Please stay on the line: Putting I&I on hold with SSO Tanks.
City of Surrey

- BC’s second largest City
- Population 516,000+
- 1400+ km of gravity sewers
- 40 Pump Stations
- 75 km of forcemains
Inflow and Infiltration Compliance

**Metro Vancouver**

ILWRMP – Strategy: Municipalities will:

1.1.18 Develop and implement inflow and infiltration management plans, using the Metro Vancouver template as a guide, to ensure wet weather inflow and infiltration volumes are within Metro Vancouver’s allowances as measured at Metro Vancouver’s flow metering stations.

From MV I&I Allowance Assessment (2014)

*That, for the interim, Metro Vancouver continues to use 11,200 L/ha·d as the I&I allowance for basic service modeling for GVS&DD sanitary sewers and for capacity upgrades*

*That GVS&DD members will prioritize I&I management in sanitary sewer catchments tributary to reoccurring SSOs*
How we got here

Surrey’s I&I management work

Surrey:

• Is committed to meeting its obligations (ILWRMP)

• Has proactively addressed city-wide I&I for the last 15 years

• Completes annual infrastructure condition assessments

• Undertakes a comprehensive annual flow monitoring program to quantify I&I rates (120 sites)
How we got here

**Surrey’s I&I management work**

- Rehabilitation work has consisted of grouting, lining, and some partial/full replacement.
- Post-rehab monitoring undertaken to assess success reducing I&I.
- Despite the efforts to date the City is still experiencing I&I rates in the order of 12,000 to 20,000 L/ha/day on a catchment by catchment basis.
Challenges

What are we trying to do here?

Goal:
- Contribute <11,200 L/ha/d to Metro Vancouver regional system

Issues assessing Surrey’s I&I contribution:
- No I&I analysis had been provided for MV meters
- Surrey has 48 connections to NSI, 150 connections to SS system
- Upstream municipalities contribute to MV trunks Surrey ties into
HIGH: > 50,000 L/ha/d
MEDIUM: 20-50,000 L/ha/d
LOW: < 20,000 L/ha/d
Target

Metro Vancouver + ILWRMP

1.1.18 Develop and implement inflow and infiltration management plans, using the Metro Vancouver template as a guide, to ensure wet weather inflow and infiltration volumes are within Metro Vancouver’s allowances as measured at Metro Vancouver’s flow metering stations.
Calculation of Tank Size

Flow Rate

Allowable Limit

Excessive I&I

Instantaneous I&I Flow

100 % Reduction

Time
Possible Methodologies to establish Surrey I&I contribution

• Method 1  Metro Vancouver Billing Meter – Design Event
• Method 2  Surrey’s Sanitary Sewer Model
• Method 3  I&I Assessment at Metro Vancouver’s Billing Sites
• Method 4  Surrey’s I&I Rate Map
• Method 5  Metro Vancouver’s Sanitary Sewer Model
Possible Methodologies to establish Surrey I&I contribution

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- Method 4: Surrey’s I&I Rate Map
- Method 5: Metro Vancouver’s Sanitary Sewer Model
Total Sanitary Flow
Dry Weather Flow
Rainfall Dependent I&I
I&I Envelope

\[ y = 19.591x + 69.276 \]
\[ R^2 = 0.9367 \]
Scaling Factor

y = 19.591x + 69.276
R² = 0.9367
Scaling Factor

24-hr avg RDII

Scaling Factor
Dry Weather Flow
Results

SSO Tank Size Required

Tank Size Required (cu.m.)

<table>
<thead>
<tr>
<th>Catchment</th>
<th>100% Storage</th>
<th>50% Storage</th>
<th>20% Storage</th>
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<td>North Surrey</td>
<td>20,000</td>
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<tr>
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Class D Cost Estimate

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## Alternatives

### Comparison of Tanks and Rehab

#### Tank Cost

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#### Sewer Rehabilitation Cost

<table>
<thead>
<tr>
<th>Repair Type</th>
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<th>I&amp;I Reduction</th>
<th>Expected Rate</th>
<th>Cost</th>
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<tr>
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<td>$500/m</td>
<td>60%</td>
<td>8,000 L/ha/d</td>
<td>$700.0M</td>
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Considerations

**Causes of Variability**

- BSF allowance for population vs. actual population
- In-line storage in MV trunks

Resolution:

- Allowance for trunk storage
- Dynamic modelling
- Flow monitoring
Positive Outcomes

Opportunities

- SSO tanks can reduce peak I&I, ensure compliance with ILWRMP
- Tanks are expensive, but provide cost certainty
- Tanks provide deferral opportunity to focus on investigations so that rehab is effective
- City-wide attenuation is significant, may help you achieve regional target
SSO Tank Study

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