MFOA / LAS Asset Management Symposium

Water & Wastewater Case Study: Observations of single Asset Across Several Municipalities

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Brief History of Water & Wastewater Legislation in Ontario

- In 2000, the Walkerton Crisis occurred which initiated a Commission review which established the basis for legislative change in Ontario.
- Judge O’Conner’s Part II report provided 93 recommendations relative to making changes to the Water and Wastewater Industry in Ontario.
- The following pages summarize the legislation which requires asset management.
## Timeline of Legislative Changes 2000 – 2013

<table>
<thead>
<tr>
<th>Year</th>
<th>Event Description</th>
<th>Timeline</th>
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<tbody>
<tr>
<td>2000</td>
<td>Walkerton Crisis</td>
<td>Undertaken</td>
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<tr>
<td>2000</td>
<td>Regulation 459/00</td>
<td>Undertaken</td>
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<tr>
<td>2000</td>
<td>Walkerton Inquiry</td>
<td>Undertaken</td>
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<tr>
<td>2000</td>
<td>Safe Drinking Water Act</td>
<td>Undertaken</td>
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<tr>
<td>2000</td>
<td>Sustainable Water and Sewage Systems Act</td>
<td>Undertaken</td>
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<tr>
<td>2000</td>
<td>Expert Panel - &quot;Watertight&quot; Report</td>
<td>Undertaken</td>
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<tr>
<td>2000</td>
<td>Clean Water Act</td>
<td>Undertaken</td>
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<tr>
<td>2000</td>
<td>Water Opportunities Act</td>
<td>Undertaken</td>
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**Legend**
- Undertaken
- Pending
- Repealed
- Asset Management Related
Sustainable Water and Sewage Systems Act (SWSSA)

- Act was to ensure that all costs (full cost pricing) for providing service were assessed
- Full Cost pricing defined as:
  - “source protection, operating costs, financing costs, renewal and replacement costs and improvement costs associated with extracting, treating or distributing water to the public and such other costs which may be specified by regulation.”
Safe Drinking Water Act

- Passed December, 2002 and provided for approx. 50 of the 93 Walkerton Part II Recommendations including:
  - Mandatory licensing & accreditation of testing labs
  - New standards for treatment, distribution quality and testing
  - Mandatory operator training and certification
  - Mandatory Licensing of municipal water provides
  - Stronger enforcement and compliance provisions
  - “Standard of care” requirements for municipalities
O. Reg. 453/07 and Guideline

In August, 2007, the province passed O. Reg. 453/07 and the Guideline “Towards Financially Sustainable Drinking-Water and Wastewater Systems”. A brief summary of key elements of Regulation 453/07 is provided below:

- The financial plan would represent one of the five key elements for obtaining your Municipal Drinking-Water License.
- The plan was to be completed July 1, 2010 (may be later if Drinking water license is to be obtained later than this).
- The financial plans shall be for a period of a least six years but longer planning horizons are encouraged.
- As the regulation is under the Drinking Water Act, the preparation of the plan is mandatory for water and encouraged for wastewater.
- The Regulations & Guideline appeared to be a transition to SWSSA or a similar regime.
Water Opportunities Act, 2010

- Will require municipalities to develop and submit a Sustainability Plan which shall include:
  - An asset management plan for the physical infrastructure;
  - Financial Plan;
  - For water, a conservation plan
  - Assessment of risks that may interfere with the future delivery of the municipal service, including, if required by the regulations, the risks posed by climate change and a plan to deal with those risks;
  - Strategies for maintaining and improving the municipal service to ensure future demand can be satisfied, consider technologies to improve the service and potential increased co-operation with other municipal service providers.
Present Reporting Requirements

- At this time, O. reg. 453/07 is the only mandatory requirement for water assets (and encouraged for wastewater assets) – WOA regulations not in place yet

- The regulation focuses more on the reporting format than the requirement for long term financial planning hence assets are required to be depreciated vs. providing a financial plan for lifecycle replacement
PSAB, Asset Management and New Legislation

- Although Financial Planning and PSAB reporting include the reporting of assets, their approach to valuation and use are entirely different (examples to be shown subsequently)

<table>
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<tr>
<th>PAST EXPENDITURES</th>
<th>FUTURE EXPENDITURES</th>
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<tbody>
<tr>
<td><strong>PSAB</strong></td>
<td><strong>Asset Management</strong></td>
</tr>
<tr>
<td>O. Reg. 453/07</td>
<td><strong>SWSSA</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Financial Plan</strong></td>
</tr>
</tbody>
</table>

**Municipal Assets**
- roads
- water
- wastewater
- stormwater
- recreation
- public works
- library
- etc
Depreciation vs. Lifecycle Replacement

- In budgeting/financial planning, amounts to be set aside for future replacement, two approaches considered:
  - Depreciation
  - Lifecycle replacement approach

- The difference in the two approaches – depreciation records the using up of the asset and lifecycle focuses on the replacement of the asset
STRAIGHT LINE DEPRECIATION

Formula: \[
\frac{\text{Original Cost} - \text{Salvage Cost}}{\text{Number of Years of Useful Life}}
\]

SINKING FUND METHOD

1. “Estimate Future Replacement Cost”

2. “Estimate Annual Contribution which will Grow with Interest to Equal Future Replacement Cost”

Formula: \[
\text{Interest Rate} \times \frac{\left(1 + \text{Interest Rate}\right)^{\text{Term}} - 1}{ \text{Original Cost}}
\]

Note: Interest Rate used would be the Investment Rate - Inflation Rate, e.g. 4% - 2% = 2% and is presented as 0.02.
Financial Impact of Two Approaches

- Assume $1 million watermain (today’s cost) – it is 40 years old and has a remaining useful life of 10 years
- PSAB reporting would require estimating the original acquisition cost (using Stats Can Construction Index it would be $132,000) and then dividing it by the estimated number of years useful life (e.g. 50 years) – annual amount to depreciate is approx. $2,640 – recorded value on the books is $26,400
- Lifecycle (asset management) approach will be to assess how much you need to start putting away in reserves to save for the replacement - assuming 2% inflation and a 4% investment rate would require $98,000 annual payment (for inflated project costs of $1.22 million)
Depreciation vs. Lifecycle Replacement

- O. Reg 453/07 requires that all municipalities providing water service (approx. 300) in Ontario report on this basis.

- It is estimated that less than half have undertaken a longer term lifecycle financial plan to address their asset replacement needs (however given the long term impacts, these are most likely phased in over a long term).
Sample of Water and Wastewater Assets in Ontario

- The following slides provides for a sampling of water and wastewater assets for 43 Ontario municipalities (15%)
- These include 2 cities, 10 municipalities, 21 Towns, 9 Townships and 1 Village
- Population for sample municipalities ranges from a low of 2,034 to a high of 185,500
- Number of Customers (water) ranges from 566 to 45,915
Sample of Water and Wastewater Assets in Ontario

- **Age of water system:**
  - Oldest dates back to 1890 (Chatham-Kent and Meaford)
  - Newest system dates to 1970 (Bayham)

- **Age of wastewater system:**
  - Oldest dates back to 1890 (Penetanguishene and Meaford)
  - Newest system dates to 1980 (Bayham)
Water Treatment - Asset Value per customer

Total Water Treatment Cost Per Customer (2014$)

- Tay
- Parry Sound
- Meaford
- Central Huron
- Leamington
- Petawawa
- Erin
- Kingsville
- Renfrew
- Kawartha Lakes
- Cornwall
- Guelph-Eramosa
- Chatham-Kent
- Minto
- Petrolia
- Severn
- Cavan Monaghan
- Penetanguishene
- Centre Wellington
- Collingwood
- Southgate
- South Huron
- Wasaga Beach
- Plympton-Wyoming
- Shelburne
- Midland

Treatment Per Customer
Water Distribution
- Asset Value per customer

Total Water Distribution Cost Per Customer (2014$)

- Distribution Per Customer
- Purchased Water from Upper Tier/Water Board

Warwick
Tay
West Lincoln
Parry Sound
Lambton Shores
Leamington
Erin
Centre Wellington
Thames Centre
Central Elgin
South Huron
King
Point Edward
Tecumseh
Renfrew
Essex
Brighton
Bayham
Collingwood
Chatham-Kent
Minto
Shelburne
Southgate
Pelham
Lincoln
Meaford
Guelph-Eramosa
Petrolia
Wasaga Beach
Midland
Aylmer
Kingsville
Central Huron
Petawawa
Cavan Monaghan
Kawartha Lakes
Penetanguishene
Plympton-Wyoming
Richmond Hill
Severn

Total
Water Distribution
Cost Per Customer
(2014$)

$0
$5,000
$10,000
$15,000
$20,000
$25,000
$30,000
$35,000
$40,000
$45,000

Purchased Water from Upper Tier/Water Board

Total Water Value per customer

Total Water Cost Per Customer - Excluding Municipalities with Purchased Water from Upper Tier/Water Board (2014$)

- Treatment Per Customer
- Distribution Per Customer
Wastewater Treatment - Asset Value per customer

Total Wastewater Treatment Cost Per Customer (2014$)

- Point Edward
- Tay
- Parry Sound
- Cavan Monaghan
- Shelburne
- Renfrew
- Thames Centre
- Amherstburg
- Kawartha Lakes
- Collingwood
- Central Huron
- Petawawa
- Chatham-Kent
- Petrolia
- Leamington
- Meaford
- Lambton Shores
- Midland
- Essex
- Cornwall
- Plympton-Wyoming
- Aylmer
- Bayham
- Central Elgin
- Severn
- Penetanguishene
- Wasaga Beach
- South Huron
- Tecumseh

Treatment Per Customer
Wastewater Collection - Asset Value per customer

Total Wastewater Collection Cost Per Customer (2014$)

- Collection Per Customer
- Purchased Wastewater Service from Upper Tier
Total Wastewater Value per customer

Total Wastewater Cost Per Customer - Excluding Serviced Municipalities from Upper Tier (2014$)

- Treatment Per Customer
- Collection Per Customer

Point Edward
Parry Sound
Amherstburg
Bayham
Collingwood
Petrolia
Central Huron
Kawartha Lakes
Cavan Monaghan
Shelburne
Centre Wellington
Renfrew
Lambton Shores
Meaford
Essex
Aylmer
Wasaga Beach
Chatham-Kent
Midland
Minto
Central Elgin
Cornwall
Warwick
Petawawa
Leamington
Tecumseh
Brighton
Southgate
South Huron
Penetanguishene
Severn
How long do the Assets Last?

- **Vertical Assets** (e.g. treatment, storage)
  - Generally, concrete superstructure has a long term life (50 – 75 years)
  - Mechanical and pumps – 20 years
  - Electrical – 25 years
  - Filtration – will vary considerably (sand, cartridge, membrane)

- **Watermains** affected by many factors:
  - Material type, maintenance practices, soil conditions, age, weather conditions, pipe size, and ground movement
# Water Main Material Types

<table>
<thead>
<tr>
<th>Pipe Material</th>
<th>Diameter of Pipe</th>
<th>Period When Material Type Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pit Cast Iron</td>
<td>75 - 1,500 mm</td>
<td>1850s - 1940s</td>
</tr>
<tr>
<td></td>
<td>3&quot; - 60&quot;</td>
<td></td>
</tr>
<tr>
<td>Spun Cast Iron</td>
<td>75 - 1,500 mm</td>
<td>1930s - 1960s</td>
</tr>
<tr>
<td></td>
<td>3&quot; - 60&quot;</td>
<td></td>
</tr>
<tr>
<td>Ductile Iron</td>
<td>75 - 1,500 mm</td>
<td>1960+</td>
</tr>
<tr>
<td></td>
<td>3&quot; - 60&quot;</td>
<td></td>
</tr>
<tr>
<td>Steel</td>
<td>&gt; 150 mm</td>
<td>1850+</td>
</tr>
<tr>
<td></td>
<td>&gt; 6&quot;</td>
<td></td>
</tr>
<tr>
<td>PVC (Thin wall)</td>
<td>100 - 1,200 mm</td>
<td>1970s</td>
</tr>
<tr>
<td></td>
<td>4&quot; - 48&quot;</td>
<td></td>
</tr>
<tr>
<td>PVC (High Density)</td>
<td>100 - 1,575 mm</td>
<td>1980s+</td>
</tr>
<tr>
<td></td>
<td>4&quot; - 63&quot;</td>
<td></td>
</tr>
<tr>
<td>Asbestos Cement</td>
<td>100 - 1,050 mm</td>
<td>1930s - 1980s</td>
</tr>
<tr>
<td></td>
<td>4&quot; - 42&quot;</td>
<td></td>
</tr>
<tr>
<td>Concrete Pressure Pipe</td>
<td>250 - 3,660</td>
<td>1940s +</td>
</tr>
<tr>
<td></td>
<td>10&quot; - 146&quot;</td>
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</tbody>
</table>
Closing Remarks

- Given the magnitude of investment (on average, $35,000 per customer) and the potential timing for that investment, the need for long range planning is evident.
- Whether legislated or not, proper longer term asset management plans and financial plans need to be undertaken to at least understand the magnitude of the issues facing municipalities.
- If legislated, an Ontario perspective can be developed which may lead to developing some form of assistance plan or long term loan program for those who will need assistance.