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Stormwater and Erosion
and Sediment Control
Conference

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New Guidance and Specifications for Proprietary Stormwater Treatment Technologies

Source to Stream Conference

Tim Van Seters, Toronto and Region Conservation Authority

March 22, 2023

The water component of STEP is a collaborative of:





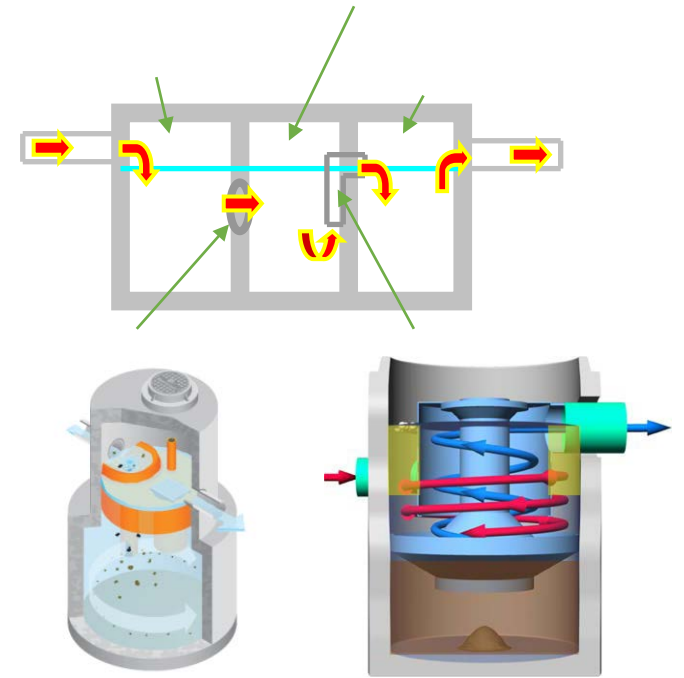
Outline

- **Part One:**
 - Background on the Environmental Technology Verification Process in Canada
 - Overview of three national ‘Specifications’ currently under development with support from the Standards Council of Canada
- **Part Two:**
 - Overview of City of Toronto Design Criteria for Manufactured Treatment Devices

OGS and Filtration MTDs

- **Oil Grit Separators** (aka Hydrodynamic Separators)
 - Captures coarse solids, trash/debris, floatables, oil and grease
 - Functions based on principles of hydrodynamic settling
 - Used for stormwater **pre-treatment** in Ontario

- **Stormwater Filtration MTDs**
 - Captures debris, trash settleable and non-settleable solids
 - May provide enhanced capture of other stormwater pollutants
 - Function based on principles of filtration and may also include hydrodynamic settling
 - Often used for **standalone** water quality treatment

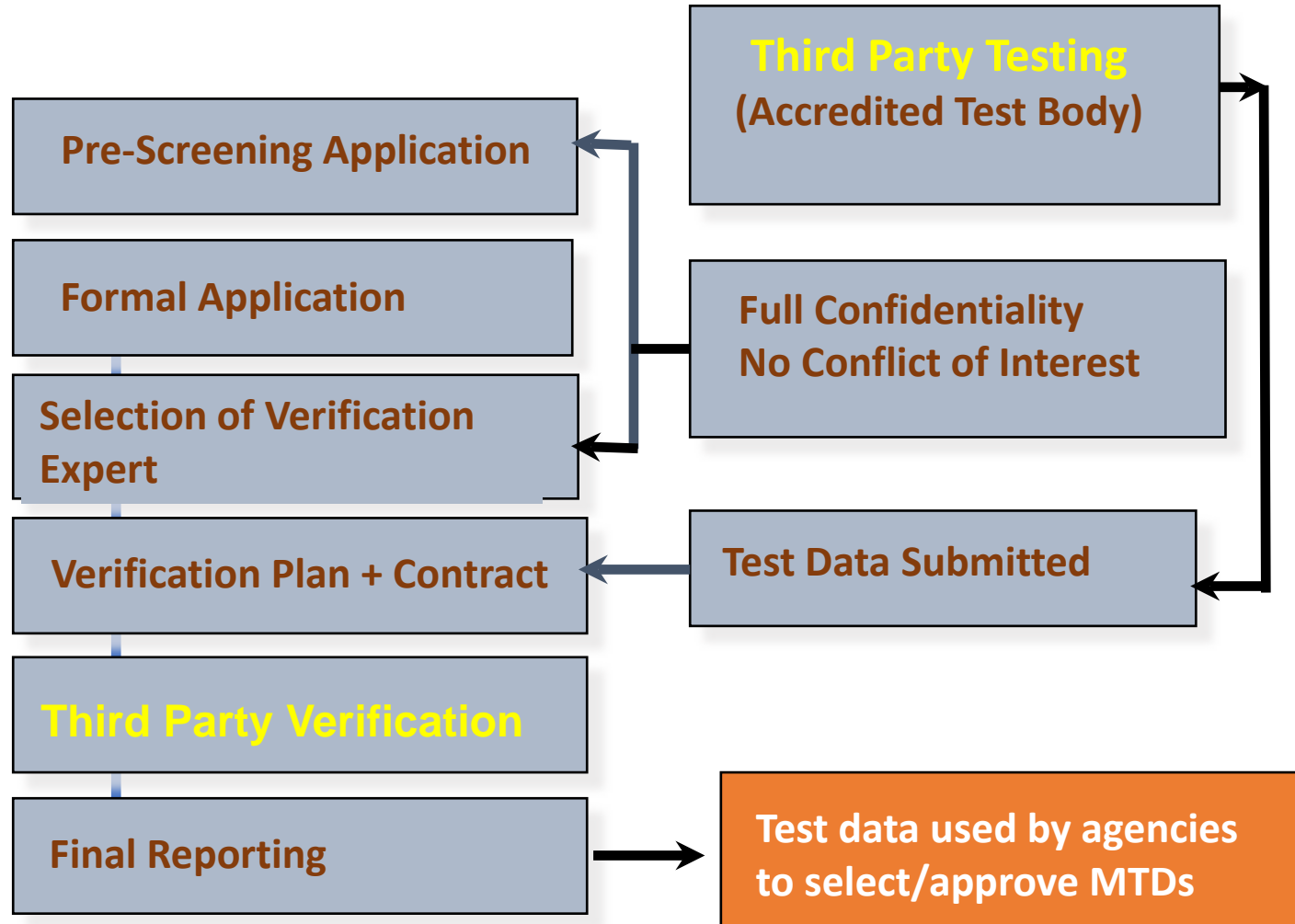


Oil Grit Separators



Filtration MTDs

Testing and Verification Process through ISO 14034 ETV standard



OGS Test Procedure currently being updated

Filtration MTD Test Procedure under development

Other SW devices: technology specific test plan

<https://etvcanada.ca/home/protocols-and-procedures/>

Why ETV?

- Standardized testing provides credible and robust process for evaluation of options
- Transparent and scientifically defensible process avoids conflicts and misleading claims
- Simplifies technology selection and permitting process

Publicly Available Specifications (PAS)

- Provides guidance and recommendations on policies, practices and approaches. May be developed into a standard at a later date
- Three PAS documents currently under development:
 - Update. ***“Canadian Procedure for Laboratory Testing of Oil Grit Separators”***
 - New. ***“Canadian Procedure for Field Testing of Stormwater Filtration MTDs”*** based on the Washington State *“Technology Assessment Protocol”*
 - New. ***“Guidance on the Use and Application of Results from Verified Laboratory and Field Testing for Stormwater Manufactured Treatment Devices”***

PAS Development Process

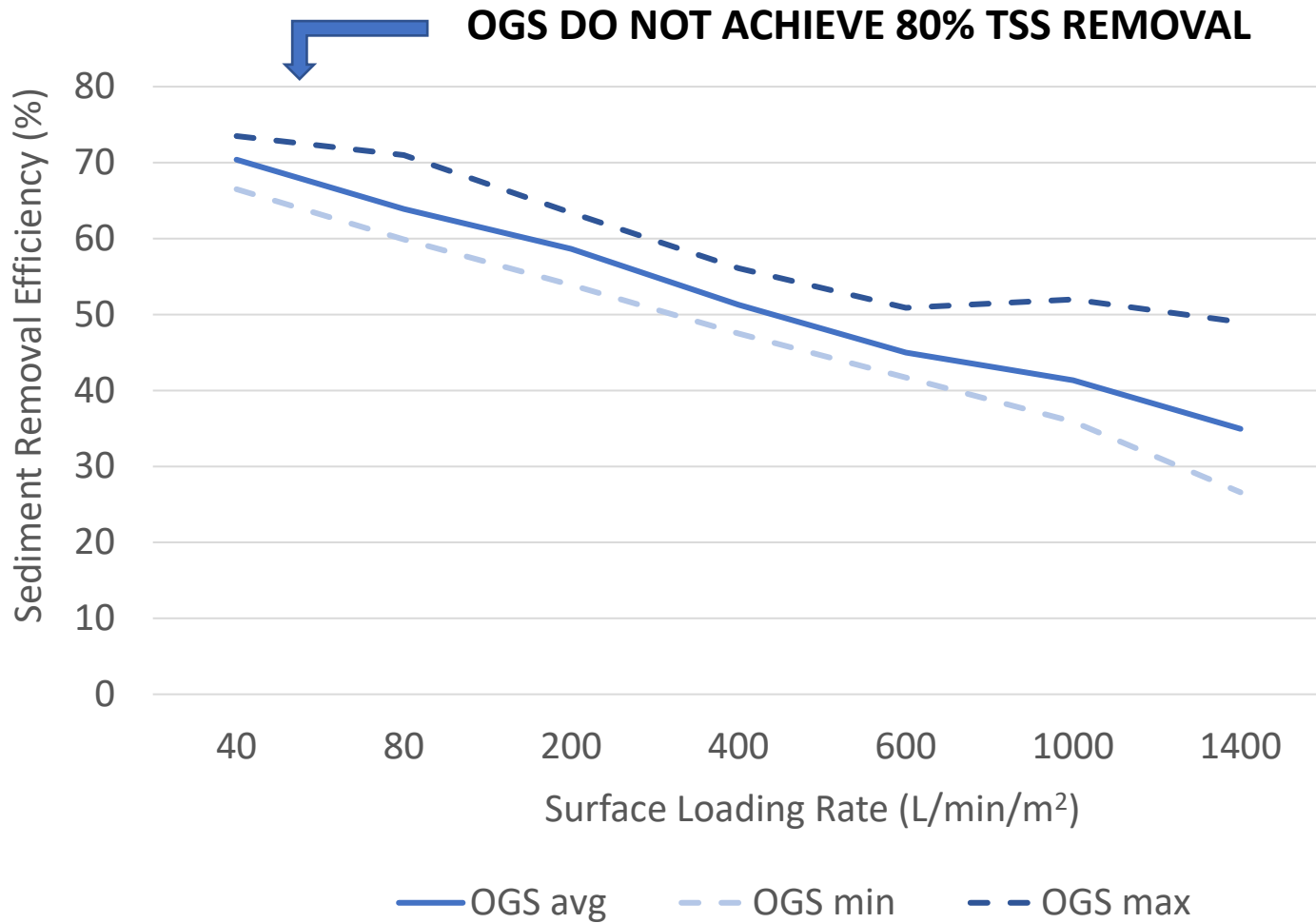
- Prepared by TRCA, guided by 14 member Steering Group (6 Provinces)
- Review and comments by:
 - Steering Group
 - Review Panel (30 members)
 - Public Inquiry
- Currently in the Public Inquiry phase
- Final PAS documents to be completed by early June, 2023

PAS #1: OGS Laboratory Test Procedure Update

- **Performance Testing:**
 - **Suspended solids removal** at 7 surface loading rates
 - **Suspended solids removal by particle size class**
 - **Potential for scour of retained sediment at high flow rates**
 - **Light Liquid Capture and Retention**
 - **Scaling Rules** governing how test data may be applied to other model sizes
- Updated PAS includes minor changes in testing and reporting



Laboratory Test Results



- Similar performance at low flow rates (n=10)
- Most units passed the scour test with only one showing significant high flow rate scour
- Several units were also verified for light liquid retention

PAS #2: Field Test Procedure for Filtration MTDs

- Currently no standard test procedure in Canada
- Field testing required because filters are strongly influenced by the texture and composition of stormwater sediments
- Current ISO/ETV verifications for filters include both lab and field tests – not standardized
- New Field Test Procedure based largely on Washington '*Technology Assessment Protocol – Ecology*' (TAPE)



Membrane filter



Vertical media filter



Media cartridges



PAS #3: Guidance on the Use and Application of Verified ETV data for OGS and Filtration MTDs

- Guidance on how ETV test data should be interpreted and factored into approval agency approvals and procurement of stormwater MTDs
- Documents considerations for MTD siting, selection and sizing
- Defines key design parameters and maintenance considerations
- Step by step decision making process

Sample ETV Review Sheet for OGS

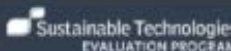
- Simplifies approvals for OGS sizing
- Provides average year TSS removal claim for selected OGS
- Rational Method used for flow rate calculations
- Model may vary based on:
 - TSS removal target (e.g. 60%)
 - Maintenance frequency (e.g. 1 year)
- Vendor to provide model sizes

https://wiki.sustainabletechnologies.ca/wiki/Oil_and_Grit_Separator

OGS REVIEW SHEET
PERFORMANCE EVALUATION

Version 0.9 Last Updated: 11/22/2019

** DRAFT FOR FEEDBACK **



1 Project Background

Project Name: _____

Site Location: _____

Reference Documentation: _____

2 Design and Performance Objectives

MTD Application: Stand-Alone Treatment Train / Multi-Component

Describe Application: _____

MTD TSS Removal Objective: _____ Oil Retention? Select from Dropdown

3 Site Design Characteristics

Catchment Area [ha]: _____ % Imperviousness: _____

Ranoff Coefficient: _____

4 MTD Selection and Dimensions

Testing/Verification: CETV Laboratory Testing Protocol Tested ISO14034:ETV Verification Statement

Manufacturer Name: _____

Technology Name: _____ Proposed Model: _____

	Model	Diameter [m]	Surface Area [m ²]	Treatment Depth [m]	Max Sediment Depth [m]
Laboratory Tested Model					
Proposed Model	0				

5 ISO14034:ETV Verified Test Results

Sediment Capture Test

SLR [L/min/m ²]	40	80	200	400	600	1000	1400	1800
Removal Efficiency [%]								

Scour Test

SLR [L/min/m ²]	200	400	1400	2000	2600
Effluent Conc. [mg/L]					

Tested for Oil Retention? Select from Dropdown

6 Design Considerations

Internal By-Pass? Select from Dropdown Installation Configuration Select from Dropdown

Flow Attenuation? Select from Dropdown Max Treated Flow [L/s] _____

Ass Sediment Volume [m³]: _____ Provided Storage Vol [m³]: _____

7 Average Year Performance Evaluation

TSS Removal Performance Credit: 6.0%

I	II	III	IV	V	VI	VII	VIII	IX	X
% Annual Rainfall Volume	% Weight Rainfall Volume	Design Intensity [mm/hr]	Peak Runoff Flow [L/s]	Design Flow to MTD [L/s]	Design SLR [L/min/m ²]	Evaluated TSS Removal [%]	Off-Line TSS Removal [%]	Incremental Removal [%]	Cumulative Removal [%]
10%	10%	1.0	0.0	0.0	#DIV/0!	#DIV/0!	N/A	0.0%	0.0%
20%	10%	2.0	0.0	0.0	#DIV/0!	#DIV/0!	N/A	0.0%	0.0%
30%	10%	2.5	0.0	0.0	#DIV/0!	#DIV/0!	N/A	0.0%	0.0%
40%	10%	3.5	0.0	0.0	#DIV/0!	#DIV/0!	N/A	0.0%	0.0%
50%	10%	4.5	0.0	0.0	#DIV/0!	#DIV/0!	N/A	0.0%	0.0%
60%	10%	6.5	0.0	0.0	#DIV/0!	#DIV/0!	N/A	0.0%	0.0%
70%	10%	10.5	0.0	0.0	#DIV/0!	#DIV/0!	N/A	0.0%	0.0%
80%	10%	13.0	0.0	0.0	#DIV/0!	#DIV/0!	N/A	0.0%	0.0%
90%	10%	26.5	0.0	0.0	#DIV/0!	#DIV/0!	N/A	0.0%	0.0%
100%	10%	44.5	0.0	0.0	#DIV/0!	#DIV/0!	N/A	0.0%	0.0%

Further Information

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437-388-4876

Public Review:

<https://sustainabletechnologies.ca/canadian-stormwater-environmental-technology-verification-setv-project/>

Supported by:

Standards Council of Canada



Design Criteria for Manufactured Treatment Devices

Source to Stream Conference - 2023

Shad Hussain, Senior Engineer - Strategic Planning and Policy
Water Infrastructure Management, Toronto Water

March 22, 2023

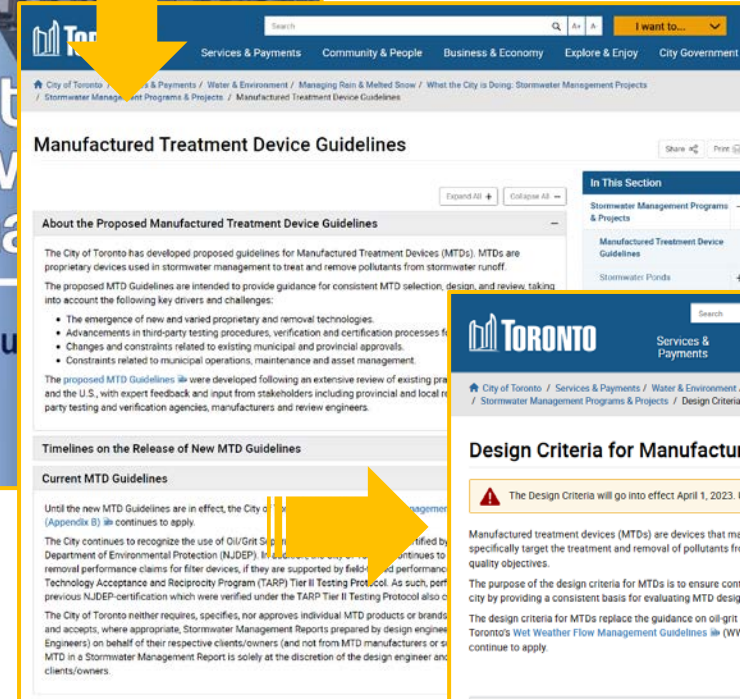


Overview

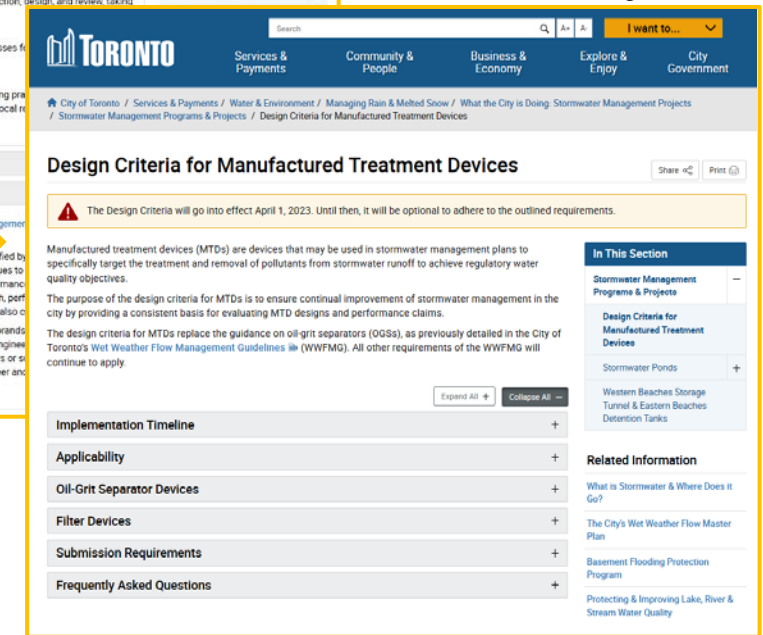
1. Context
2. Policy Review
3. Objective
4. Applicability
5. OGS Criteria
6. Filter Device Criteria
7. Implementation Tools
8. Conclusions



2006
*Interim Guidance for OGS
Sec 2.2.2.2(3)/Appendix B*



2019/20
*Clarifications +
Draft Proposal*



2022/23
Final Design Criteria

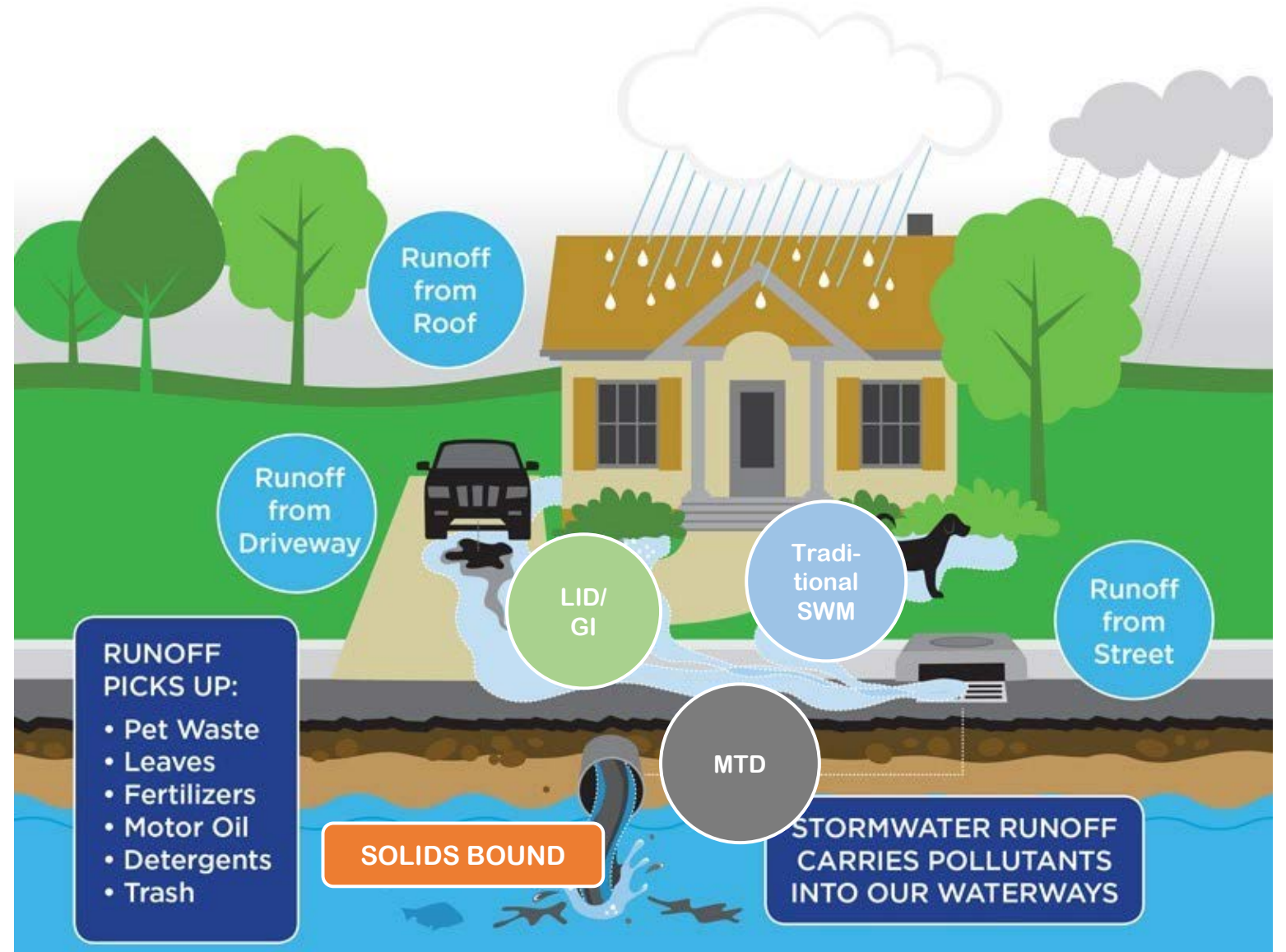
1. Context

Stormwater Management Plan/Reports Submissions

- Subject to WWFMG Targets (Balance, Quality, Quantity)
- MTDs - proprietary stormwater treatment technologies, target TSS Removal

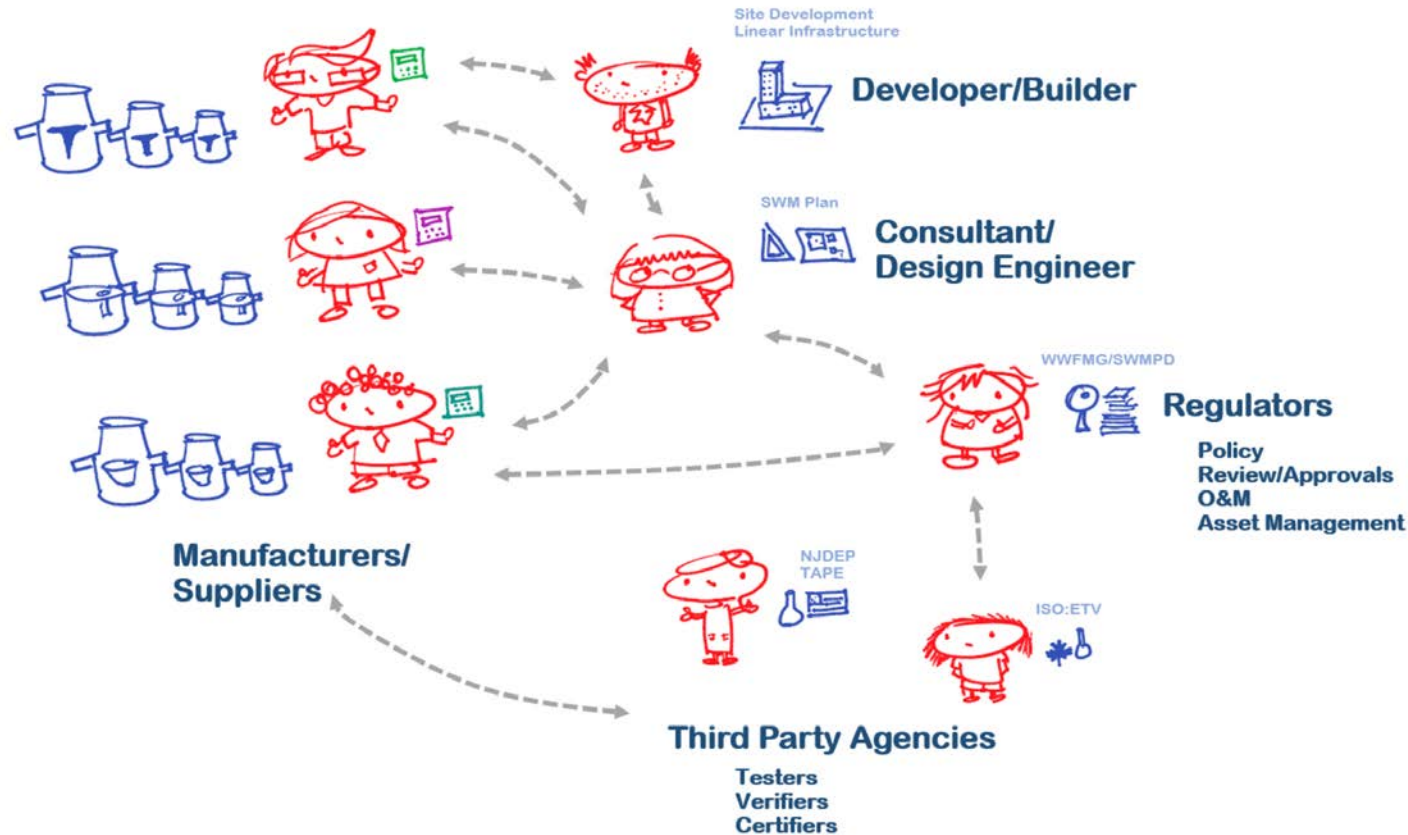
City Application Process

- New Private Developments
- New/Upgrades to Municipal Infrastructure
- Retrofit Storm Connection



Illustrative figure adapted from <https://rvah2o.org/stormwater/>

2. Policy Review



- Many Stakeholders!
- Different Goals, Constraints and Needs
- Need for collective understanding & collaboration
- Drafts for feedback in 2019, 2020

3. Objectives



To ensure **continued improvement of SWM** by providing a consistent basis for evaluating MTD designs and performance claims for water quality.

- Minimum requirements, with flexibility to allow for SWM innovation



Policy Considerations:

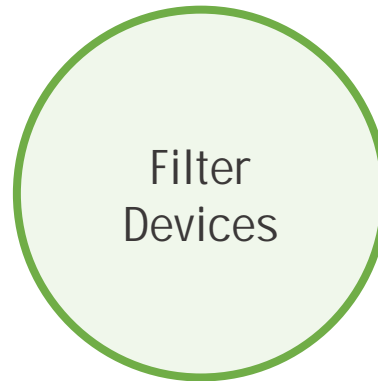
- **Technology** – Testing/Verification, Sizing, SWM Design
- **Asset Management** – O&M Program, Capital Program
- **Regulatory Process** – Application Review, Updated Regulations (MECP CLI)

4. Applicability

Various Types - Water Quality Benefit vs Credit



*Primarily designed for TSS removal
Standard Testing and Verification*



*Primarily designed for O&M Benefit -
Scour, Debris/Floatable Removal,
Clog Prevention*

5. OGS Criteria



Lab Tested (CETV OGS Protocol) + ISO 14034:ETV Verified



Design Treatment Flow

- Use City's rainfall intensity distribution (Capture % Avg Annual Volume)
- Use Rational Method (no attenuation)



Sizing, Performance Evaluation, Scaling

- Meet WQ target for full range of design flows
- Assess % removal using test results (no MTD in series)
- Meet scaling provisions + other conditions

Table 1. Removal efficiencies (%) at specified surface loading rates.

Particle size fraction (µm)	Surface loading rate (L/min/m ²)							
	40	80	200	400	600	1000	1400	1800
500-1000	97.9	86.3	100+	91.3	93.6	100+	91.0	94.4
250 - 500	83.9	95.9	94.1	97.6	100+	96.9	100+	94.4
150 - 250	90.3	95.1	99.8	99.1	93.0	96.3	90.5	94.4
100 - 150	100+	100+	99.8	99.8	88.9	95.1	89.4	88.8
75 - 100	97.9	92.3	94.1	65.1	63.0	74.5	61.3	52.4
50 - 75	71.4	72.3	49.0	32.6	23.3	18.2	18.1	16.1
20 - 50	70.0	43.1	14.0	13.3	7.2	2.5	2.5	6.9
8 - 20	31.8	13.8	6.0	5.8	1.3	4.4	4.5	3.3
5 - 8	18.8	25.3	14.1	5.5	6.3	6.6	6.5	5.3
< 5	11.7	6.4	5.9	4.1	4.7	9.2	6.6	3.0
All particle sizes	73	67	61	53	50	52	49	47

* Removal efficiencies were calculated to be above 100%. Calculated values were between 102.7 and 117.5%. See text and Bulletin # CETV 2016-11-001 for explanation.



Off-line/In-line Installation

- Ensure by-pass capacity > max design flows



Operations & Maintenance

- Target 1-yr maintenance interval

6. Filter Device Criteria



- i) Field Tested (TAPE Protocol) + ISO 14034:ETV Verified
- ii) Field Tested (TAPE Protocol) + TAPE "GULD" Certification



Design Treatment Flow

- o Use rainfall intensity for 90% Avg Annual Volume Capture



Sizing, Performance Evaluation, Scaling

- o Meet WQ target for design flow
- o Confirm 80% removal is achieved from 95% CI test results
- o Meet scaling provisions



Off-line/In-line Installation

- o Ensure by-pass capacity > max design flow



Operations & Maintenance

- o Target 1-yr maintenance interval



7. Implementation



Released November 2022;

- Optional since January 1, 2023
- Effective April 1, 2023



Submission Requirements (with SWM Report) –

- Summary Form
- Supporting Documentation

No City-approved Sizing Tool/Spreadsheet –

- Ensure 3rd-party tools adhere to design criteria



Frequently Asked Questions –

- Site-specific inquiries through review process

8. Conclusions



Design criteria not substitute for professional judgement
Familiarize with external relevant references



Collaborate with technical experts and stakeholders
Understand responsibilities



Questions?

Web search: [Design Criteria for Manufactured Treatment Devices – City of Toronto](#)



Key Contributors

Mike Cai
Joe Amato
Vivian Yao

Significant Input/Feedback

TRCA-STEP
MECP
MELCC-Quebec
Manufacturers/Suppliers



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