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### TRIECA 2017 Stormwater Management Facilities Condition Assessments, Inventories and Maintenance Prioritization

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## 1. SWMF as Assets

- Stormwater management facilities are important assets that are often overlooked
- They provide important water quantity and quality improvements that reduce peak flows and remove suspended sediment, although performance can decline over time
- Analysis of facility design intent and current operational function are required for assessing if facilities are meeting water quantity and quality targets.





# 2. SURVEY

## **Survey / Sonar Data Collection**



Trimble R8 GPS Receiver

SonarMite v5 Echo Sounder









## **Sonar Secondary Options**













## **Survey / Sonar Data Collection**











## **Data Processing**













## **Data Modelling**





# 3. INSPECTIONS

## **Importance of Inspection**

- Assess various components within the pond block
- Identify existing deficiencies including vegetation (aquatic), access routes, encroachments, structures, and signage
- Utilities













### Inspection of Maintenance Issues at Inlet, Outlet, Ponded Area and Pond Block

- Damaged or missing equipment (signage, fencing, rope, poles, manhole, railings, etc.)
- Vegetative growth
- Garbage accumulation
- Sediment accumulation
- Damaged fencing or concrete
- Water level issues
- Encroachment issues
- Beaver activity







#### **Operation and Maintenance- Examples 1**





#### **Operation and Maintenance- Examples 2**





#### **Example Inspection Results**

Constructed wetland system; dry weather flow treatment

Built in 2005; Catchment: Residential/commercial (620 ha); Volume (design/2015 permanent pool): 2660/1420 m<sup>3</sup>

> Aquatic: SAR (background info and MNR) Terrestrial Wildlife: SAR (background info) Tree Inventory: 117

Inlet: damage to concrete







Access: trees planted on access ramp Easement: yes

Outlet: debris and litter accumulation



Sediment: Remaining volume: -710 m<sup>3</sup> Disposal at non-hazardous facility



# **4. FUNCTIONAL ASSESSMENT**

## **Removal Efficiency**

- Based on MOECC Stormwater Management Planning and Design Manual (2003)
- Reduction in permanent pool volume proportionate to reduction in TSS removal efficiency
- MOECC SWM Manual guidelines recommend pond cleanout when TSS removal efficiency is reduced by 5% (e.g. Enhanced wet pond designed for 80% TSS removal requires cleanout when remaining permanent pool volume correlates to a 75% TSS removal efficiency)
- TSS removal efficiency is back-calculated based on contributing drainage area, percent imperviousness of contributing drainage area, and remaining permanent pool volume, as per Table 3.2 of MOECC SWM Manual



## **Performance (Water Quality) Monitoring**

- Conducted at the inlet and outlet of the pond
- Multiple grab samples analyzed for TSS
- Loggers to measure water level and temperature
- Automatic sampler triggered by rain gauge





## **Retrofit Opportunities**

This is the stage where retrofit opportunities can be considered.

#### **Examples include:**

- Adding flow splitters to take ponds offline
- Deepening wet ponds
- Increasing hydraulic residence time
- Adjusting outlet rates based on drainage areas









#### **Definition and Weight of Prioritization Criteria**

Category	Criteria	Definition	Weigh				
Functionality	Capacity	Available sediment volume (or removal efficiency)	20%				
	Maintenance Needs	Conditions of inlet, outlet, berms	15%				
Environmental	Receiving Water Sensitivity	Receiving water classification	10%				
	Natural Heritage	Existence of aquatic and terrestrial SAR	5%				
Safety	Infrastructure Risk	Erosion proximity to infrastructure, risk due to failure of pipes (special considerations)	5%				
	Structural deficiencies	Structural deficiencies	10%				
Social-Political	Community Concerns	Resident complaints, community and Councilor involvement	10%				
Technical	Accessibility	Access road and easement	10%				
	Sediment Disposal	Sediment volume and quality, and available land for storage	10%				
	Scheduling	Length of time and schedule	2.5%				
	Implementation	2.5%	Issues				
			Blockage				
				Damaged footbridge			
				Structural deficiency			
				Damaged concrete			
* Covered under Fu	unctionality (available sediment volur	ne)		Damaged manhole			
				Damaged outlet structure			



**Bank erosion** 

#### **Preliminary Prioritization Criteria and Weights**





## Variables and Scoring

- Measurable variables selected to the extent possible
- Descriptive variables assigned a quantifiable element
- Scoring based on professional judgement
- Scores of 0 or 1 to 5 (best to worst) consistent among all variables



#### **Prioritization Matrix**

Pond		Descrip	Description			lity Control Les	vel		Construction ( Year		Catchment Area (ha)		ın Volume (m3)	Constructed Volume (m3)	Permanen Pond Volum 2015 (m3)	t Permar e- Pool Min Mainten Volumo	nent iimum ance (m3)	Percer Imperviou:	nt s (%)
scw	P037 - Morningside Pond	Wet por	Wet pond facility		MOECC enhanced				2001	100.02		2	21170	21170	20950	20950 1389(		68	
SCW	P038 - Hydro West Pond	Wet por	Wet pond facility		MOECC enhanced				2001 4		5.6		8025	8025	5710	568	0	63	
SCW	P039 - Hydro East Pond	Wet por	d facility		MOECC enhanced				2001	6	3.7	1	1085	11085	12900	817	0	65	
SCW	P040 - Silvercore Pond	Wet por	d facility		MOECC enhanced				2001	19.2		3838		3838	4040	247	0	64	
SCW	P041 - Tapscot Bend		Community	Bessiving Vaterbadu	Le.	aaassihilitu	0.e.e.c.cibi	Servic	sing_lalat	-	Semieire	- Outlo		Servicing Bands	d Area	Servicing Bons	- I Block		Frasian
SCW SCW	P043 - Bell Esti P044 - Mattam		Concerns	Receiving waterbody	B	load	lity- Easement	Servic	cing- iniec		Servicing	g- Outle		Servicing-Ponde	ed Area	Servicing-Pond	DIOCK		LIOSION
SCW	P048 - Centenn SCWP037 - Morningside Pond	Morningside Tributary		-		Yes Da		amaged or missing equipment Blo		Blockage	lockage		Damaged or missing equipment-					Bottom of inlet	
SCW	P001 - Morning SCWP038 - Hydro West Pond		Morningside Tributary		-		Yes Damaged		iged or missing eq	equipmentBlockage		Damaged or mis		ising equipment-				Bottom of inlet	
SCW	P022 - Morning ScwP039 - Hydro East Pond		XX	Morningside Tributary	-		Vec	Sedim	ediment accumulation -		tive growth		Vegetative growth						
SCW	DO25 - Dourse V company Transmission			Moningside Tributary	_		V		Tresh and		Track	ive Browni		vegetative growth		-			
SC F	Pond	Sediment Disp	osal Option		Se	ediment Volume-	Remaining		Remaining		Available L	and Potential		Implementatio	Aquatic Biolog	39	Terrestr	rial-Fauna	k erosion
sc						2015 (m3)	Availa Sediment	able Volum	Available Sediment Vo	luma	for Sedim Storage	ent	Conflicts	n- Potential Ausilabilitu					
<u>.</u>							ím3	a concinii Bi	(%)	une	Storage	e	connecs	Issues					
SU S	CWP037 - Morningside Pond	Use as daily co	over or dispo	sal at non-hazardous fac	ilit	220	706	0	97%		Yes		No	No	SAR (backgrou	nd and MNRF)	SAR (ba	ckground inf	io)
<u>50</u> s	CWP038 - Hydro West Pond	Use as daily co	over or dispo	sal at non-hazardous fac	ilit	2320	30	)	1%		Yes		No	No	SAR (backgrou	nd and MNRF)	SAR (ba	ckground inf	o) k erosion
SC S	CWP039 - Hydro East Pond	Use as daily co	over or dispo	sal at non-hazardous fac	ilit	-1820	474	0	163%		Yes		No	No	SAR (backgrou	nd and MNRF)	SAR (ba	ckground inf	o)
SC S	CWP040 - Silvercore Pond	Use as daily co	over or dispo	sal at non-hazardous fac	ilit	-200	157	0	115%		Yes		No	No	SAR (backgrou	nd and MNRF)	SAR (ba	ckground inf	o)
SC S	CWP041 - Tapscott Industrial	Use as daily co	over or dispo	sal at non-hazardous fac	ilit	3390	146	0	30%		Yes		No	No	SAR (backgrou	nd and MNRF)	SAR (ba	ckground inf	o)
SC S	CWP043 - Bell Estate Pond	Use as daily co	over or dispo	sal at non-hazardous fac	ilit	-630	111	.0	231%		Yes		No	No	SAR (backgrou	nd and MNRF)	SAR (ba	ckground inf	o)
SC S	CWP044 - Mattamy Rouge	Use as daily co	over or dispo	sal at non-hazardous fac	ilit	670	199	0	75%		Yes		No	No	SAR (backgrou	nd and MNRF)	SAR (ba	ckground inf	o)
sc S	CWP048 - Centennial Gardens	Use as daily co	over or dispo	sal at non-hazardous fac	ilit	-40	21	0	-137%		Yes		No	No	SAR (backgrou	nd and MNRF)	SAR (ba	ckground inf	ion
SC S	CWP001 - Morningside Tributary Pond	Use as daily co	over or dispo	sal at non-hazardous fac	ilit	3800	463	50	N/A		Yes		No	No	SAR (backgrou	nd and MNRF)	SAR (ba	ckground inf	o)
<u></u>	CWP022 - Morningview Pond	Use as daily co	over or dispo	sal at non-hazardous fac	ilit	2900	231	90	89%		Yes		No	No	SAR (backgrou	nd and MNRF)	SAR (ba	ckground inf	o) k erosion
E S	CWP025 - Rouge Valley Pond	N/A				540	604	0	58%		Yes		No	No	SAR (backgrou	nd and MNRF)	SAR (ba	ckground inf	0)
ET S	CWP028 - Port Union West Pond	Use as daily co	over or dispo	sal at non-hazardous fac	111	150	14		48%		Yes		No	No	SAR (backgrou	nd and MNRF)	N/A		
N S	CWP042- Intracorp Pond	N/A			_	430	15		26%		NO		NO	NO	SAR (backgrou	nd and MINRF)	SAR (Da	ckground int	0)
N 2	CWP052 - X Pond	Line og deiluge	une es diese	and at one home days for		1620	62	0	102%		Vec		NO	No	CAD (hp.ckgroup	ad and MNDE)	CAD (ba	element inf	
N a	CWP035 - Willowied Park	Use as daily co	wer or dispo	sal at non-hazardous fac		1020	410	0 n	72%		Vec		No	No	SAR (backgrou	nd and MNRF)	SAR (Da	ckground inf	o) (a) k erosion
TC a	CWP049 - Greywood South Lowcrest Pond	Use as daily co	wer or dispo	sal at non-hazardous fac		610	13	) )	61%		Vec		No	No	SAR (backgrou	nd and MNRF)	SAR (Da	ckground inf	
E	CWP055 - Grewwood South Bridlewood Pond	Use as daily co	ver or dispo	sal at non-hazardous fac		250	-30	<u>,</u>	-1/%		Vec		No	No	SAR (backgrou	nd and MNRF)	SAR (ba	ckground inf	(0) · · · · · · · · · · · · · · · · · · ·
FT S	CWP056 - Greywood South Pinemeadow Pond	Use as daily co	ver or dispo	sal at non-hazardous fac	1111	120	-5	, 	-14%		Yes		No	No	SAR (backgrou	nd and MNRF)	SAR (ba	ckground inf	0)
FT S	CWP057 - Arsandco Park Pond	Use as daily co	ver or dispo	sal at non-hazardous fac	ilit	-690	163	0	173%		Yes		No	No	SAR (backgrou	nd and MNRF)	SAR (ba	ckground inf	(o)
E S	CWP058 - East Point Park Pond	Use as daily co	ver or dispo	sal at non-hazardous fac	ilit	690	N//	A	2.070		Yes		No	No	SAR (backgrou	nd and MNRF)	SAR (ba	ckground inf	o) nel erosion
E s	CWP061 - Ellesmere Pond					-75	85		137%				No	No					
E	TWP002 - Wincott Park Wetland	Use as daily co	over or dispo	sal at non-hazardous fac	ilit	1240	-71	0	-27%		Yes		No	No	SAR (backgrou	nd and MNRF)	SAR (ba	ckground inf	o) k erosion
EI E	TWP016 - Mainshep Road Pond	N/A				1190	-16	0	-16%		Yes		No	No	SAR (backgrou	nd and MNRF)	SAR (ba	ckground inf	io)
EI N	IYWP004 - Moccasin Trail Pond	N/A				2250	-100	00	-80%		Yes		No	No	SAR (backgrou	nd and MNRF)	SAR (ba	ckground inf	o) cerosion
ET N	IYWP005 - York U Pond1	N/A				-100	238	0	104%		Yes		No	No	SAR (backgrou	nd and MNRF)	SAR (ba	ckground inf	o)
SC N	IYWP010 - Earl Bales Park Pond	Use as daily co	over or dispo	sal at non-hazardous fac	ilit	25251	-149	51	-145%		Yes		No	No	SAR (backgrou	nd and MNRF)	SAR (ba	ckground inf	o) k erosion
<u> </u>	OWP001 - Greenwood Pond	Use as daily co	over or dispo	sal at non-hazardous fac	ilit	880	-17	0	-24%		Yes		No	No	SAR (backgrou	nd and MNRF)	SAR (ba	ckground inf	o)
E	TWP001 - Humber Bay Pond	Use as daily co	over or dispo	sal at non-hazardous fac	ilit	850	165	10	91%		Yes		No	No	SAR (backgrou	nd and MNRF)	SAR (ba	ckground inf	o)
E	TWP003A - Sam Smith Park Pond	Use as daily co	over or dispo	sal at non-hazardous fac	ilit	N/A	N//	A	_		Yes		No	No	SAR (backgrou	nd and MNRF)	SAR (ba	ckground inf	o)
E	TWP009 - Grenadier Pond	N/A					N//	A	_		Yes		No	No	N/A		N/A		
E	TWP013 - Catfish Pond	Use as daily co	over or dispo	sal at non-hazardous fac	ility		N//	A			NO		No	No	N/A		N/A		
E	TWP014A - Ellis Ave. & Colborne Lodge Dr. HP1 Wetland	Use as daily co	over or dispo	sal at non-hazardous fac	ilit	350	157	0	116%		Yes		No	No	SAR (backgrou	nd and MNRF)	SAR (ba	ckground inf	0)
E	TWP014B - Ellis Ave. & Colborne Lodge Dr. HP5 Wetland	N/A				270	-10	0	-15%		Yes		No	No	SAR (backgrou	nd and MNRF)	SAR (ba	ckground inf	o)
E	TWP014C - Ellis Ave. & Colborne Lodge Dr. HP7 Wetland	Use as daily co	over or dispo	sal at non-hazardous fac	ilit	-110	62	D	122%		Yes		No	No	SAR (backgrou	nd and MNRF)	SAR (ba	ckground inf	0)
E	TWP014D - Ellis Ave. & colborne Lodger Dr. W11 Wetland	Use as daily co	over or dispo	sal at non-hazardous fac	ilit	430	-31	0	-258%		Yes		No	No	SAR (backgrou	nd and MNRF)	SAR (ba	ckground inf	0)
S	CWP026 - Dunker Pond	N/A				5780	382	90	87%		NO		No	No	SAR (backgrou	nd and MNRF)	SAR (ba	ckground inf	0)



### **Financial and Implementation Considerations**

- Categories of costs: capital works vs operational works
- Timeframe: projects to be rated as immediate, short term (2-5 years) or long term (5-10 years) depending on needs, in order to align with the client's capital planning and budgeting process
- Packaging: projects grouped based on timeframes, available funding, and proximity of ponds



## Thank You

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