The Town of Georgina
W & WW Risk Assessment and Prioritized Capital Plan

Council Meeting
March 2nd , 2015

Presentation Content

1. Background and Study Objectives
2. Asset Management Principles
3. Risk Based Decision Making
4. Water and Wastewater System Overview
5. Management Scenarios
6. Analysis Results
7. Concluding Comments

W & WW Risk Assessment - Background

- Next Step following the Town's Asset Management Plan (2014)
- Leveraging:
  - Water & Wastewater GIS (2015)
  - Town's Dynamic "All Pipe" Water Model (2015)
  - Available Water & Wastewater Condition Information
- Prioritization of Water & Wastewater Project Based Risk

Study Objectives

- Development of Risk Assessment Framework
  - Data Consolidation
  - Tools Development
  - Methodology Development
- Conduct Asset by Asset Risk Analysis
- Development of Risk Based Asset Replacement Program
- Scenarios to Identify Funding Requirements

Goals of Asset Management

- Repeatable & Transparent Evidence-Based Budget Process
- Explicit Relationship to Performance of System and Expenditure Needs
- Optimized & Informed Decision-Making

Assessing Risk

Risk = Likelihood of Failure * Consequences of Failure

Watermains

Likelihood

↓

Breaks

Material

Age (Remaining Service Life)

Consequence

↓

Local

↓

Pressure/Flow (Model)

Road Class

Landuse

Environmental

System

↓

Level of Service (Model)

Sewers

Likelihood

↓

Age (Remaining Service Life)

Condition Score

Consequence

↓

Local

↓

Upstream PS

Flow/Diameter

Road

Landuse

Environmental

System

↓

Level of Service (Model)

Weighting of Each Factor

A pairwise analysis is used to develop weightings of the relevant importance of each aspect.

Pairwise analyses are used for weighting the following:

1. Failure Indicators (either direct or indirect)
2. Consequence Criteria (for each CoF category)
3. Consequence Categories

Assessing Risk – Likelihood of Failure

Likelihood of Failure

Break Record

Breaks		
0		**1**
1	2	**3**
>	2	**5**

Material

Material		
PVC	Polvinyl Chloride	**2**
CI	Cast Iron	**5**
COP	Copper	**5**
CPP	Concrete Pressure Pipe	**2**
DI	Ductile Iron	**3**
PE	Polyethylene	**2**
UNK	Unknown	**5**
STL	Steel	**5**
AC	Asbestos Cement	**2**
HDPE	High Density Polyethylene	**2**
PV	Poly Vinyl	**5**

Estimated Service Life

Estimated Useful Life		
PVC	Polyvinyl Chloride	**75**
CI	Cast Iron	**50**
COP	Copper	**50**
CPP	Concrete Pressure Pipe	**75**
DI	Ductile Iron	**50**
PE	Polyethylene	**75**
UNK	Unknown	**50**
STL	Steel	**60**
AC	Asbestos Cement	**75**
HDPE	High Density Polyethylene	**75**
PV	Poly Vinyl	**75**

Remaining Life

Remaining Life		
>	60	**1**
59	40	**2**
39	20	**3**
19	10	**4**
<	10	**5**

Likelihood of Failure

	Breaks	Remaining Life	Material	Total	**Weighting**
Breaks		2	4	6	**35%**
Remaining Life	3		4	7	**41%**
Material	2	2		4	**24%**

Watermain Consequence of Failure - Local

Consequence of Failure- Local

Hydraulic Model

Max Day Pressure (psi)		
<	50	1
51	80	2
>	80	3
		4
		5

Flow (L/s)		
0	25	1
26	75	2
76	125	3
126	200	4
201	1000	5

Environmental Feature GIS

Proximity to Environmental Feature (m)		
>	100	1
11	100	3
<	10	5

Road GIS

Road Class	
	1
Laneway	1
Private Road	1
Proposed Road	1
Rural Road	2
Urban Road	3
Arterial Road	4
Regional Road	5

Property and Environment						
	Flow	Max Day Pressure	Road Class	Prox to Env Feature	Total	Weighting
Flow		4	4	5	13	**35%**
Max Day Pressure	1		1	2	4	**11%**
Road Class	4	5		4	13	**35%**
Proximity to Env Feature	3	1	3		7	**19%**

System Overview

Water System

- Total System Length = **205,732 m**
- Total System Replacement Cost = **$155M**
- Average Asset Age = **21 years**
- Average Remaining Life **= 52 years**

Wastewater System

- Total System Length = **174,570 m**
- Total System Replacement Cost = **$136M**
- Average Asset Age = **22 years**
- Average Remaining Life **= 66 years**

Prioritized Capital Program - Scenarios

1. Average Asset Replacement Value

Average Annual Cost for Replacement =
Total Replacement Cost ÷ Year for Full Replacement

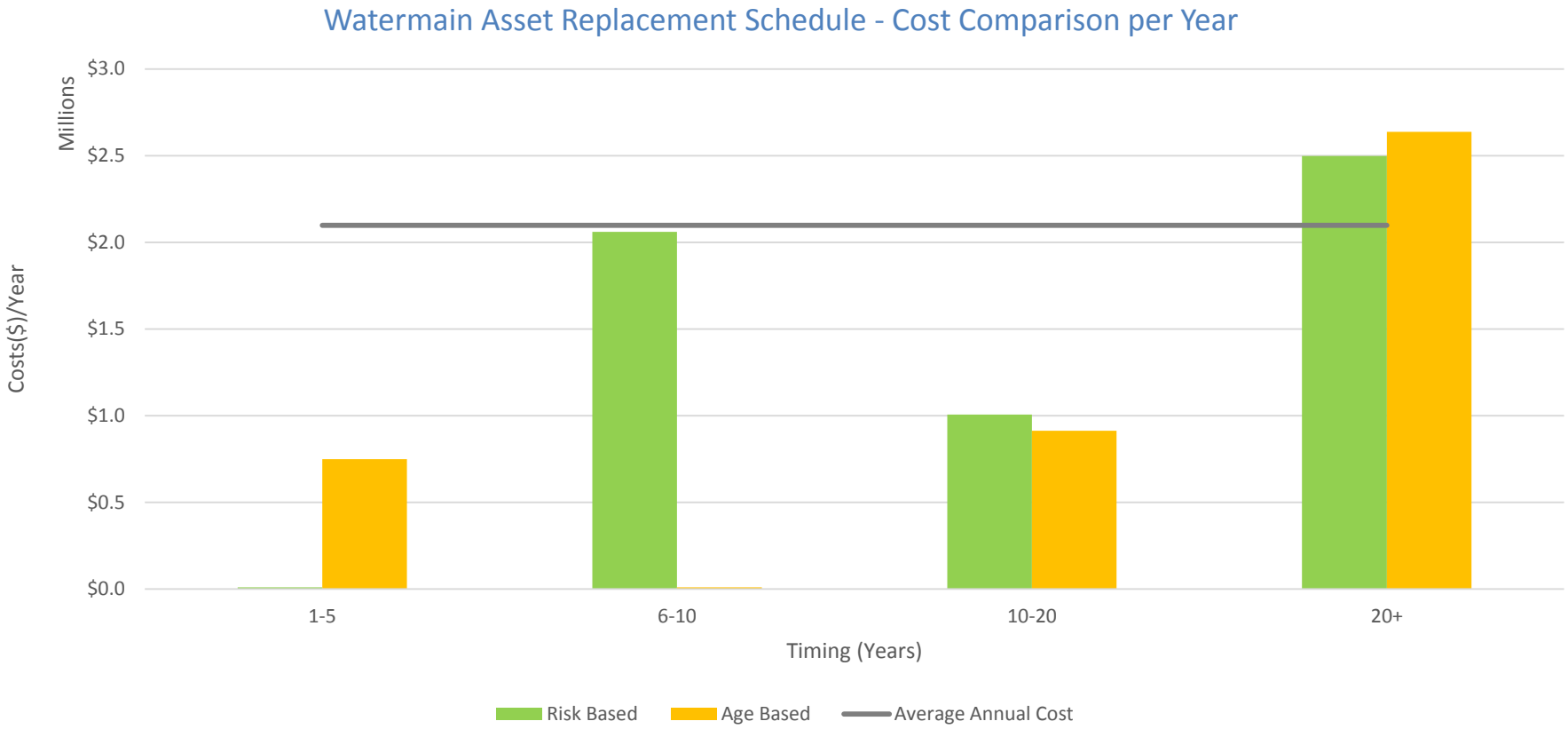
2. Age Based Replacement Value

Replace Asset When → Asset Age = Estimated Service Life

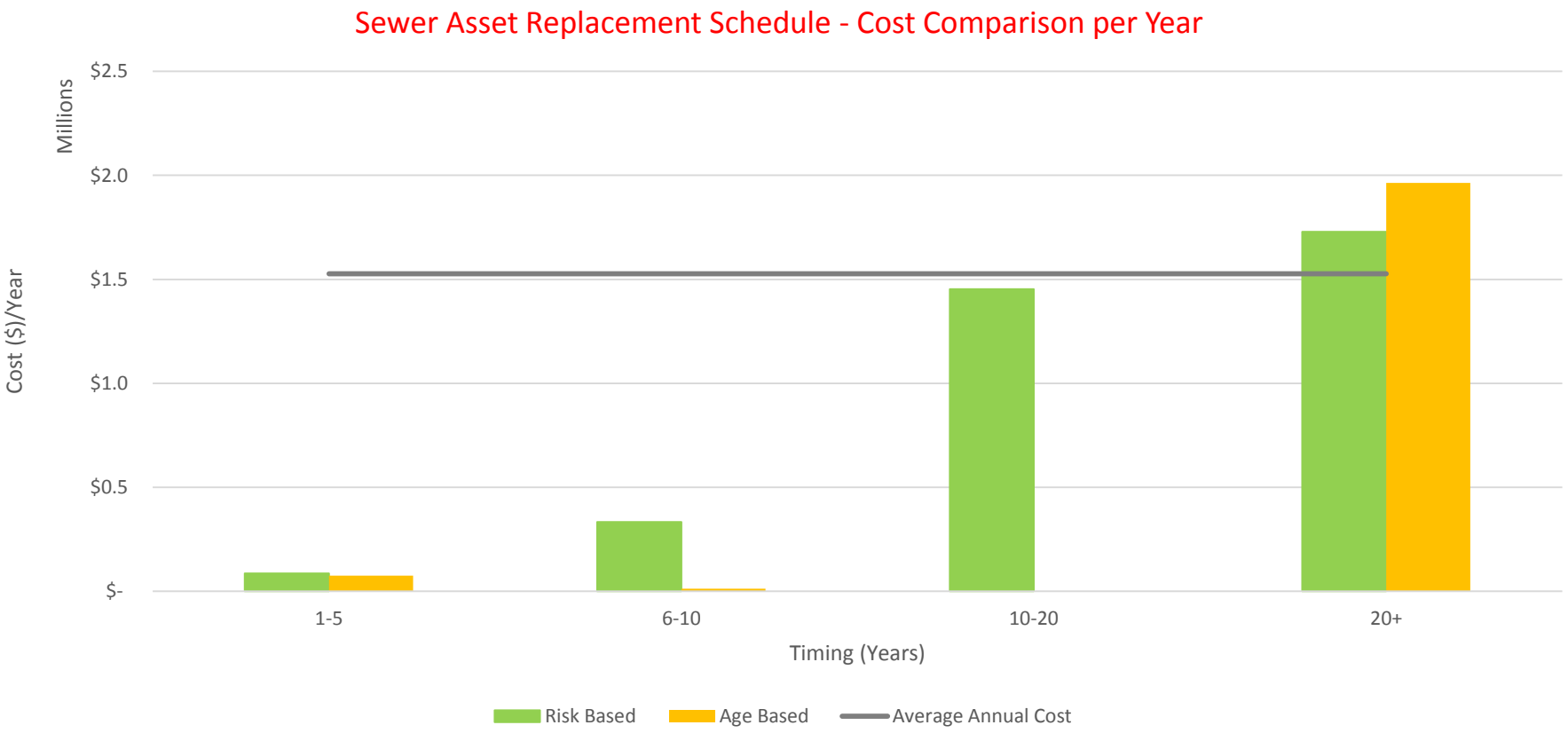
3. Risk Based Replacement Value

Replace Asset according to risk-based prioritization program
Risk: Likelihood of Failure & Consequence of Failure

Watermains Replacement Program



Sewermains Replacement Program



20 Year Capital Program Summary

	Timing	Water	Wastewater
Risk Based	20 Year Annual	$ 1,038,000	$ 831,000
Annual Based	20 Year Annual	$ 646,000	$ 21,000
Years for Full Replacement		74	89
Average Annual Cost for Replacement		$ 2,099,000	$ 1,527,278

Key Analysis Results

- Overall, Low Likelihood of Failure within Water System
  - System is Relatively New
  - Low Number of Watermain Breaks
- Overall, Low Consequence of Failure within Water System
  - Good System Looping Resulting in Minimal Break Impacts to Customers

Low Watermain Risk Ratings

- Overall, Low Likelihood of Failure within Wastewater System
  - System is Relatively New
- Overall, Low Consequence of Failure within Wastewater system
  - 4.8 km / 175 km (3%) of Sewers 600 mm or Larger

Low Sewer Risk Ratings

Moving Forward

1. Tools in place to be continually updated as new information becomes available
2. Sewer analysis can be enhanced with:
   a) Condition Scores (CCTV Inspection)
   b) Sewer System Model
   c) Input on Scoring, Rating, Weighting and Actions
3. Adjust priorities and risk sensitivity as needed
4. Use updated tool to help manage system and balance priorities

Thank You

Q & A