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Navigating the Discharge Approval Process for Building Foundation Drainage

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Outline

- Overview of City of Toronto's Long-Term Private Water Discharge Permit Application Process
- Typical Building Foundation Drainage (Groundwater) Treatment Needs
- Case Study
- Questions and Discussion

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Private Water Discharge Approval Process

3

Application Requirements

- Sending building foundation drainage (groundwater) to storm or sanitary sewer requires Private Water discharge approval
- Both SHORT and LONG TERM Private Water discharge approvals are required
  - Form 1 – Contact Information
  - Form 2 – Short Term Private Water Application
  - Form 3 – Long Term Private Water Application

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Long Term Discharge Approval

- To be permitted to discharge to City of Toronto's storm or sanitary sewer system:
  - Water quality must meet storm and/or sanitary/combined sewer limits of Toronto Municipal Code Chapter 681
  - Discharge volumes and flowrates must be manageable for the City's sewer infrastructure
- There is currently a fee to discharge to sanitary sewer
- Treatment strategy for long term discharge required in order to receive approval for short term discharge

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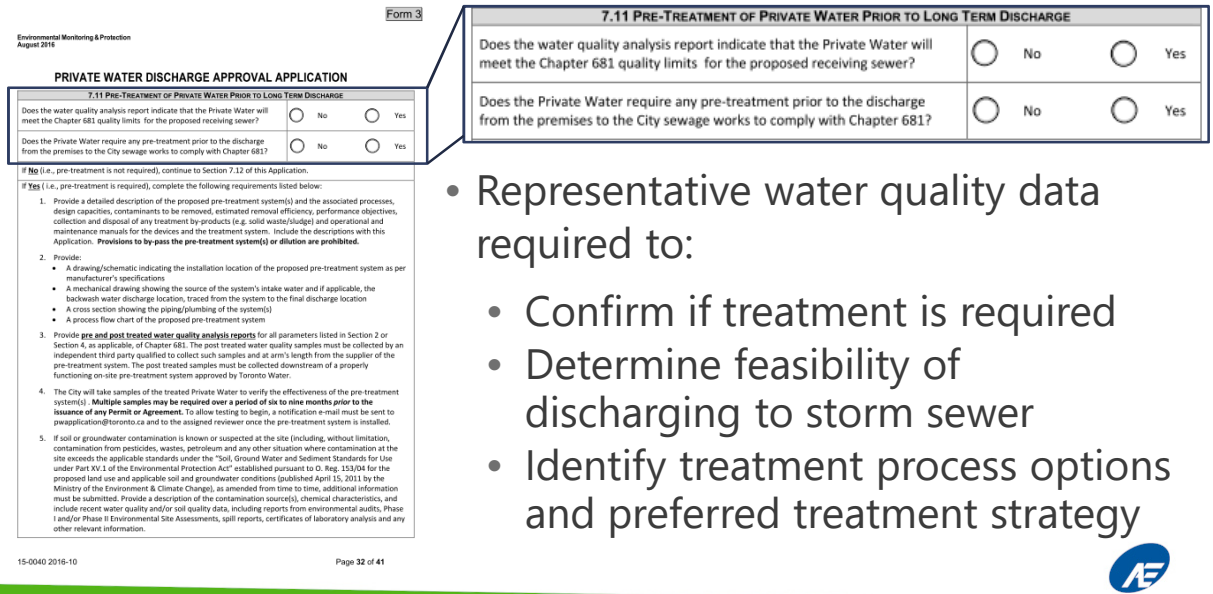
Long Term Discharge Approval (cont.)



Form 3

Environmental Monitoring & Protection
August 2016

PRIVATE WATER DISCHARGE APPROVAL APPLICATION

7.11 Pre-Treatment of Private Water Prior to Long Term Discharge

Does the water quality analysis report indicate that the Private Water will meet the Chapter 681 quality limits for the proposed receiving sewer?	No	Yes
Does the Private Water require any pre-treatment prior to the discharge from the premises to the City sewage works to comply with Chapter 681?	No	Yes

If **No** (i.e., pre-treatment is not required), continue to Section 7.12 of this Application.

If **Yes** (i.e., pre-treatment is required), complete the following requirements listed below:

1. Provide a detailed description of the proposed pre-treatment system(s) and the associated processes, design capacities, contaminants to be removed, estimated removal efficiency, performance objectives, collection and disposal of any treatment by-products (e.g. solid waste/sludge) and operational and maintenance manuals for the devices and the treatment system. Include the descriptions with this Application. **Provisions to by-pass the pre-treatment system(s) or dilution are prohibited.**
2. Provide:
   - A drawing/schematic indicating the installation location of the proposed pre-treatment system as per manufacturer's specifications
   - A mechanical drawing showing the source of the system's intake water and if applicable, the backwash water discharge location, traced from the system to the final discharge location
   - A cross section showing the piping/plumbing of the system(s)
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3. Provide **pre and post treated water quality analysis reports** for all parameters listed in Section 2 or Section 4, as applicable, of Chapter 681. The post treated water quality samples must be collected by an independent third party qualified to collect such samples and at arm's length from the supplier of the pre-treatment system. The post treated samples must be collected downstream of a properly functioning on-site pre-treatment system approved by Toronto Water.
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5. If soil or groundwater contamination is known or suspected at the site (including, without limitation, contamination from pesticides, wastes, petroleum and any other situation where contamination at the site exceeds the applicable standards under the "Soil, Ground Water and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act" established pursuant to O. Reg. 153/04 for the proposed land use and applicable soil and groundwater conditions (published April 15, 2011 by the Ministry of the Environment & Climate Change), as amended from time to time, additional information must be submitted. Provide a description of the contamination source(s), chemical characteristics, and include recent water quality and/or soil quality data, including reports from environmental audits, Phase I and/or Phase II Environmental Site Assessments, spill reports, certificates of laboratory analysis and any other relevant information.

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- Representative water quality data required to:
  - Confirm if treatment is required
  - Determine feasibility of discharging to storm sewer
  - Identify treatment process options and preferred treatment strategy

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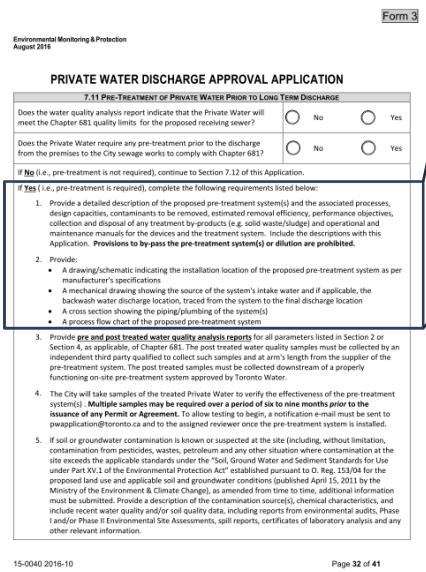
Long Term Discharge Approval (cont.)



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- Design of treatment system requires multi-discipline coordination
  - e.g., architectural, mechanical
- Size and location of treatment room important consideration

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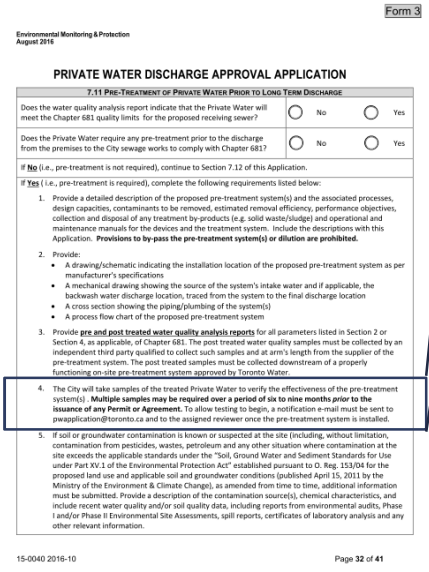
Long Term Discharge Approval (cont.)



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- Demonstration of consistent compliance with sewer limits required over 6 to 9 months
  - Development of monitoring program recommended
- City will collect samples to verify compliance

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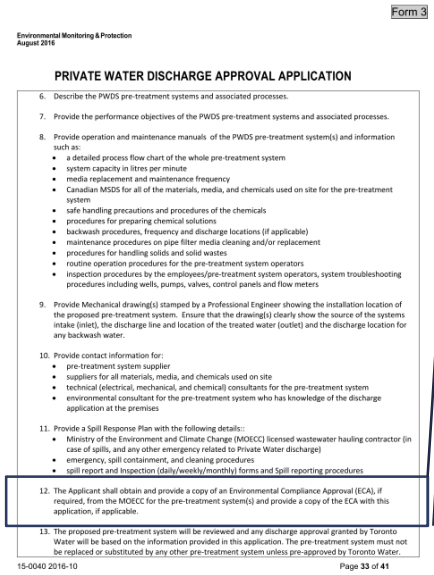
Long Term Discharge Approval (cont.)



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PRIVATE WATER DISCHARGE APPROVAL APPLICATION

6. Describe the PWDS pre-treatment systems and associated processes.

7. Provide the performance objectives of the PWDS pre-treatment systems and associated processes.

8. Provide operation and maintenance manuals of the PWDS pre-treatment system(s) and information such as:
   - a detailed process flow chart of the whole pre-treatment system
   - system capacity in litres per minute
   - media replacement and maintenance frequency
   - Canadian MSDS for all of the materials, media, and chemicals used on site for the pre-treatment system
   - safe handling precautions and procedures of the chemicals
   - procedures for preparing chemical solutions
   - backwash procedures, frequency and discharge locations (if applicable)
   - maintenance procedures on pipe filter media cleaning and/or replacement
   - procedures for handling solids and solid wastes
   - routine operation procedures for the pre-treatment system operators
   - inspection procedures by the employees/pre-treatment system operators, system troubleshooting procedures including wells, pumps, valves, control panels and flow meters

9. Provide Mechanical drawing(s) stamped by a Professional Engineer showing the installation location of the proposed pre-treatment system. Ensure that the drawing(s) clearly show the source of the systems intake (inlet), the discharge line and location of the treated water (outlet) and the discharge location for any backwash water.

10. Provide contact information for:
    - pre-treatment system supplier
    - suppliers for all materials, media, and chemicals used on site
    - technical (electrical, mechanical, and chemical) consultants for the pre-treatment system
    - environmental consultant for the pre-treatment system who has knowledge of the discharge application at the premises

11. Provide a Spill Response Plan with the following details::
    - Ministry of the Environment and Climate Change (MOECC) licensed wastewater hauling contractor (in case of spills, and any other emergency related to Private Water discharge)
    - emergency, spill containment, and cleaning procedures
    - spill report and Inspection (daily/weekly/monthly) forms and Spill reporting procedures

12. The Applicant shall obtain and provide a copy of an Environmental Compliance Approval (ECA), if required, from the MOECC for the pre-treatment system(s) and provide a copy of the ECA with this application, if applicable.

13. The proposed pre-treatment system will be reviewed and any discharge approval granted by Toronto Water will be based on the information provided in this application. The pre-treatment system must not be replaced or substituted by any other pre-treatment system unless pre-approved by Toronto Water.

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- Environmental Compliance Approval (ECA) required if discharging to storm sewer
  - Separate approval application process through MECP

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Typical Treatment Requirements

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Toronto Sewer Discharge Limits

- Common constituents found in groundwater include:

Parameter	Storm Sewer Limit	Sanitary and Combined Sewer Limit
Total Suspended Solids (TSS)	15 mg/L	350 mg/L
Total Iron	None	None
Total Manganese	0.05 mg/L (50 µg/L)	5 mg/L
Free Chlorine Residual	Non-detectable	None

- Other metals, inorganics and organics may be present depending on site specific conditions (e.g., zinc, phosphorus, phenols, etc.)

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Toronto Sewer Discharge Limits (cont.)

Table 2 - Limits for Storm Sewer Discharge
[Amended 2010-07-08 by By-law No. 868-2010; 2016-02-04 by By-law No. 100-2016]

Parameter	Limit	Unit	Parameter	Limit	Unit
pH	>6.0 to <9.5	SU	1,1,2,2-tetrachloroethane	0.017	mg/L[5]
Temperature	< 40	Degrees Celsius	1,2-dichlorobenzene	0.0056	mg/L[5]
Biochemical oxygen demand	15	mg/L[5]	1,4-dichlorobenzene	0.0068	mg/L[5]
Cyanide (total)	0.02	mg/L[5]	3,3'-dichlorobenzidine	0.0008	mg/L[5]
Phenolics (4AAP)	0.008	mg/L[5]	Benzene	0.002	mg/L[5]
Phosphorus (total)	0.4	mg/L[5]	Bis (2-ethylhexyl) phthalate	0.0088	mg/L[5]
Suspended solids (total)	15	mg/L[5]	Chloroform	0.002	mg/L[5]
Arsenic (total)	0.02	mg/L[5]	Cis-1,2-dichloroethylene	0.0056	mg/L[5]
Cadmium (total)	0.008	mg/L[5]	Di-n-butyl phthalate	0.015	mg/L[5]
Chromium (total)	0.08	mg/L[5]	Ethyl benzene	0.002	mg/L[5]
Chromium (hexavalent)	0.04	mg/L[5]	Methylene chloride	0.0052	mg/L[5]
Copper (total)	0.04	mg/L[5]	Nonylphenols	0.001	mg/L[5]
Lead (total)	0.12	mg/L[5]	Nonylphenol ethoxylates[4]	0.01	mg/L[5]
Manganese (total)	0.05	mg/L[5]	PCBs	0.0004	mg/L[5]
Mercury (total)	0.0004	mg/L[5]	Pentachlorophenol	0.002	mg/L[5]
Nickel (total)	0.08	mg/L[5]	Tetrachloroethylene	0.0044	mg/L[5]
Selenium (total)	0.02	mg/L[5]	Toluene	0.002	mg/L[5]
Silver (total)	0.12	mg/L[5]	Total PAHs[4]	0.002	mg/L[5]
Zinc (total)	0.04	mg/L[5]	Trans-1,3-dichloropropylene	0.0056	mg/L[5]
			Trichloroethylene	0.0076	mg/L[5]
			Xylenes (total)[4]	0.0044	mg/L[5]

- Other water quality characteristics will impact treatment approach
  - e.g., pH, alkalinity, hardness, etc.

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Iron and Manganese

- Naturally and commonly found minerals in groundwater
  - Typically in dissolved form
- Iron related bacteria can grow and proliferate in water containing iron levels as low as 0.1 mg/L
  - Form biofilm and sludge leading to O&M challenges
  - Managed through reduction in iron levels, periodic 'shock' disinfection of influent sump pit and routine sludge removal and cleaning of sump pits

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Iron and Manganese (cont.)

- Oxidation/Precipitation/Filtration is a well established approach to iron and manganese reduction
  - Oxidation to transfer from a dissolved to a solid state (i.e., precipitate)
  - Filtration removes precipitate
- Chlorine and ozone are common oxidants
  - Cannot discharge chlorine residual to storm sewer
  - Ozone can be generated from ambient air via an ozone generator (i.e., no chemicals)

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Iron and Manganese (cont.)

- If using ozone, require quenching step to address any remaining ozone residual
  - Granular Activated Carbon (GAC) filtration is non-chemical approach to quenching ozone
- If using ozone, specify ambient ozone monitor and safety mechanisms to alarm and shut down generator
- Filters require periodic backwashing and generate liquid waste stream sent to sanitary

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Other Contaminants

- Other contaminants requiring treatment may be present depending on site conditions
- Treatment approach for additional contaminants and overall strategy determined on case by case basis
  - Discharge to storm or sanitary?
  - Other water quality characteristics
  - Footprint limitations
  - O&M and H&S considerations, etc.

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Case Study – Toronto Condominium

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Background

- Groundwater inflow of up to 400 m^3/day estimated
- Discharge of treated groundwater to storm sewer

Parameter	Concentration Measured	Toronto Storm Sewer Limit
Total Suspended Solids	Not detected to 15 mg/L	15 mg/L
Total Manganese	190 to 340 µg/L	50 µg/L
Total Iron	560 to 1,500 µg/L	None
Nonylphenol	Not detected to 0.038 mg/L	0.001 mg/L
pH	6.7 to 7.8	6 to 9.5
Total Hardness	520 to 540 mg/L	None

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Site Specific Considerations

- Use of chlorine avoided because discharging to storm so ozone preferred choice of oxidant
  - Additional advantage is that nonylphenol can be reduced through oxidation with ozone
- Direct filtration (i.e., no settling) preferred to reduce required treatment room footprint
- Ceiling height constraints impacted filter specification
- Treatment system liquid waste streams can be sent to sanitary sewer

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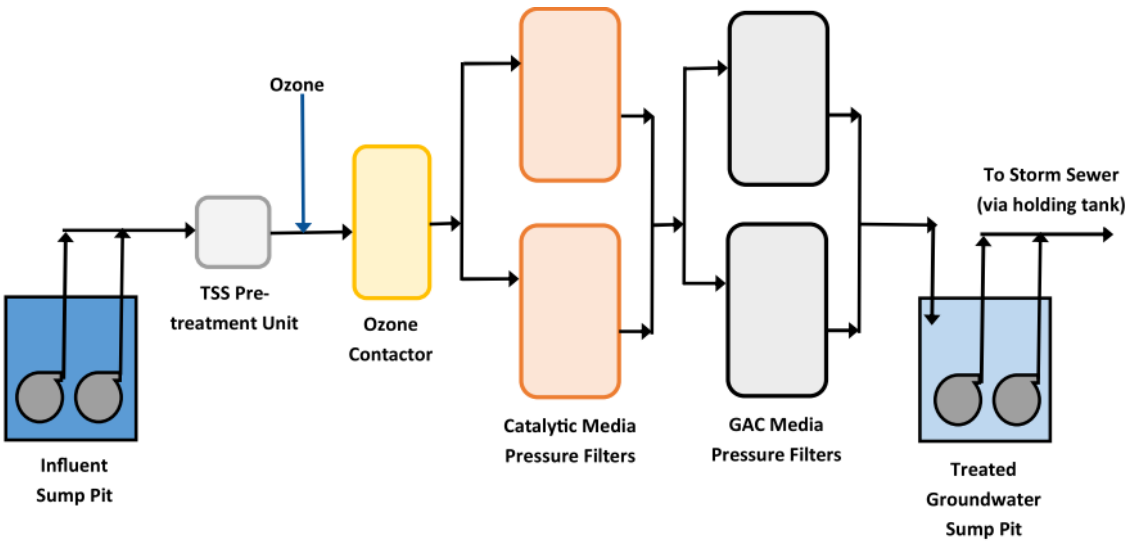
Process Flow Diagram



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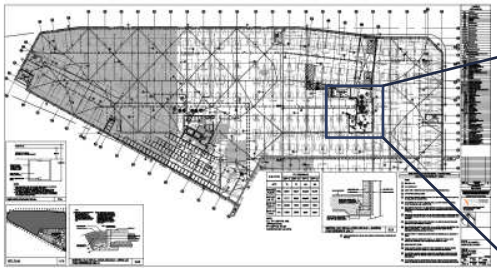
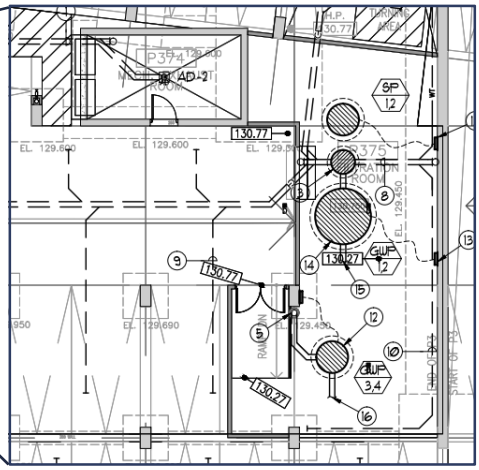
Multi-Discipline Coordination





- Room footprint, height and access needs
- Size and location of influent, treated water and sanitary sump pits
- Service water connections

Treatment Room

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Summary

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Summary

- Long Term Private Water Discharge Permit application is a multi-step process
  - Having representative water quality sample data early on in the design is important so long-term treatment strategy can be developed
  - Pre-consultation with City to present long-term treatment strategy will assist in minimizing any delay in obtaining short term discharge approval

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Summary (cont.)

- Encouraging multi-discipline coordination early on in design process will improve success of treatment system design, installation and commissioning
- A well designed treatment system is critical to successfully demonstrating compliance with Toronto Municipal Code Chapter 681 and minimizing any delay in obtaining long term discharge permit approval
  - Site specific treatment strategy is key

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Thank You!

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