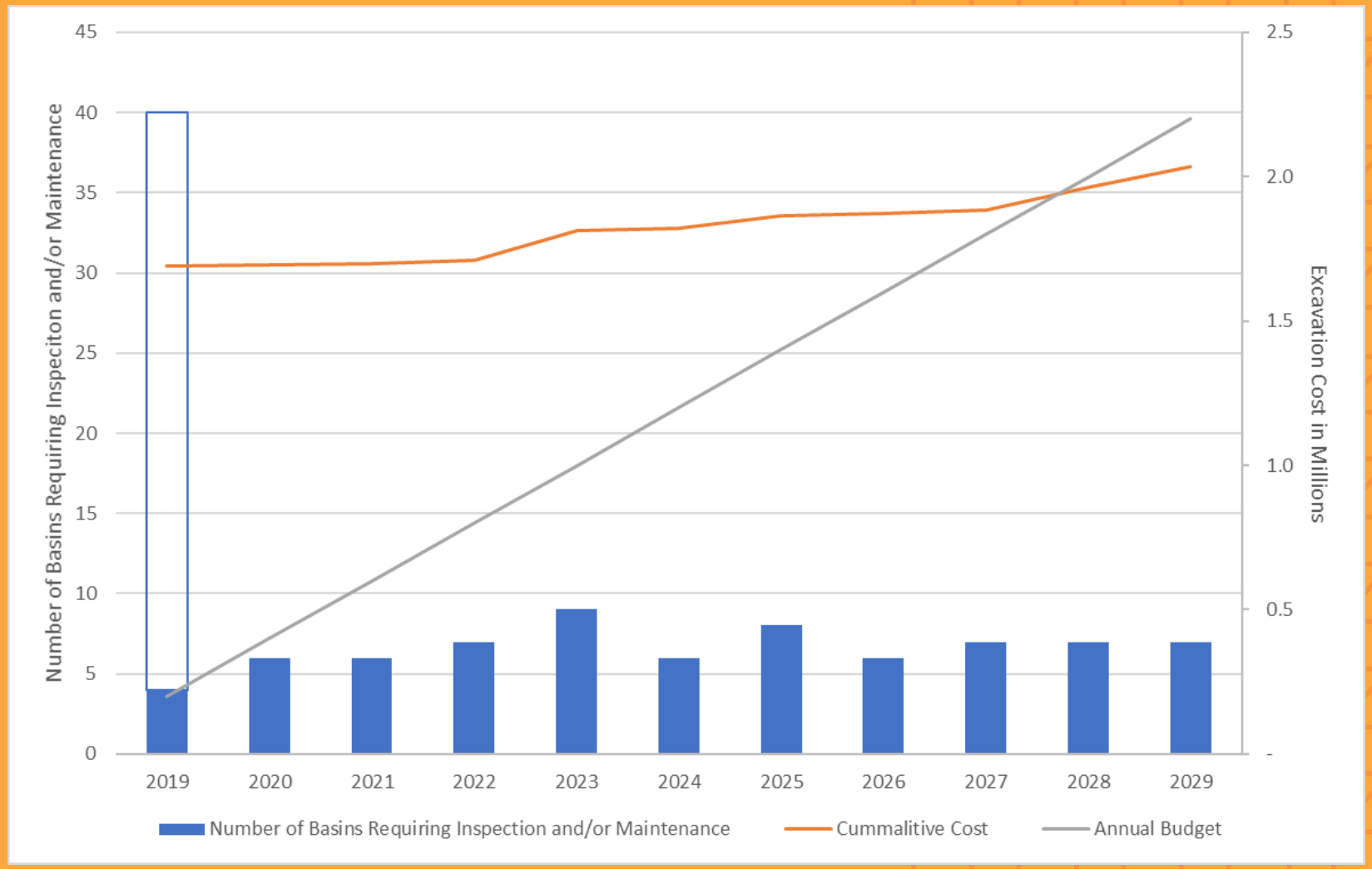
Is BMP Management Making You Feel SWAMPed?

May 4, 2022

Do your maintenance needs exceed your resources available?



SWAMP Benefits

- Stormwater BMPs are assets

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- Manage benefits of BMPs in perpetuity

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- Simplify operations and maintenance of stormwater BMPs

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- Simplify operations and maintenance of stormwater BMPs
- Prioritize inspection/maintenance
- Remove perceived politics from maintenance
- Schedule and budget activities
- Meet regulatory permit requirements

Minnesota Pollution Control Agency

MS4 Permit Requirements

- Minnesota Pollution Control Agency and MS4 permit require cities/agencies to have a SOP for inspection and maintenance of all owned and operated BMPs.
- Also requires cities to determine treatment effectiveness of stormwater basins.

Validation of SWAMP

- Developed to meet Client's needs
- Incorporated input from regulatory agencies
- Calibrated using:
  - Sediment Studies
  - Hundreds of Pond Surveys
  - Degradation and Modeling Analysis
- Has been utilized by WSB clients for 9+ years

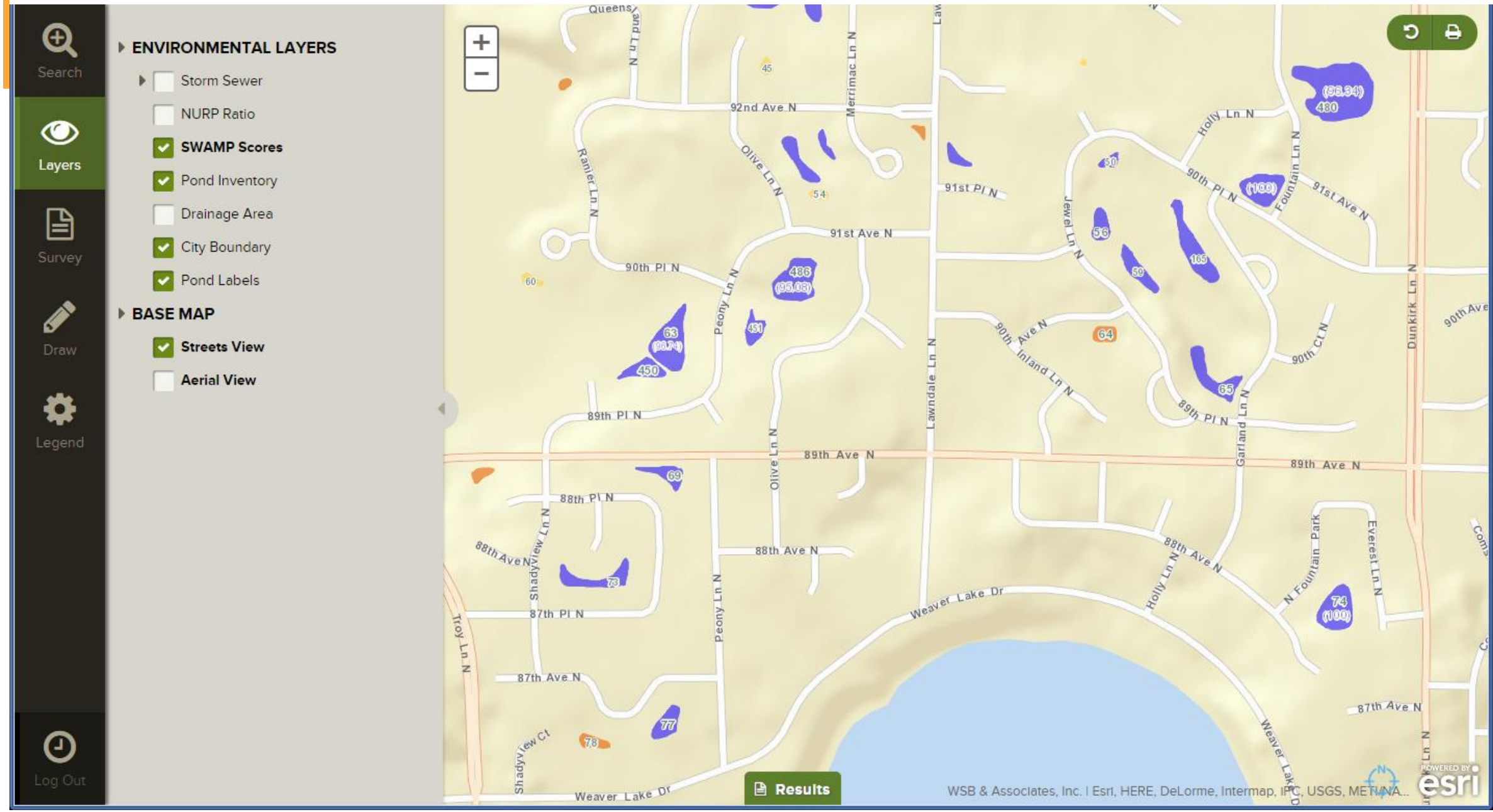
History

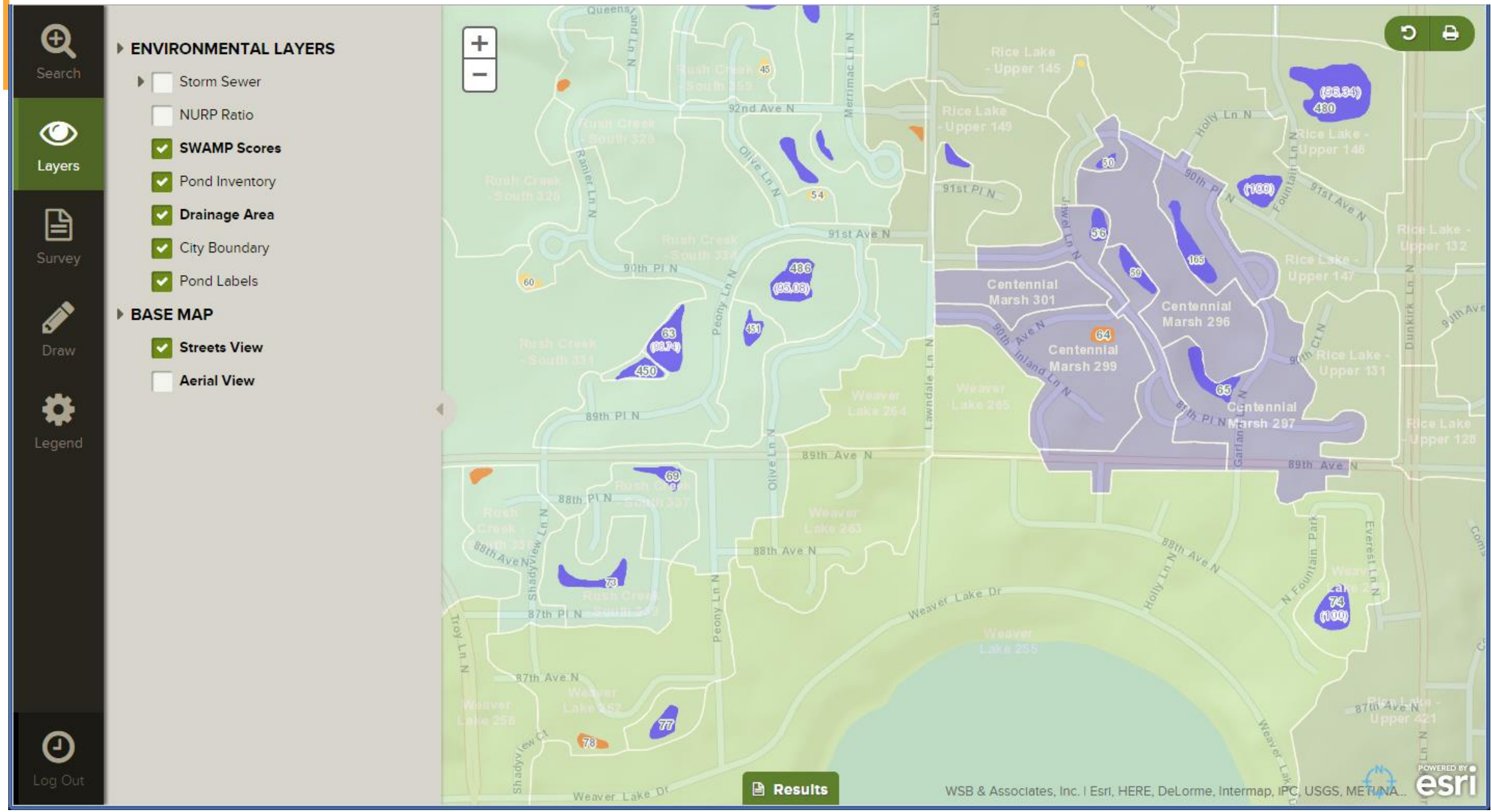
- Not feasible to inspect all basins annually [many communities have hundreds of basins]
- Find a way to efficiently manage stormwater BMPs
- Developed similar to infrastructure management programs
- Multi-platform web application

  - Tablets - Smart phones - Desktops

Success Stories

- Ducks Walking on Water
- Value
  - Saves money on feasibility and modeling of pond projects
  - Efficiently allows for cost-benefit comparisons


Search
Layers
Survey
Draw
Legend
Log Out
ENVIRONMENTAL LAYERS
Storm Sewer
NURP Ratio
SWAMP Scores
Pond Inventory
Drainage Area
City Boundary
Pond Labels
BASE MAP
Streets View
Aerial View
Results
92nd Ave N
91st Ave N
91st Pl N
90th Pl N
90th Ave N
90th Inland Ln N
90th Ct N
89th Pl N
89th Ave N
88th Pl N
88th Ave N
87th Pl N
87th Ave N
Weaver Lake Dr
Ranier Ln N
Olive Ln N
Peony Ln N
Merrimac Ln N
Lawndale Ln N
Jewel Ln N
Holly Ln N
Fountain Ln N
Garland Ln N
Dunkirk Ln N
Everest Ln N
N Fountain Park
Shadyview Ln N
Shadyview Ct
Troy Ln N
WSB & Associates, Inc. | Esri, HERE, DeLorme, Intermap, IPC, USGS, METI/NA...
POWERED BY esri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ENVIRONMENTAL LAYERS
Storm Sewer
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SWAMP Scores
Pond Inventory
Drainage Area
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BASE MAP
Streets View
Aerial View
Centennial Marsh 301
Centennial Marsh 296
Centennial Marsh 299
Centennial Marsh 297
Rice Lake - Upper 145
Rice Lake - Upper 149
Rice Lake - Upper 148
Rice Lake - Upper 147
Rice Lake - Upper 132
Rice Lake - Upper 131
Rice Lake - Upper 128
Rice Lake - Upper 421
Weaver Lake 264
Weaver Lake 265
Weaver Lake 263
Weaver Lake 255
Weaver Lake 256
Weaver Lake 252
92nd Ave N
91st Ave N
91st Pl N
90th Pl N
90th Ave N
89th Pl N
89th Ave N
88th Pl N
88th Ave N
87th Pl N
87th Ave N
Weaver Lake Dr
Olive Ln N
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Lawndale Ln N
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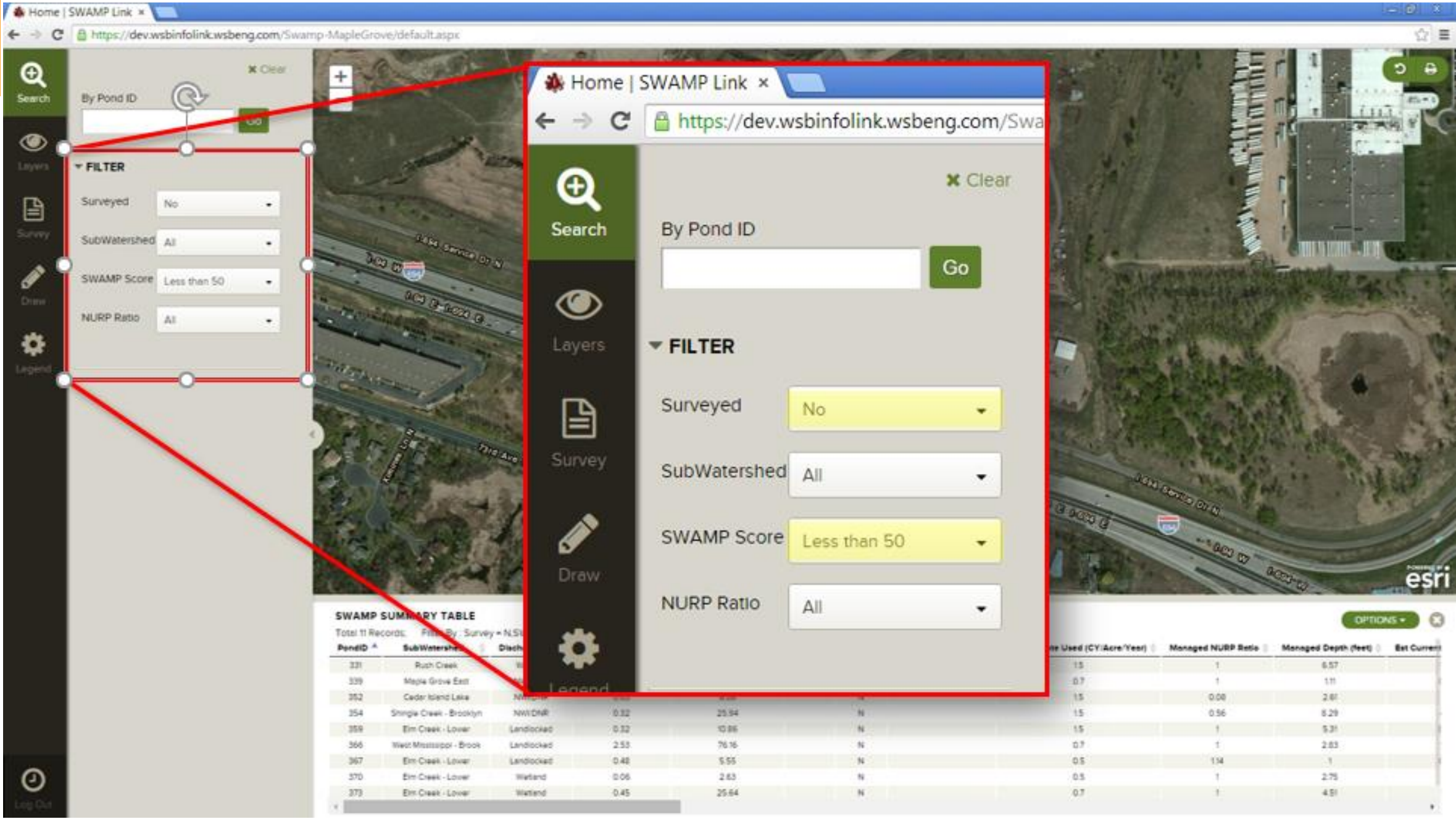
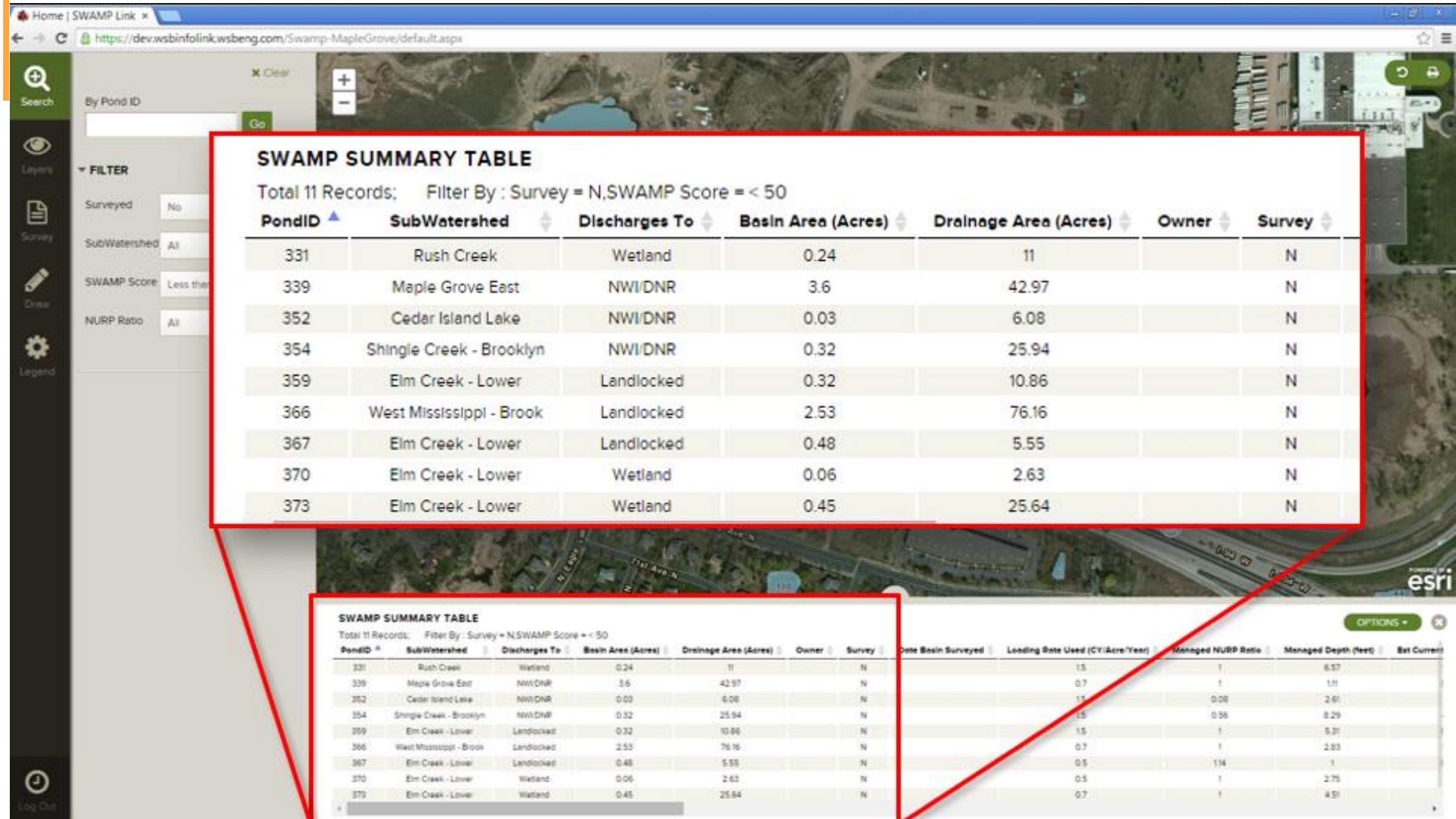
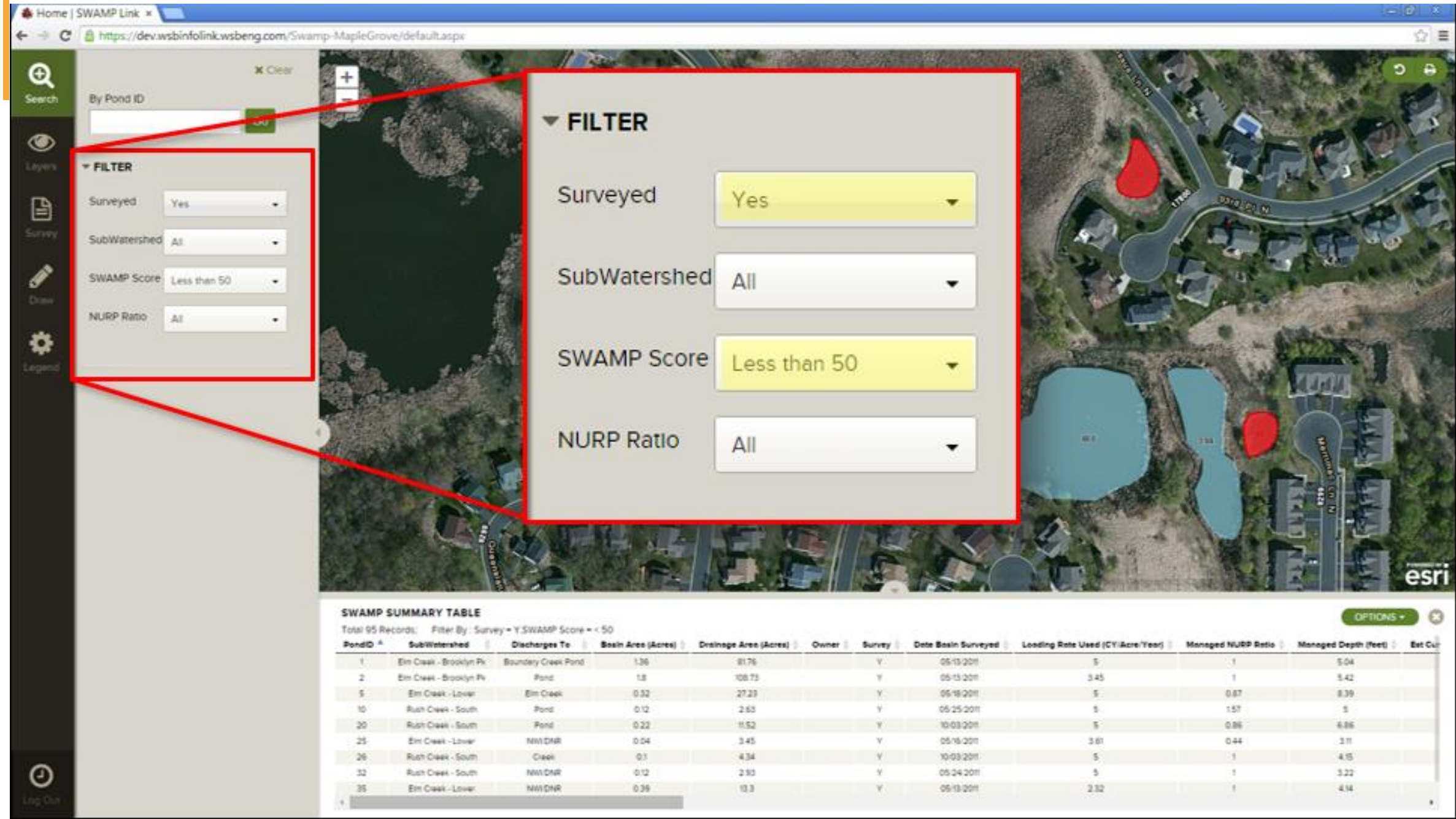
POWERED BY esri


Home | SWAMP Link
https://dev.wsbinfolink.wsbeng.com/Swamp-MapleGrove/default.aspx
Search
Clear
By Pond ID
Go
FILTER
Surveyed
No
SubWatershed
All
SWAMP Score
Less than 50
NURP Ratio
All
Layers
Survey
Draw
Legend
Log Out
SWAMP SUMMARY TABLE
esri


Home | SWAMP Link
https://dev.wsbinfolink.wsbeng.com/Swamp-MapleGrove/default.aspx
Search
By Pond ID
Go
FILTER
Surveyed
SubWatershed
SWAMP Score
NURP Ratio
Layers
Survey
Draw
Legend
Log Out
SWAMP SUMMARY TABLE
Total 11 Records: Filter By : Survey = N,SWAMP Score = < 50
PondID | SubWatershed | Discharges To | Basin Area (Acres) | Drainage Area (Acres) | Owner | Survey
331 | Rush Creek | Wetland | 0.24 | 11 | | N
339 | Maple Grove East | NWI/DNR | 3.6 | 42.97 | | N
352 | Cedar Island Lake | NWI/DNR | 0.03 | 6.08 | | N
354 | Shingle Creek - Brooklyn | NWI/DNR | 0.32 | 25.94 | | N
359 | Elm Creek - Lower | Landlocked | 0.32 | 10.86 | | N
366 | West Mississippi - Brook | Landlocked | 2.53 | 76.16 | | N
367 | Elm Creek - Lower | Landlocked | 0.48 | 5.55 | | N
370 | Elm Creek - Lower | Wetland | 0.06 | 2.63 | | N
373 | Elm Creek - Lower | Wetland | 0.45 | 25.64 | | N
esri

	A	B	C	D
1	**City of Anytown, USA**			
2	**Inspection Prioritization Report**			
3				
4	**Inspection Rank**	Pond ID	Current SWAMP Score	Survey
5	1	352	0.0	N
6	2	359	5.9	N
7	3	452	15.8	N
8	4	331	24.8	N
9	5	423	27.0	N
10	6	373	37.1	N
11	7	367	42.8	N
12	8	339	44.3	N
13	9	366	47.5	N
14	10	370	47.5	N
15	11	354	48.0	N
16	12	502	52.4	N


Home | SWAMP Link
https://dev.wsbinfolink.wsbeng.com/Swamp-MapleGrove/default.aspx
Search
Layers
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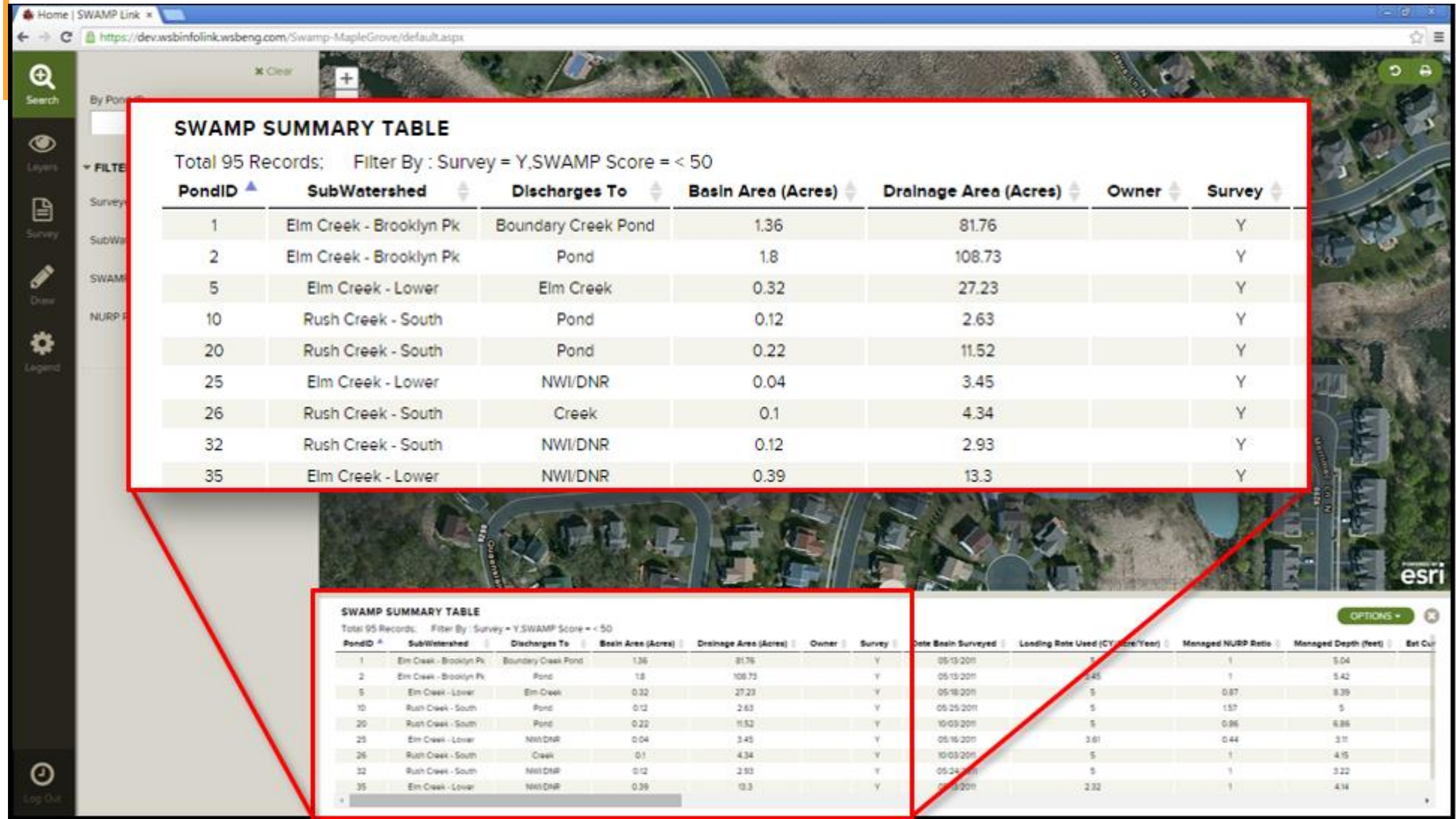
Clear
By Pond ID
FILTER
Surveyed
Yes
SubWatershed
All
SWAMP Score
Less than 50
NURP Ratio
All
SWAMP SUMMARY TABLE
OPTIONS
esri


Home | SWAMP Link
https://dev.wsbinfolink.wsbeng.com/Swamp-MapleGrove/default.aspx
Search
Layers
Survey
Draw
Legend
Log Out
SWAMP SUMMARY TABLE
Total 95 Records; Filter By : Survey = Y,SWAMP Score = < 50
PondID | SubWatershed | Discharges To | Basin Area (Acres) | Drainage Area (Acres) | Owner | Survey
1 | Elm Creek - Brooklyn Pk | Boundary Creek Pond | 1.36 | 81.76 | | Y
2 | Elm Creek - Brooklyn Pk | Pond | 1.8 | 108.73 | | Y
5 | Elm Creek - Lower | Elm Creek | 0.32 | 27.23 | | Y
10 | Rush Creek - South | Pond | 0.12 | 2.63 | | Y
20 | Rush Creek - South | Pond | 0.22 | 11.52 | | Y
25 | Elm Creek - Lower | NWI/DNR | 0.04 | 3.45 | | Y
26 | Rush Creek - South | Creek | 0.1 | 4.34 | | Y
32 | Rush Creek - South | NWI/DNR | 0.12 | 2.93 | | Y
35 | Elm Creek - Lower | NWI/DNR | 0.39 | 13.3 | | Y
OPTIONS
esri

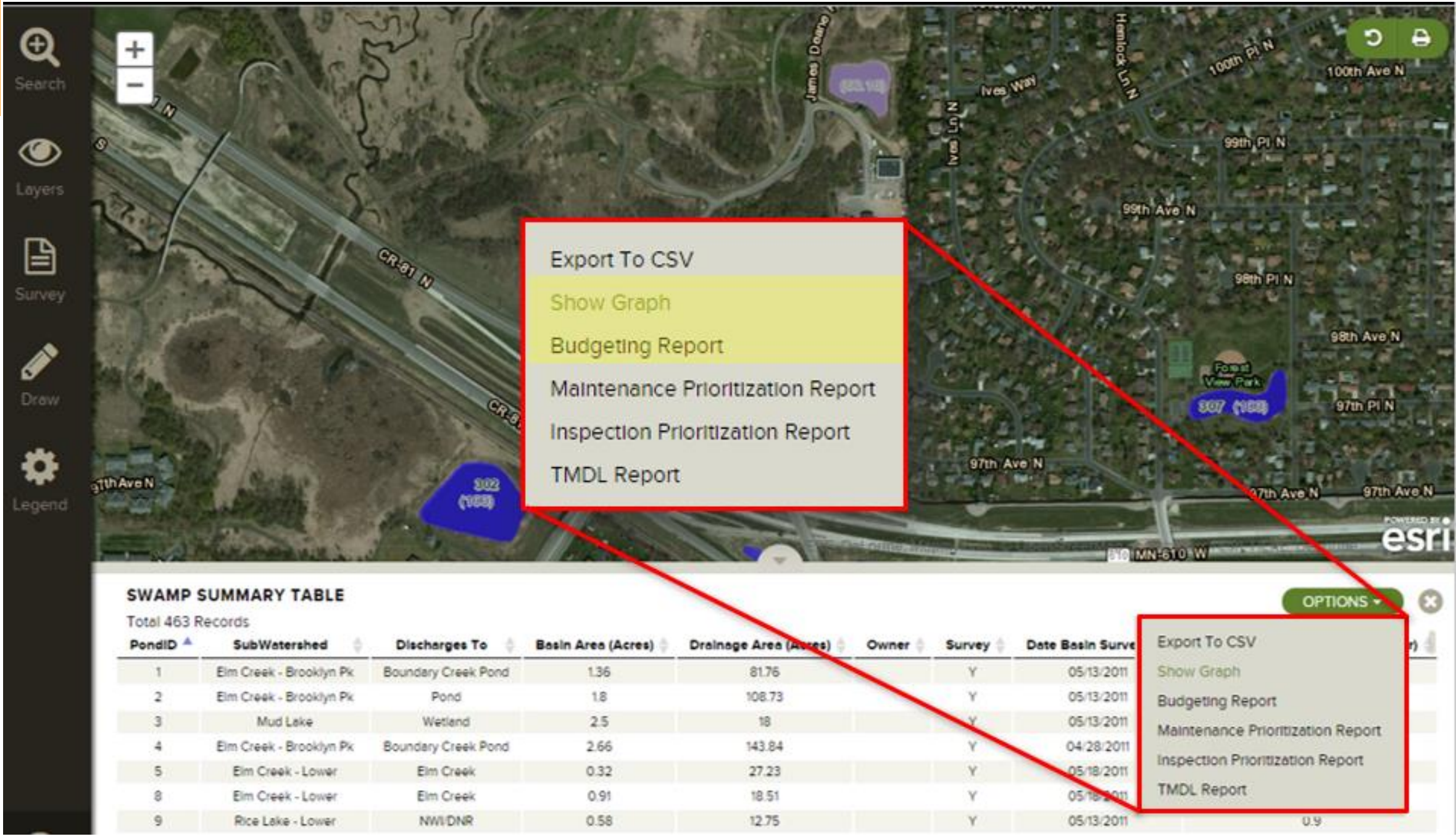
	A	B	C	D	E
1	**City of Anytown, USA**				
2	**SWAMP Maintenance Report**				
3					
4	**Maintenance Rank**		Pond ID	Current SWAMP Score	Survey
5	**1**	1	108	0.00	Y
6	**1**	1	118	0.00	Y
7	**1**	1	12	0.00	Y
8	**1**	1	130	0.00	Y
9	**1**	1	141	0.00	Y
10	**1**	1	201	0.00	Y
11	**1**	1	212	0.00	Y
12	**1**	1	41	0.00	Y
13	**1**	1	42	0.00	Y
14	**10**	10	137	4.98	Y
15	**11**	11	104	5.01	Y
16	**12**	12	74	5.50	Y
17	**13**	13	219	6.90	Y

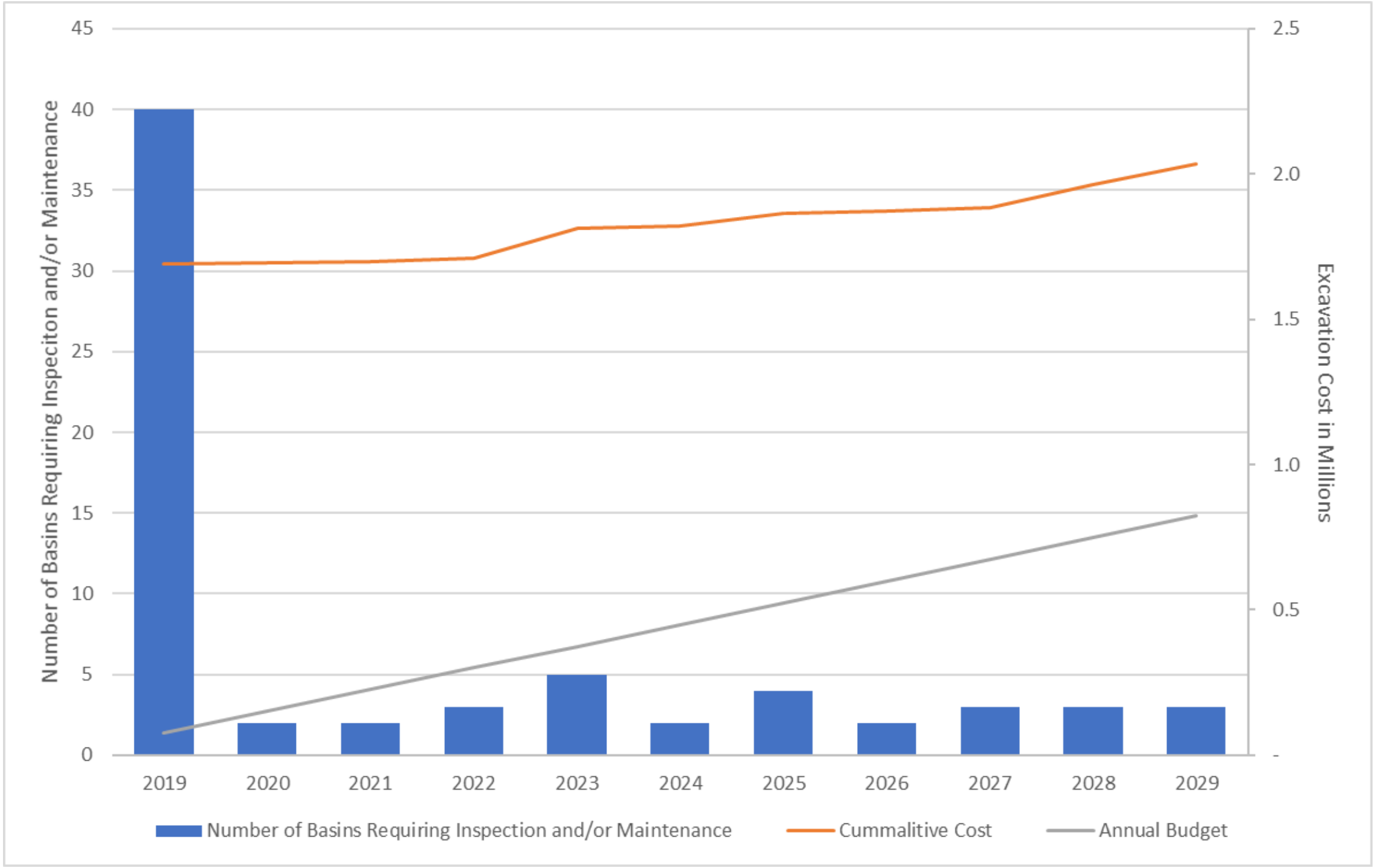
Cost Benefit Considerations

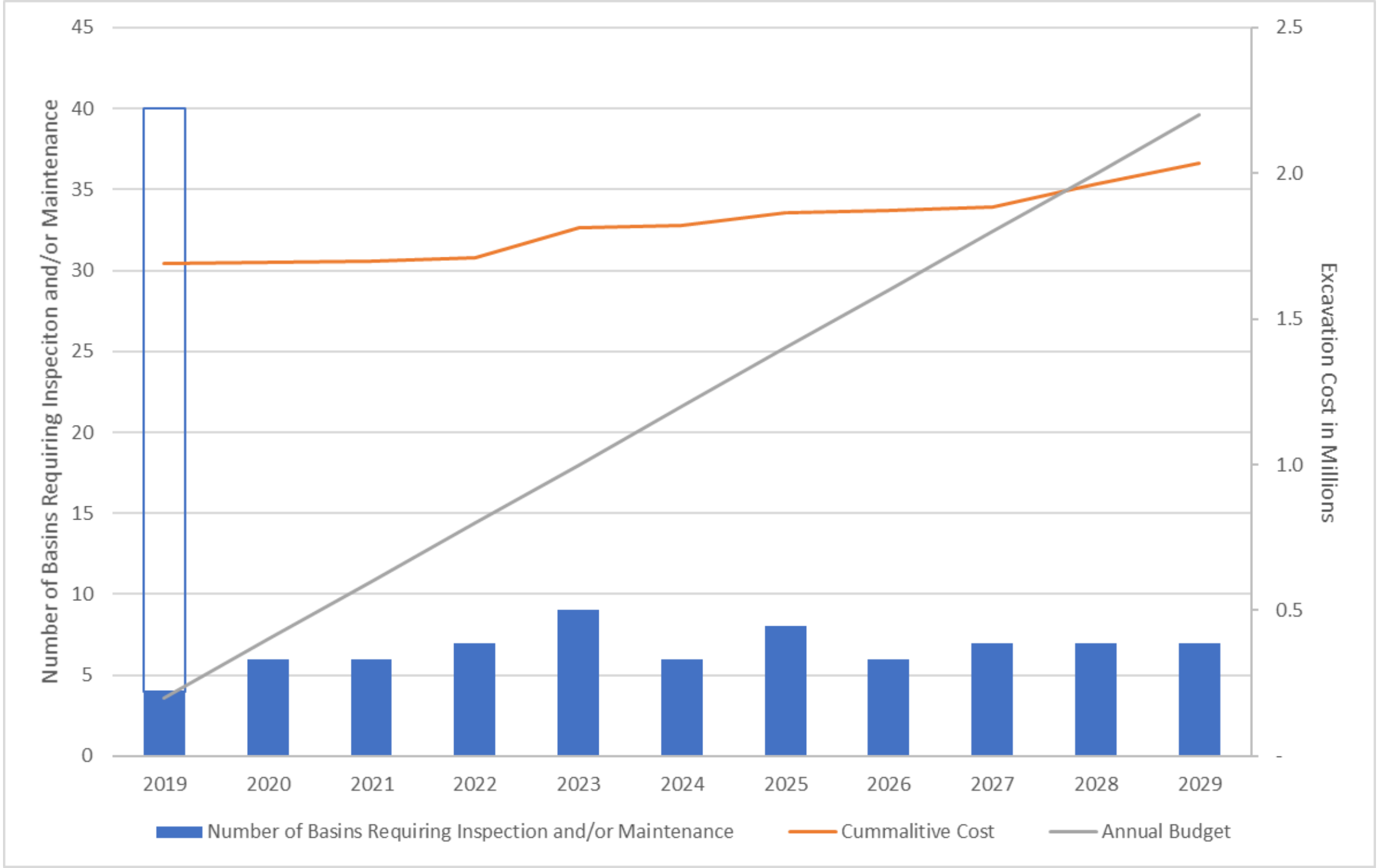
- Identify which BMPs provide the most improvement opportunity for maintenance projects
- Cost over the projected lifespan per pound of pollutant removed
- Find the lowest cost per pound of TP and maximize water quality benefit received

Budgeting and Planning

- Complete capital improvement project planning
- Accurately estimate stormwater inspection activities
- Budget maintenance projects


Search
Layers
Survey
Draw
Legend
Export To CSV
Show Graph
Budgeting Report
Maintenance Prioritization Report
Inspection Prioritization Report
TMDL Report
SWAMP SUMMARY TABLE
Total 463 Records
OPTIONS
Export To CSV
Show Graph
Budgeting Report
Maintenance Prioritization Report
Inspection Prioritization Report
TMDL Report
PondID
SubWatershed
Discharges To
Basin Area (Acres)
Drainage Area (Acres)
Owner
Survey
Date Basin Surve
1 Elm Creek - Brooklyn Pk Boundary Creek Pond 1.36 81.76 Y 05/13/2011
2 Elm Creek - Brooklyn Pk Pond 1.8 108.73 Y 05/13/2011
3 Mud Lake Wetland 2.5 18 Y 05/13/2011
4 Elm Creek - Brooklyn Pk Boundary Creek Pond 2.66 143.84 Y 04/28/2011
5 Elm Creek - Lower Elm Creek 0.32 27.23 Y 05/18/2011
8 Elm Creek - Lower Elm Creek 0.91 18.51 Y 05/18/2011
9 Rice Lake - Lower NWI/DNR 0.58 12.75 Y 05/13/2011 0.9


45
40
35
30
25
20
15
10
5
0
Number of Basins Requiring Inspeciton and/or Maintenance
2.5
2.0
1.5
1.0
0.5
-
Excavation Cost in Millions
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
Number of Basins Requiring Inspection and/or Maintenance
Cummalitive Cost
Annual Budget


45
40
35
30
25
20
15
10
5
0
Number of Basins Requiring Inspeciton and/or Maintenance
2.5
2.0
1.5
1.0
0.5
-
Excavation Cost in Millions
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
Number of Basins Requiring Inspection and/or Maintenance
Cummalitive Cost
Annual Budget

Understanding maintenance needs

1. Assessment
2. Survey

Managing an efficient maintenance project

1. Sediment Testing & Managing Dredged Sediment
2. Feasibility
3. Final Design & Construction

Assessment Prioritization

- Ponds can be assessed all at once; or
- Prioritized/Grouped into categories:
  - Watersheds
  - High, Medium, Low priority based on Visual Inspections
  - Proximity of other Capital Improvement Projects

Assessment Prioritization

- The following variables may be used:
  - Age of pond
  - Contributing drainage area characteristics (size, land use, upland treatment, etc.)
  - Size of pond
  - Known concerns based on inspections
  - Complaints received from the public
  - Type, location, and sensitivity of receiving water
  - SWAMP Score

Assessment Prioritization: Step 1

- Gathering of background information:
  - Record drawings, design calculations
  - Determination of contributing drainage area and characteristics
  - Identify information gaps

Assessment Prioritization: Step 2

- Site investigation and/or survey:
  - Bathymetric Survey
  - Identification of outlet details
  - Identification of inlet details

Assessment Prioritization: Step 3

- TSS and TP treatment effectiveness calculations using the survey data obtained:
  - P8
  - Pondnet
  - SWAMP
  - MIDS Calculator
  - Other

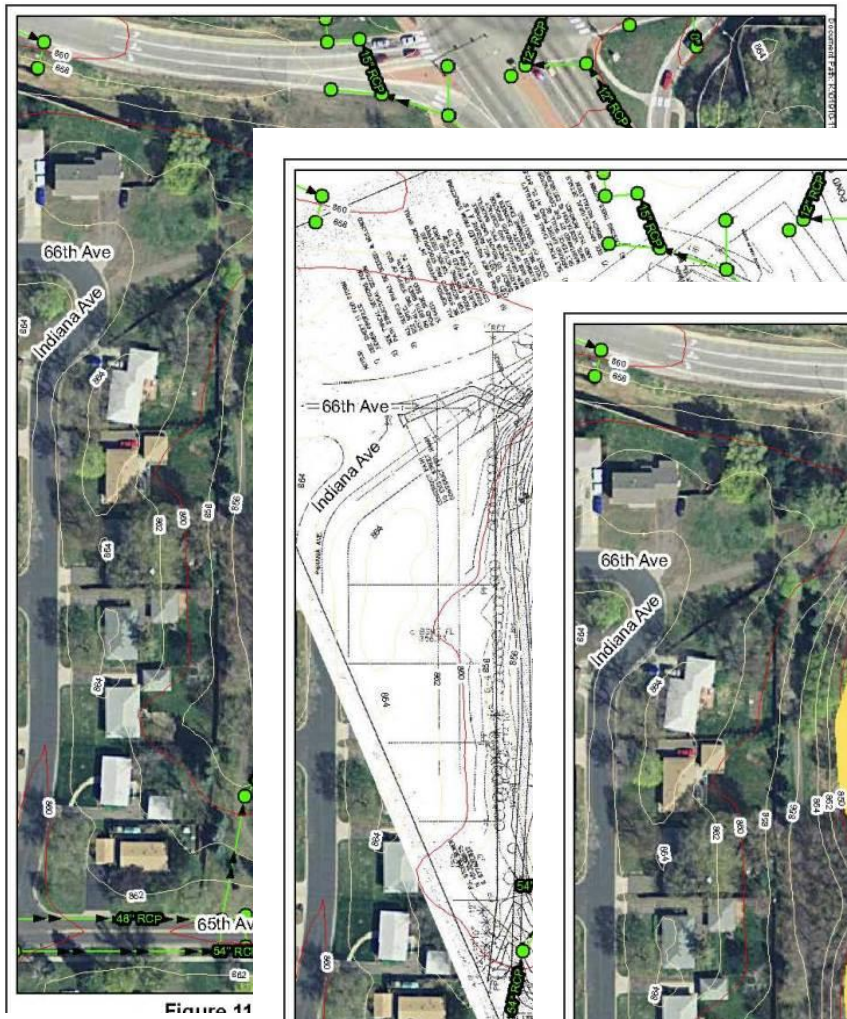
Pond Surveys (Bathymetric)

Survey Considerations

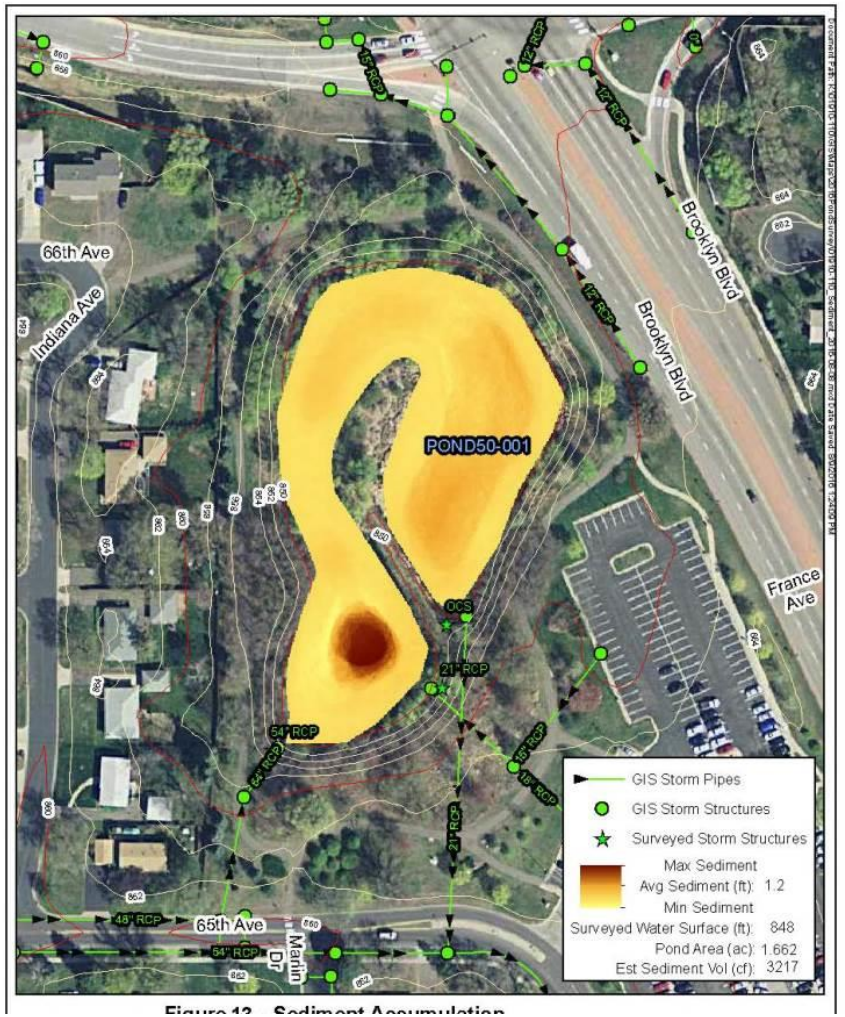
- Survey Basin Perimeter
- Survey Outlet Control Elevations
- Grid Pattern
  - Large Basin every ~ 50’
  - Small Basins every ~ 25’
  - Adjust as needed to capture significant variations

Shallow Depth Basins (<2’ depth)

Sonar / Remote Control Boat


66th Ave
Indiana Ave
65th Av
48" RCP
54" RCP

66th Ave
Indiana Ave
65th Av
48" RCP
54" RCP


POND50-001
66th Ave
Indiana Ave
Brooklyn Blvd
France Ave
65th Ave
Martin Dr
OCS
21" RCP
54" RCP
48" RCP
GIS Storm Pipes
GIS Storm Structures
Surveyed Storm Structures
Max Sediment
Avg Sediment (ft): 1.2
Min Sediment
Surveyed Water Surface (ft): 848
Pond Area (ac): 1.662
Est Sediment Vol (cf): 3217

Understanding maintenance needs

1. Assessment
2. Survey

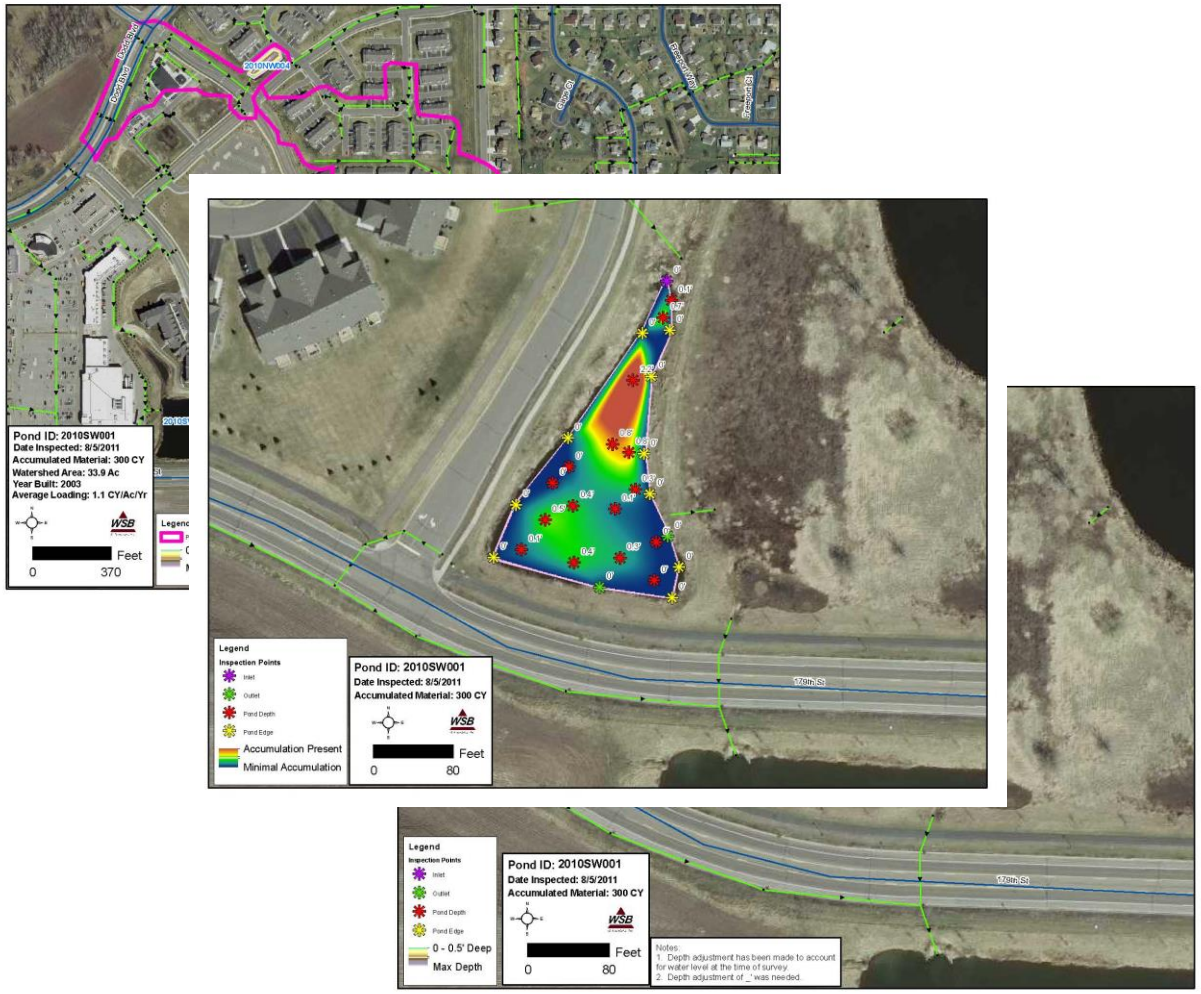
Managing an efficient maintenance project

1. Sediment Testing & Managing Dredged Sediment
2. Feasibility
3. Final Design & Construction

Pond Review Memos

Gather and organize info from assessment and survey activities:

- Includes drainage area info
- Pond Characteristics
  - Depth
  - Footprint
  - Sediment Accumulation Areas
  - Inlet and outlet information



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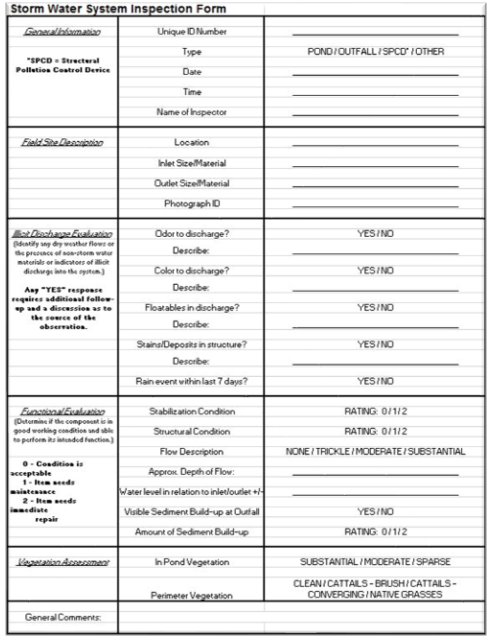
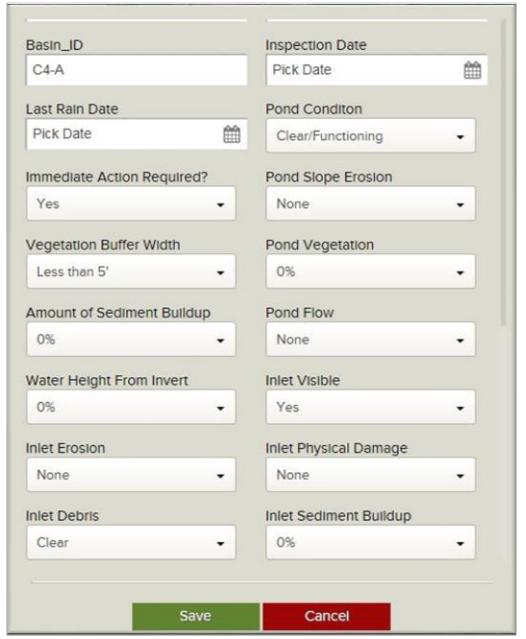


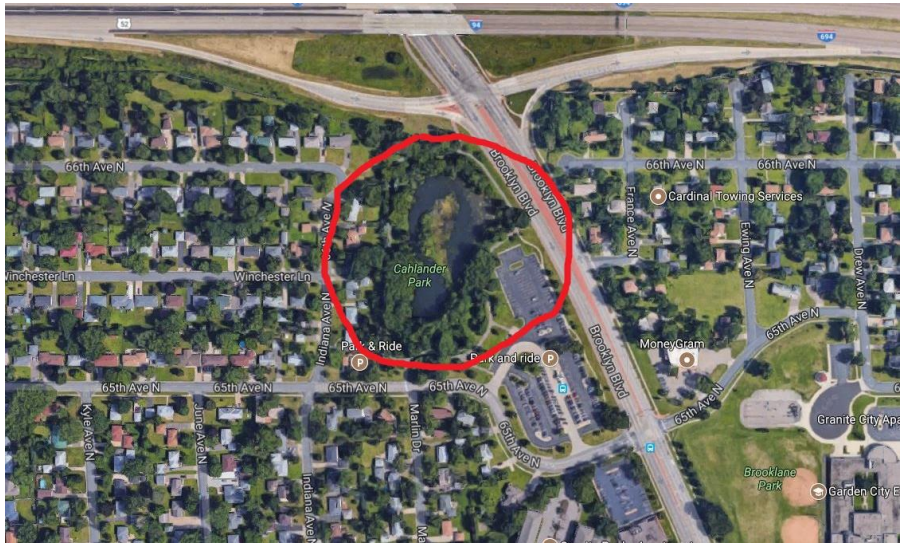
Storm Water System Inspection Form

General Information	Unique ID Number	
*SPCD = Structural Pollution Control Device	Type	POND / OUTFALL / SPCD* / OTHER
	Date	
	Time	
	Name of Inspector	
Field Site Description	Location	
	Inlet Size/Material	
	Outlet Size/Material	
	Photograph ID	
Illicit Discharge Evaluation (Identify any dry weather flows or the presence of non-storm water materials or indicators of illicit discharge into the system.) Any "YES" response requires additional follow-up and a discussion as to the source of the observation.	Odor to discharge?	YES / NO
	Describe:	
	Color to discharge?	YES / NO
	Describe:	
	Floatables in discharge?	YES / NO
	Describe:	
	Stains/Deposits in structure?	YES / NO
	Describe:	
	Rain event within last 7 days?	YES / NO
Functional Evaluation (Determine if the component is in good working condition and able to perform its intended function.) 0 - Condition is acceptable 1 - Item needs maintenance 2 - Item needs immediate repair	Stabilization Condition	RATING: 0 / 1 / 2
	Structural Condition	RATING: 0 / 1 / 2
	Flow Description	NONE / TRICKLE / MODERATE / SUBSTANTIAL
	Approx. Depth of Flow:	
	Water level in relation to inlet/outlet +/-	
	Visible Sediment Build-up at Outfall	YES / NO
	Amount of Sediment Build-up	RATING: 0 / 1 / 2
Vegetation Assessment	In Pond Vegetation	SUBSTANTIAL / MODERATE / SPARSE
	Perimeter Vegetation	CLEAN / CATTAILS - BRUSH / CATTAILS - CONVERGING / NATIVE GRASSES
General Comments:		



Pond Review Memos

- Review Historical Aerials
- Determine if pond was constructed or natural
- Scope permitting needs



Pond Review Memos

- Determine Access
- Easements
- Right of Entry

Pond Review Memos

- **Water Quality Analysis**
- Existing treatment
- Desired “managed” treatment
- **Cost Benefit Analysis**
- $ / lb TP
- **Recommendation**

Final Design & Construction

Plans

- Utilize Pond Survey to Create an Existing Surface in CAD
- Create a proposed grading plan to achieve desired volume/depth
- Create/Include Necessary Details
- Develop Erosion Control and Restoration Plan
- Complete SWPPP and other Permits (as necessary)

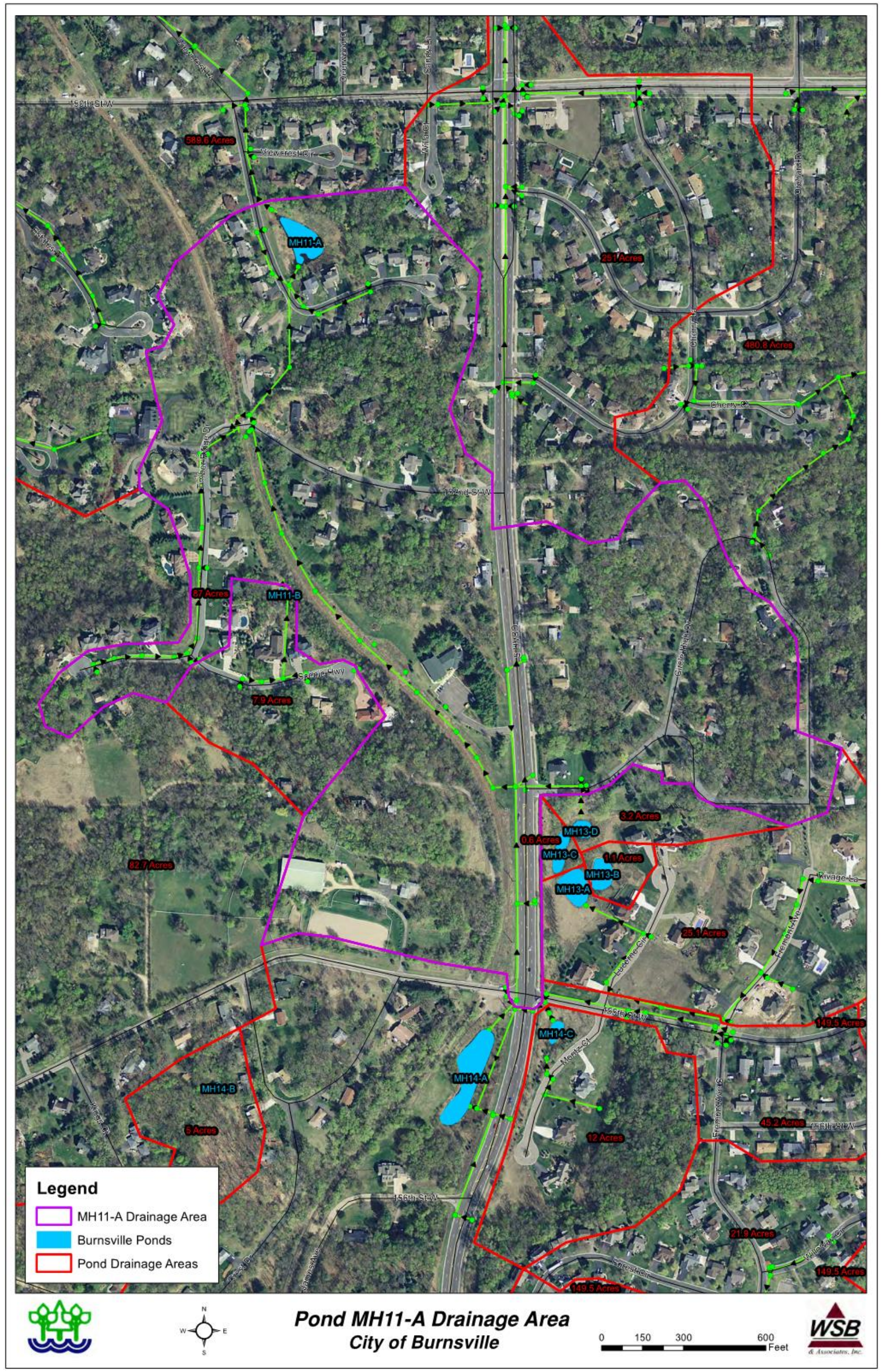
Final Design & Construction

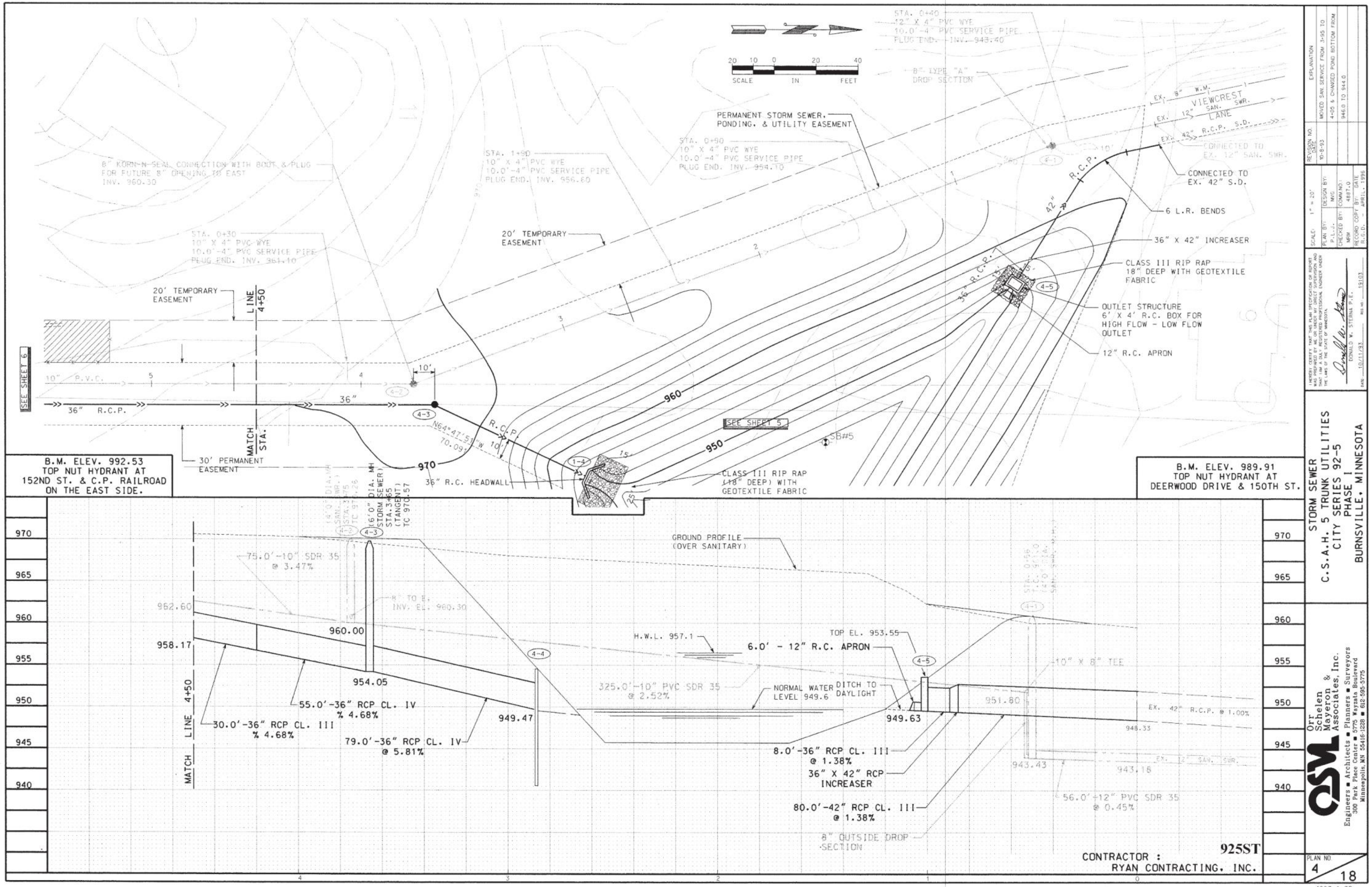
Specifications

- Access
- Clearing and Grubbing
- Dewatering/Deicing
- Excavation
  - Special Disposal
  - Measuring Volume of Material
  - Ton/CY Conversion
- Mulching/Seeding/Restoration

Pond Clean-out Project Case Study

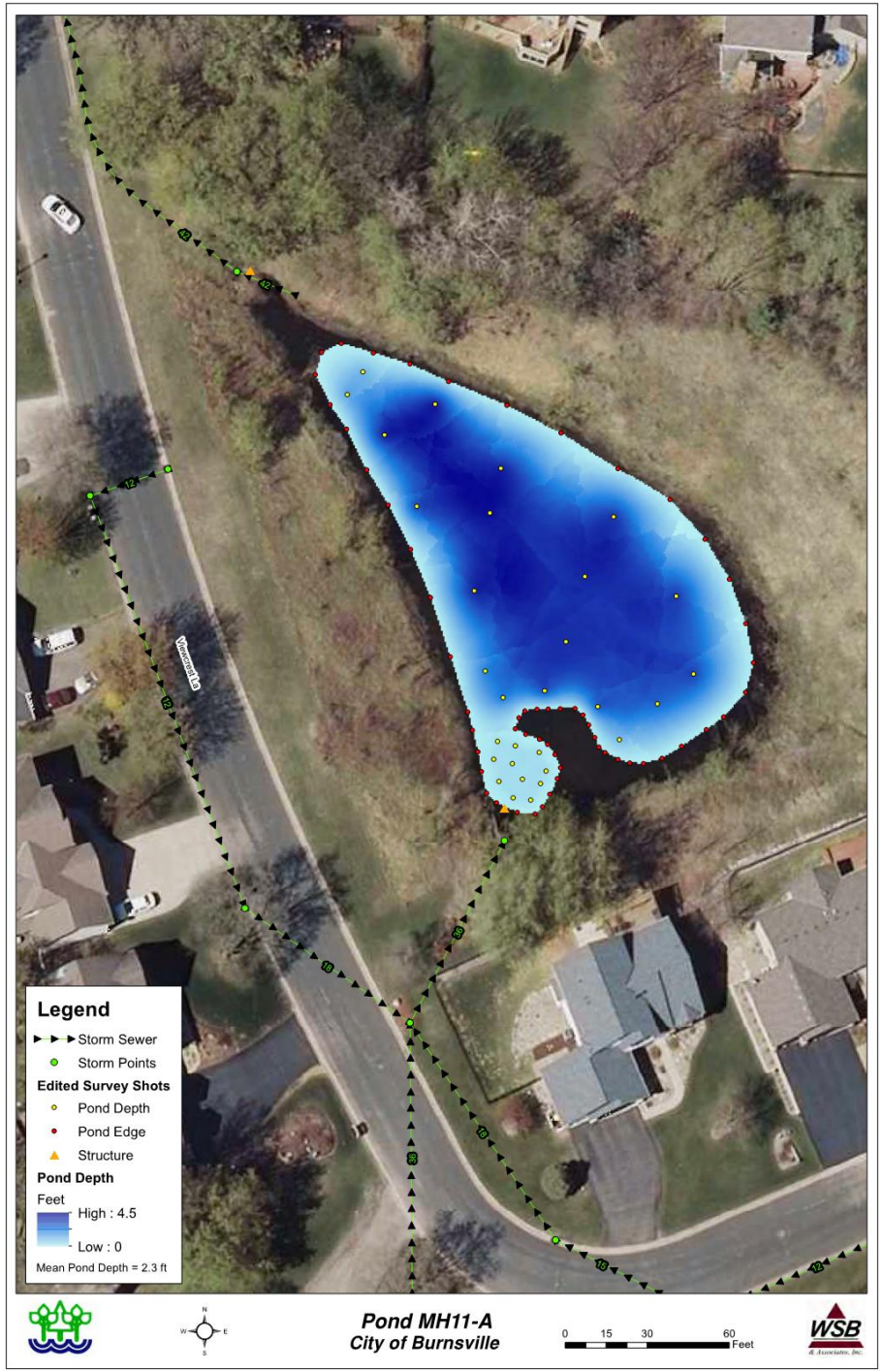
1. Assessment
2. Survey
3. Sediment Testing & Managing Dredged Sediment
4. Feasibility
5. Final Design & Construction


MH11-A
MH11-B
MH13-A
MH13-B
MH13-C
MH13-D
MH14-A
MH14-B
MH14-C
Legend
MH11-A Drainage Area
Burnsville Ponds
Pond Drainage Areas
Pond MH11-A Drainage Area
City of Burnsville
0
150
300
600
Feet
WSB
& Associates, Inc.


STORM SEWER
C.S.A.H. 5 TRUNK UTILITIES
CITY SERIES 92-5
PHASE I
BURNSVILLE, MINNESOTA
B.M. ELEV. 992.53
TOP NUT HYDRANT AT
152ND ST. & C.P. RAILROAD
ON THE EAST SIDE.
B.M. ELEV. 989.91
TOP NUT HYDRANT AT
DEERWOOD DRIVE & 150TH ST.
PERMANENT STORM SEWER, PONDING, & UTILITY EASEMENT
20' TEMPORARY EASEMENT
30' PERMANENT EASEMENT
MATCH LINE STA. 4+50
SEE SHEET 6
SEE SHEET 5
36" R.C.P.
36" R.C. HEADWALL
CLASS III RIP RAP (18" DEEP) WITH GEOTEXTILE FABRIC
CONNECTED TO EX. 42" S.D.
6 L.R. BENDS
36" X 42" INCREASER
CLASS III RIP RAP 18" DEEP WITH GEOTEXTILE FABRIC
OUTLET STRUCTURE
6' X 4' R.C. BOX FOR
HIGH FLOW - LOW FLOW
OUTLET
12" R.C. APRON
VIEWCREST LANE
GROUND PROFILE (OVER SANITARY)
H.W.L. 957.1
6.0' - 12" R.C. APRON
TOP EL. 953.55
NORMAL WATER LEVEL 949.6
DITCH TO DAYLIGHT
55.0'-36" RCP CL. IV % 4.68%
30.0'-36" RCP CL. III % 4.68%
79.0'-36" RCP CL. IV @ 5.81%
8.0'-36" RCP CL. III @ 1.38%
36" X 42" RCP INCREASER
80.0'-42" RCP CL. III @ 1.38%
958.17
960.00
954.05
949.47
949.63
CONTRACTOR :
RYAN CONTRACTING, INC.
925ST
Orr Schelen Mayeron & Associates, Inc.
Engineers ■ Architects ■ Planners ■ Surveyors
PLAN NO 4 18
4887-1.3D


MH11-A Pond Outlet


MH11-A sediment delta near 36” inlet


Legend
Storm Sewer
Storm Points
Edited Survey Shots
Pond Depth
Pond Edge
Structure
Pond Depth
Feet
High : 4.5
Low : 0
Mean Pond Depth = 2.3 ft
Pond MH11-A
City of Burnsville
0 15 30 60
Feet
WSB

Parameters	Dredge Mgmt. Level 1	Dredge Mgnt. Level 2	MHIIA-1		MHIIA-2	
	mg/kg	mg/kg	6/30/15 9:20 AM		6/30/15 8:52 AM	
Metals (mg/kg)	Optional Methods SW-846; 6010 or 6020					
Arsenic	9	20	**3.4**		**2.4**	
Copper	100	9000	**13.5**		**10.5**	
Noncarcinogenic Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)						
Acenapthene	1,200	5,260	<0.014		<0.13	
Acenapthylene	na	na	<0.014		<0.13	
Anthracene	7,880	45,400	**0.022**		<0.13	
Benzo(g,h,i)perlyene	na	na	**0.074**		**0.35**	
Fluoranthene	1,080	6,800	**0.22**		**1.9**	
Fluorene	850	4,120	<0.014		<0.13	
2-Methylnapthalene	100	369	<0.014		<0.13	
Naphthalene	10	28	<0.014		<0.13	
Phenanthrene	na	na	**0.058**		**0.80**	
Pyrene	890	5,800	**0.15**		**1.4**	
Carcinogenic PAHs & BaP Equiv. (mg/kg)	**Potency Equiv. Factor (PEF)**		Site Conc.	BaP Equiv.	Site Conc.	BaP Equiv.
Benz[a]anthracene	0.10		0.067	**0.01**	0.500	**0.05**
Benzo[a]pyrene	1.00		0.093	**0.09**	0.650	**0.65**
Benzo(b, j & k)fluoranthenes	0.10		0.220	**0.02**	1.500	**0.15**
Chrysene	0.01		0.120	**0.00**	0.850	**0.01**
Dibenz[a,h]acridine	0.10		0.007	**0.00**	0.065	**0.01**
Dibenz[a,h]anthracene	0.56		0.018	**0.01**	0.065	**0.04**
7H-Dibenzo(c,g)carbazole	1.00		0.007	**0.01**	0.065	**0.07**
Dibenzo[a,e]pyrene	1.00		0.021	**0.02**	0.065	**0.07**
Dibenzo[a,h]pyrene	10.00		0.007	**0.07**	0.065	**0.65**
Dibenzo[a,i]pyrene	10.00		0.007	**0.07**	0.065	**0.65**
Dibenzo[a,l]pyrene	10.00		0.007	**0.07**	0.065	**0.65**
7,12 Dimethylbenz-anthracene	34.00		0.007	**0.24**	0.065	**2.21**
Indeno[1,2,3,-c,d]pyrene	0.10		0.063	**0.01**	0.340	**0.03**
3-Methylcholanthrene	3.00		0.007	**0.02**	0.065	**0.20**
5-Methylchrysene	1.00		0.007	**0.01**	0.065	**0.07**
(BaP) Equivalent* **	2 mg/kg	3 mg/kg		0.64		5.49

Dredge Management Level 1= results less than SRV 1 (suitable for residential landuse)

DredgeManagement Level 2= results less than SRV 2 (suitable for industrial landuse)

Dredge Management Level 3- exceeds SRV2 (must be treated or disposed in a landfill with MPCA approved industrial waste management plan)

This memo summarizes our review of Pond MH11-A with the intent to identify options to maintain and improve pond performance for water quality, volume management, rate control, and outlet function. Pond MH11-A is located west of County Highway 5 and south of 150th Street W, just northeast of Viewcrest Lane, within the Murphy Hanrehan Subwatershed. The pond is shown on the National Wetland Inventory (NWI). Historical aerial photography (1937, 1951, and 1946 aerials) reviewed indicates that the pond may historically have been a wetland; however, based on the imagery and the asbuilt the basin was previously dredged out to result in the pond that exists today.

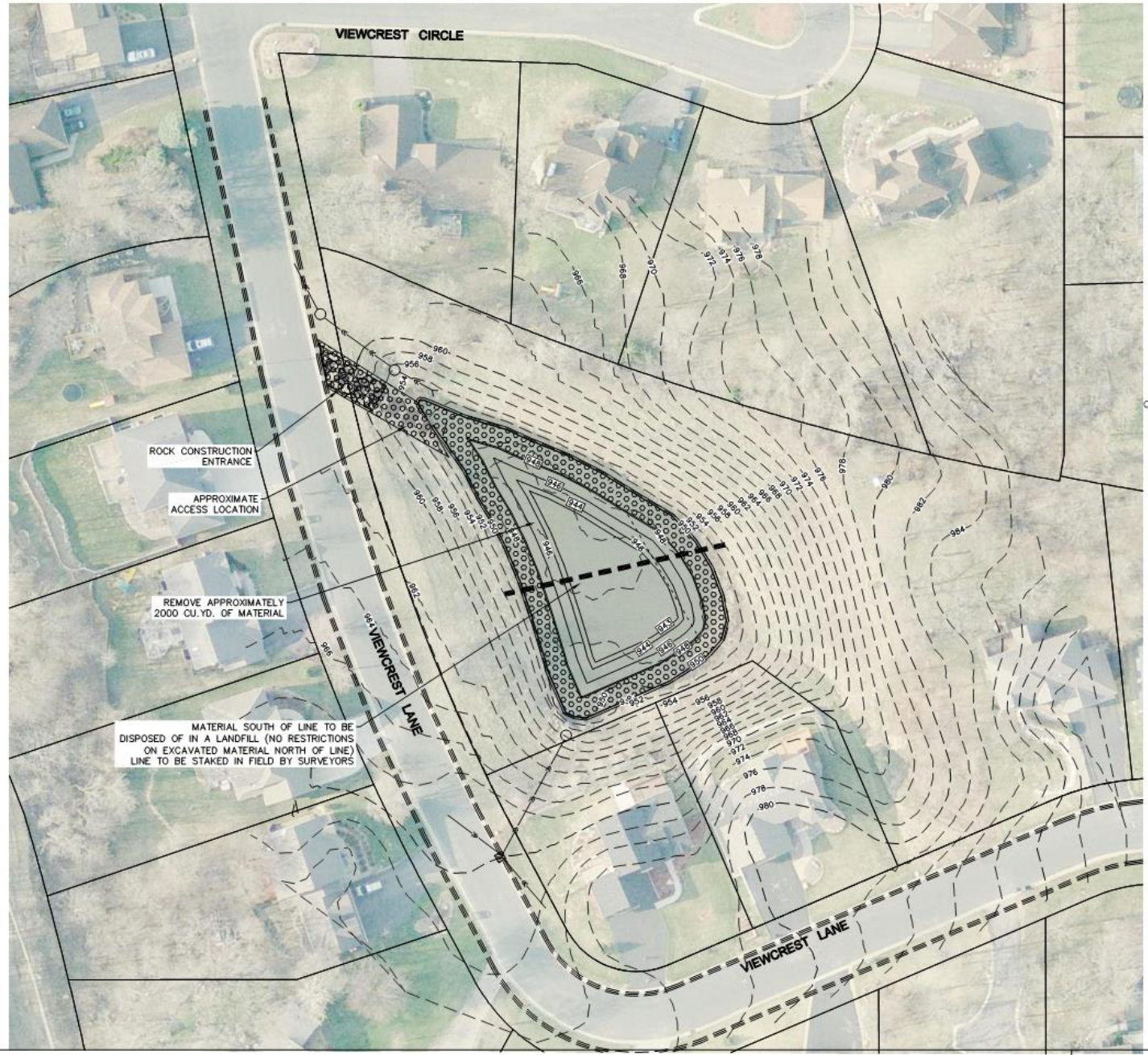
A summary of Pond MH11-A is provided in **Table 1**.

Table 1 – Pond Summary

Drainage Area	87 acres
Area at NWL	0.31 acres (per 2015 pond inspection)
Impervious %	17.1%
2015 SWAMP Score	24.24
Managed NURP Ratio	0.65
Managed Depth	8.26 feet
Current Depth	2.3 feet
Current Wet Volume	0.713 ac-ft
Downstream Waterbody	PWI 19038000W
Survey/Inspection Date	May 2015
Outlet Elev.	949.63
Outlet Diameter	12-inch
Inlet Diameter	36-inch (NW)

Table 2 – Water Quality Analysis

Option	Description	TP Removal Efficiency (%)	Annual TP Reduction (lbs/yr)	TSS Removal Efficiency (%)	Annual TSS Reduction (tons/yr)	Estimated Cost ($)	Life-Cycle (yrs)	Life-Cycle Cost Benefit ($/lb)
1 (Current)	2.3' average depth	40.61	12.89	67	3.22	-	-	
2	Excavate 870 CY to achieve an average depth of 4' (consider updating managed depth to 4')	50.02	15.87	83	3.99	$17,400	37	$98.50
3	Excavate 1,380 CY to achieve an average depth of 5' (consider updating managed depth to 5')	53.68	17.04	90	4.33	$27,600	46	$75.29
4	Excavate 1,880 CY to achieve an average depth of 6' (consider updating managed depth to 6')	56.59	17.96	93	4.47	$37,600	55	$77.50
5	Excavate 2,390 CY to achieve an average depth of 7' (consider updating managed depth to 7')	58.97	18.72	93	4.47	$47,800	64	$78.00
6	Excavate 3,030 CY to achieve the managed depth of 8.26'	61.45	19.5	93	4.47	$60,600	76	$77.66



POND MH11-A NOTES:

1. Restore all pond edges and wooded areas with type 33-261 seed (35 lbs/ac), cover crop oats (20 lbs/ac), and category 2 erosion control blanket within 7 days of disturbance. If seeding during frost conditions, mulch may be used in lieu of blanket. Contractor will need to verify vegetation establishment reseed as necessary in the spring.
2. Contractor responsible for the damage to streets and concrete curb and gutter.
3. Daily street sweeping required during hauling operations.
4. If winter conditions are present during excavation, contractor will pump water down prior to ice up. Contractor will be responsible for ice removal/stockpiling.
5. Contractor to grade around existing storm sewer structures as directed by the engineer.
6. Contractor to coordinate access limits with the city inspector in the field.

Clearing and grubbing required to access pond is considered incidental

LEGEND:

TYPE 33-261 SEED (35 LBS/AC) AND COVER CROP OATS (20 LBS/AC) AND EROSION CONTROL BLANKET.

NUMBER NO.	DATE	EXPLANATION

ISSUED: AS NOTED
PLAN BY: MRJ
DESIGN BY: JN
CHECKED BY: JN
PROJECT NO: 1880-530
RECORD COPY BY: DATE

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA

JACOB NEHMAN, P.E.
DATE: 07/27/2015 LIC. NO. 49170

POND AREA IMPROVEMENTS
FOR THE CITY OF
BURNSVILLE, MINNESOTA

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Tel: (763) 541-4800 · Fax: (763) 541-1700
wsbeng.com

engineering · planning · environmental · construction

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WSB PROJECT 1880-53 | 2015 POND MAINTENANCE POND MH11-A | P-1

Why SWAMP?

- Degradation Forecasting
- Prioritization of Inspections/Surveys
- Prioritization of Maintenance Projects
- Cost-benefit of Completing Maintenance
- Tracking of Completed Work

A Map to Managing BMPs

Storm Water Asset Management Program (SWAMP)

- SWAMP is a web-based application that allows for customized prioritization of annual storm water BMP inspection and maintenance activities.
- Using SWAMP, you will be ready to provide calculated responses regarding pond and BMP maintenance priorities and will be compliant with written procedure and treatment eff effectiveness requirements for stormwater basins.

THANK YOU

Jake Newhall, PE jnewhall@wsbeng.com

https://datalink.wsbeng.com/Swamp2.0/Login.aspx

Username: WSB-Admin
Password: wsb@swp-ad!