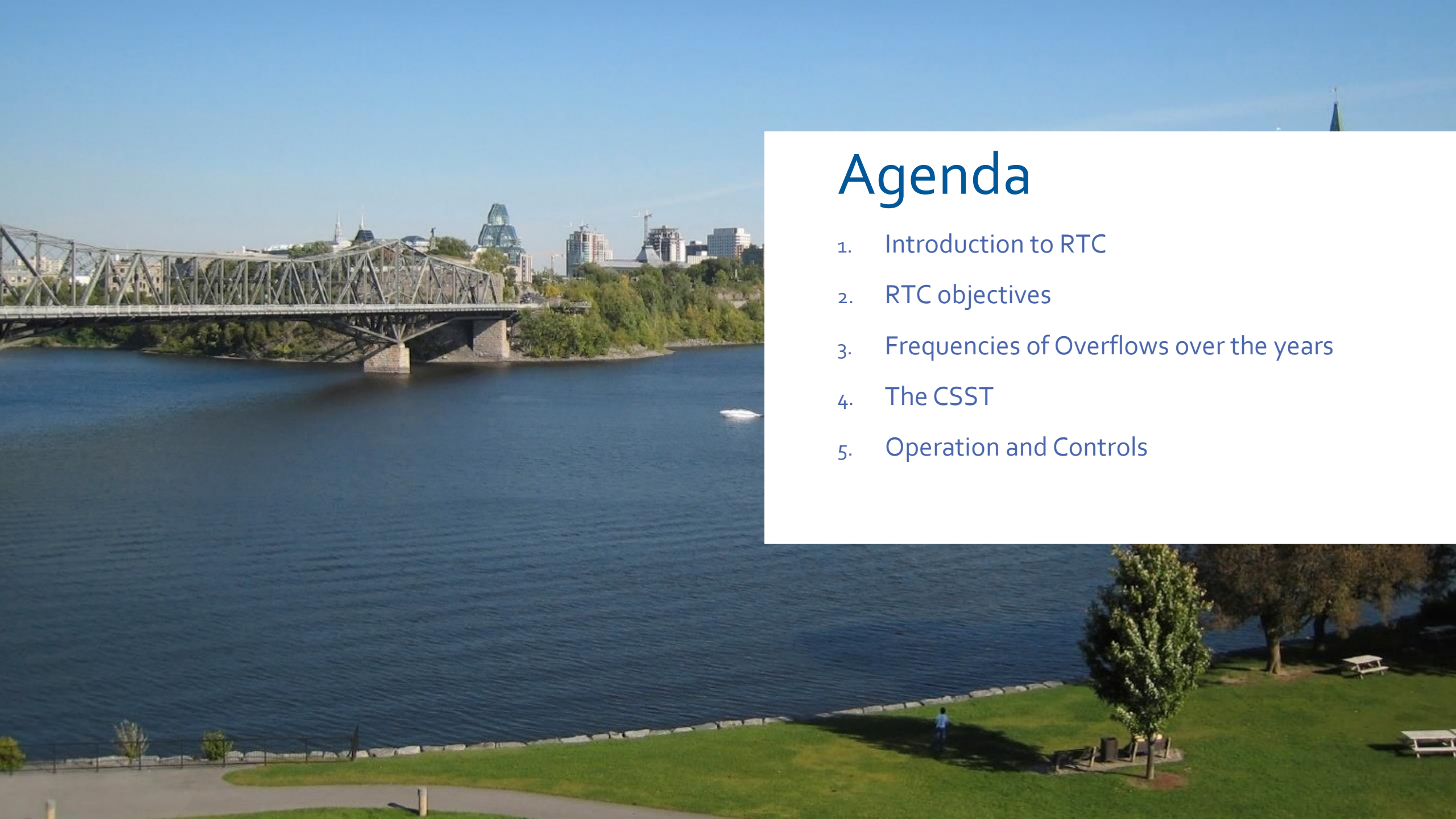
City of Ottawa

Real Time Control (RTC) and the CSST



Agenda

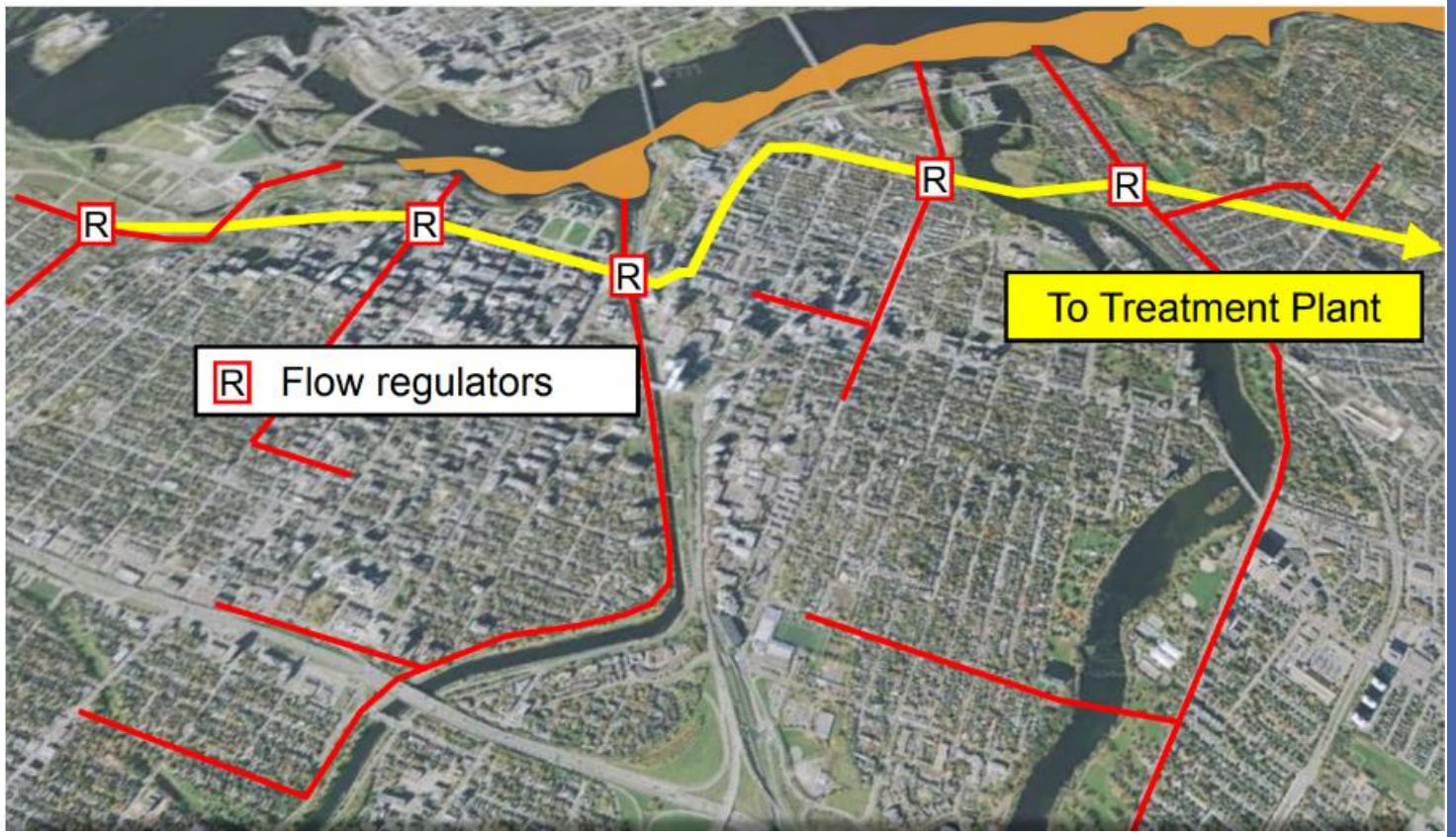
1. Introduction to RTC
2. RTC objectives
3. Frequencies of Overflows over the years
4. The CSST
5. Operation and Controls

Ottawa's first sewer system

- Like many other North American and European cities, Ottawa's first sewer system consisted of **combined sewers** (**sanitary** wastewater and **storm water runoff**). The sewage was conveyed by gravity without any treatment to the Ottawa River.
- As the City grew, dilution was no longer sufficient to offer a reasonable level of protection.

Interceptor Outfall Sewer

- Ottawa eventually built a deep interceptor sewer along its shorelines (the **Ottawa Interceptor Sewer- IOS**) to capture sewage from the shallower sewers.
- The interceptor would carry wastewater to a point further away and eventually to the Wastewater treatment facility, ROPEC, built in the 1960s.



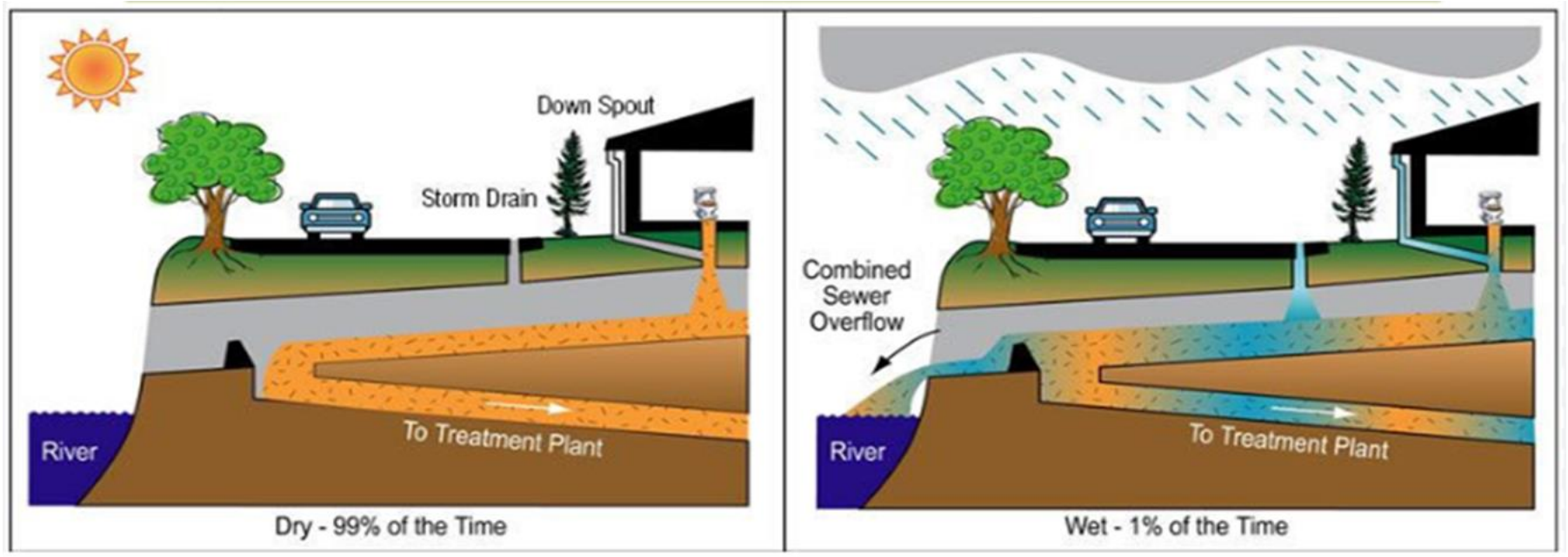
Interceptor Outfall Sewer

Most cities build them large enough to capture **dry weather flow** with some spare capacity to capture a fraction of the **wet weather flow**.

During heavy rainstorms or snowmelts, most of the wastewater is transported to treatment plants, but to prevent **flooding** and **sewer backups**, some of the rain and wastewater mixture is diverted as overflow into the river.

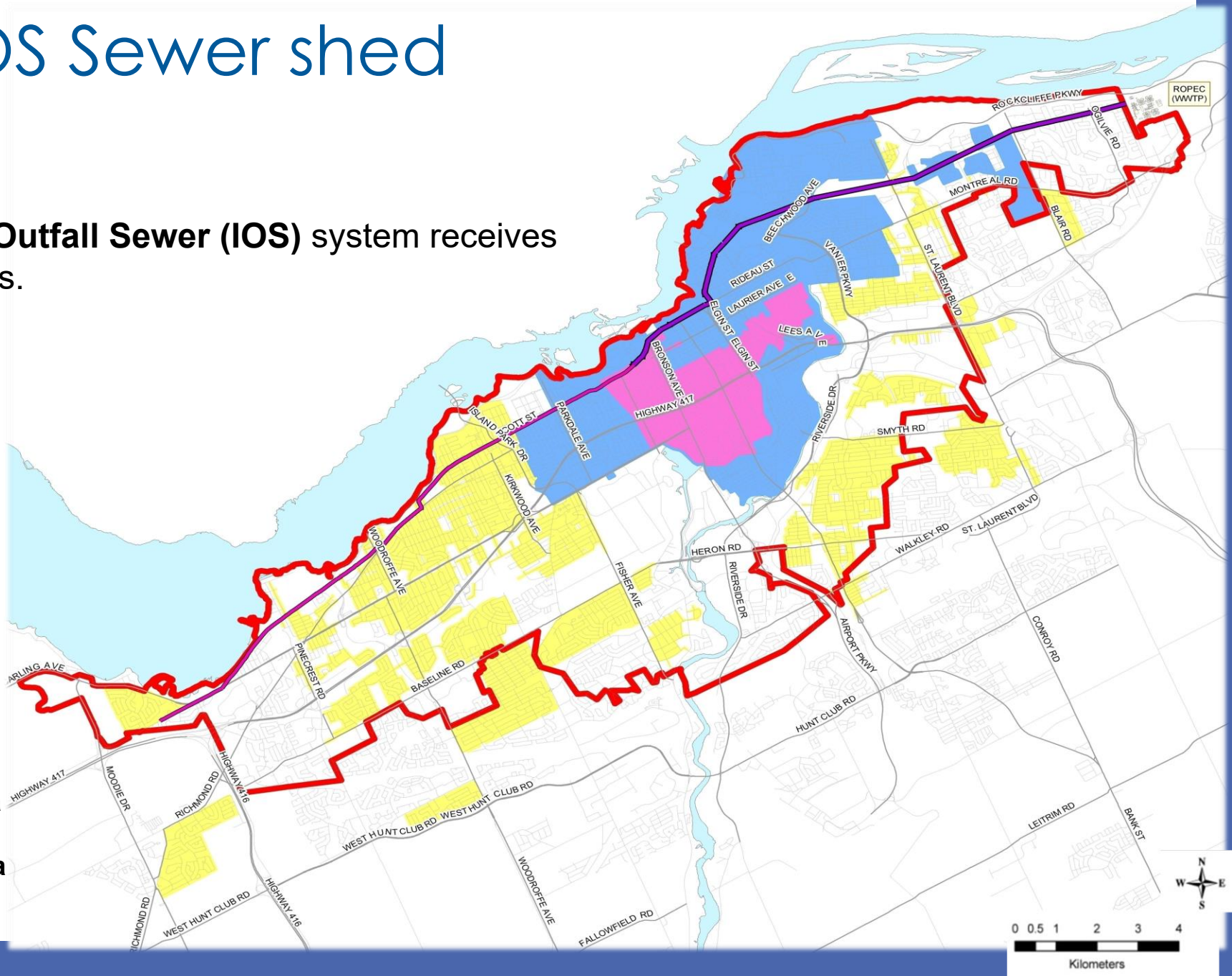
Everything above DWF is send to river

Full capacity of combined and interceptor not used



the IOS Sewer shed

The City of Ottawa **Interceptor Outfall Sewer (IOS)** system receives sewage from a number of sewers.



Interceptor Outfall Sewer (IOS)

West Nepean Collector (WNC)

IOS Sewershed

Original Combined Sewer Area

Ultimate Combined Sewer Area

CSO control

CSOs during rain events have a significant impact on the water quality of receiving environments

MECP objectives set in 1990, before F-5-5

1. System wide 90% WWF capture
2. No frequency target

Original Plans:

1. Separation North of Somerset $$$$
2. Somerset Tunnel $$$$
3. Refurbish regulators

First change of plan 2003

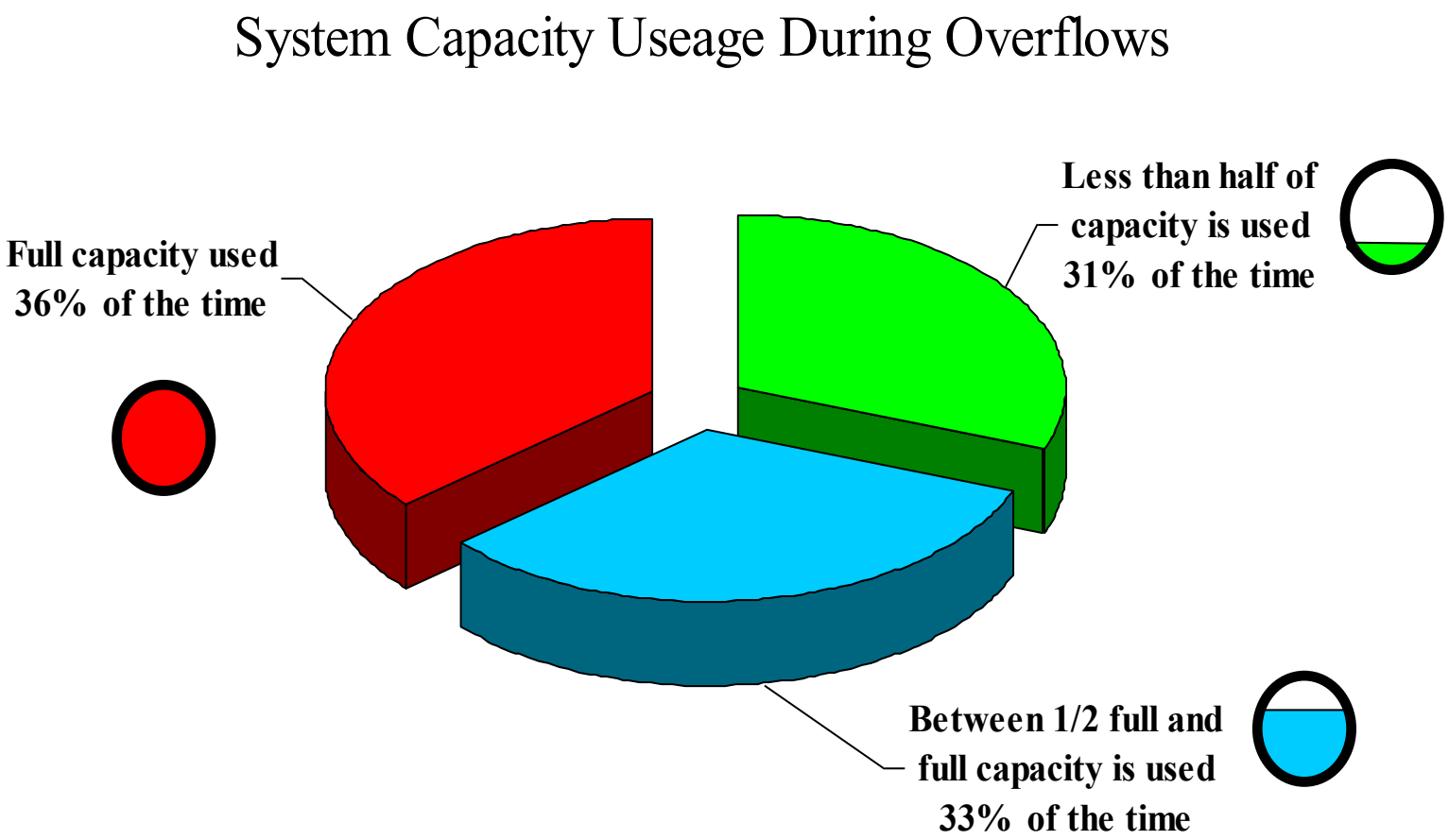
1. Can we reduce tunnel size by **optimizing existing system**?
2. Can we **reduce cost with RTC**?

Can We Do Better with What We Have?

In 2003, the City implemented:

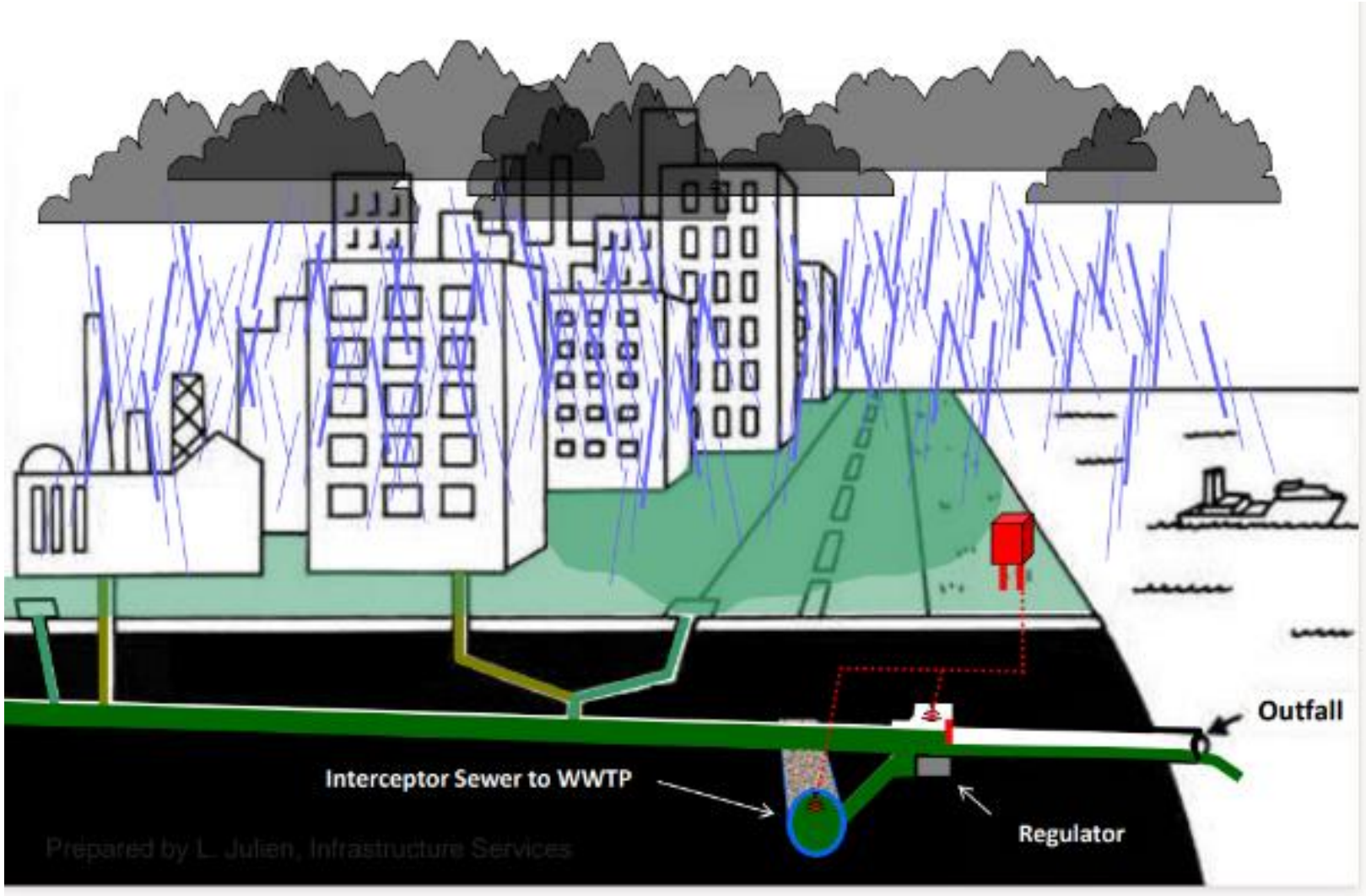
- flow monitoring program
- RTC Feasibility study

These studies confirmed that RTC was sufficient to achieve F-5-5 volumetric criterion.

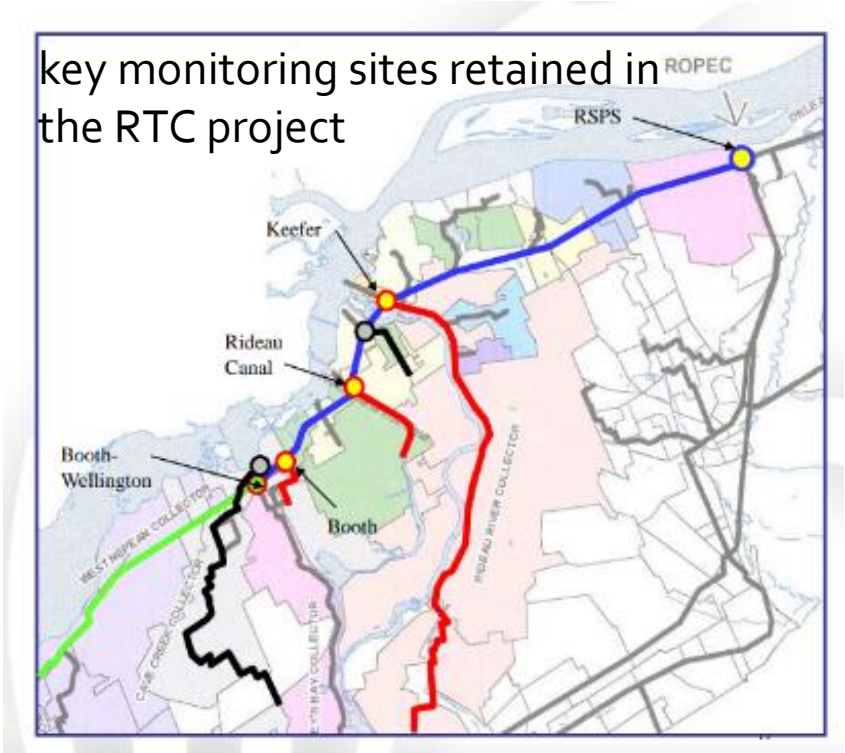


WHAT IS REAL TIME CONTROL?

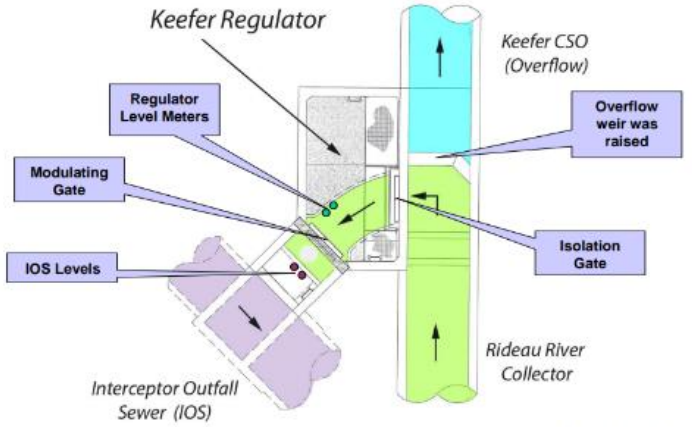
- **Real Time Control** uses continuous monitoring tools (level meters, flow meters, storage tanks) to optimize the operation (regulator, gates) of the system in **real time**.
- **Real Time Control (RTC)** increases the capacity of the system - reducing the frequency of combined sewer overflow (CSO).
- The fist operational RTC was developed in **Quebec City**, they first built a model, the SWIFT model, to test RTC prior to its installation.



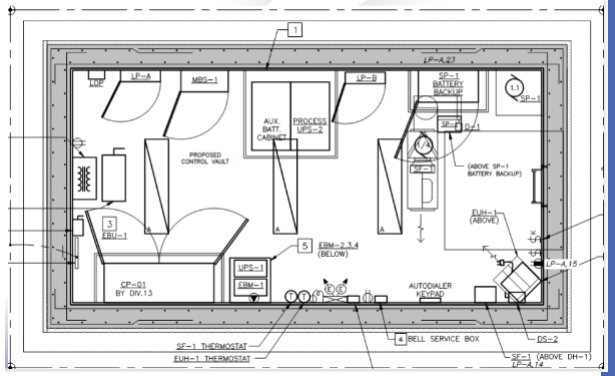
REAL TIME CONTROL PROJECT



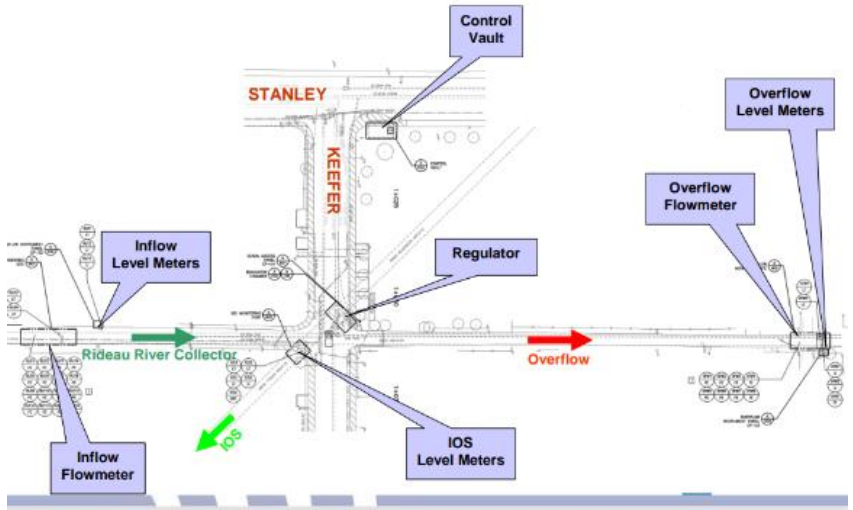
Main Components
Keefer



Keefer- Control Vault



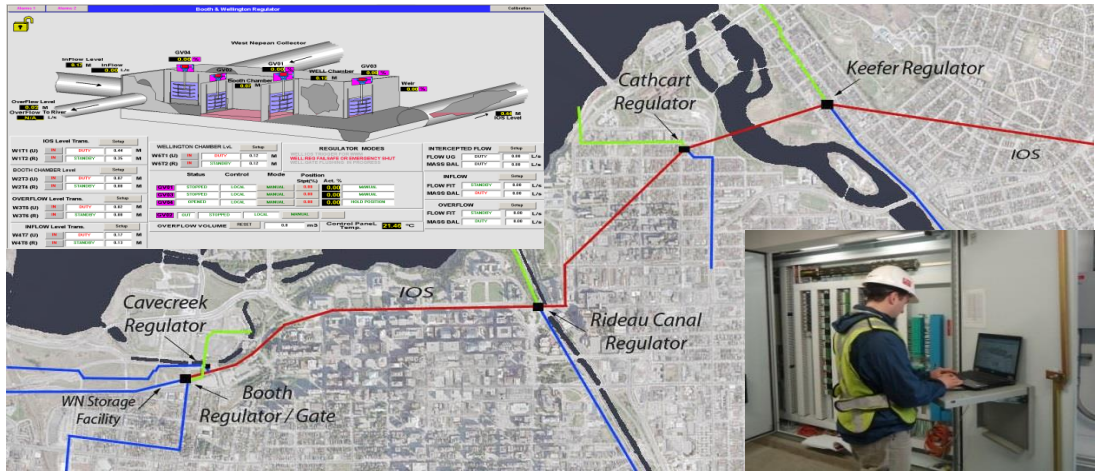
Main Components
Keefer



RTC project:

- Fast Results,
- Minimal Disruption,
- 25 million,
- ~ $100 per m3 of CSO removed,
- Award winning project (OPWA, CEO), Federal funding

Regulator Upgrades and Real Time Control



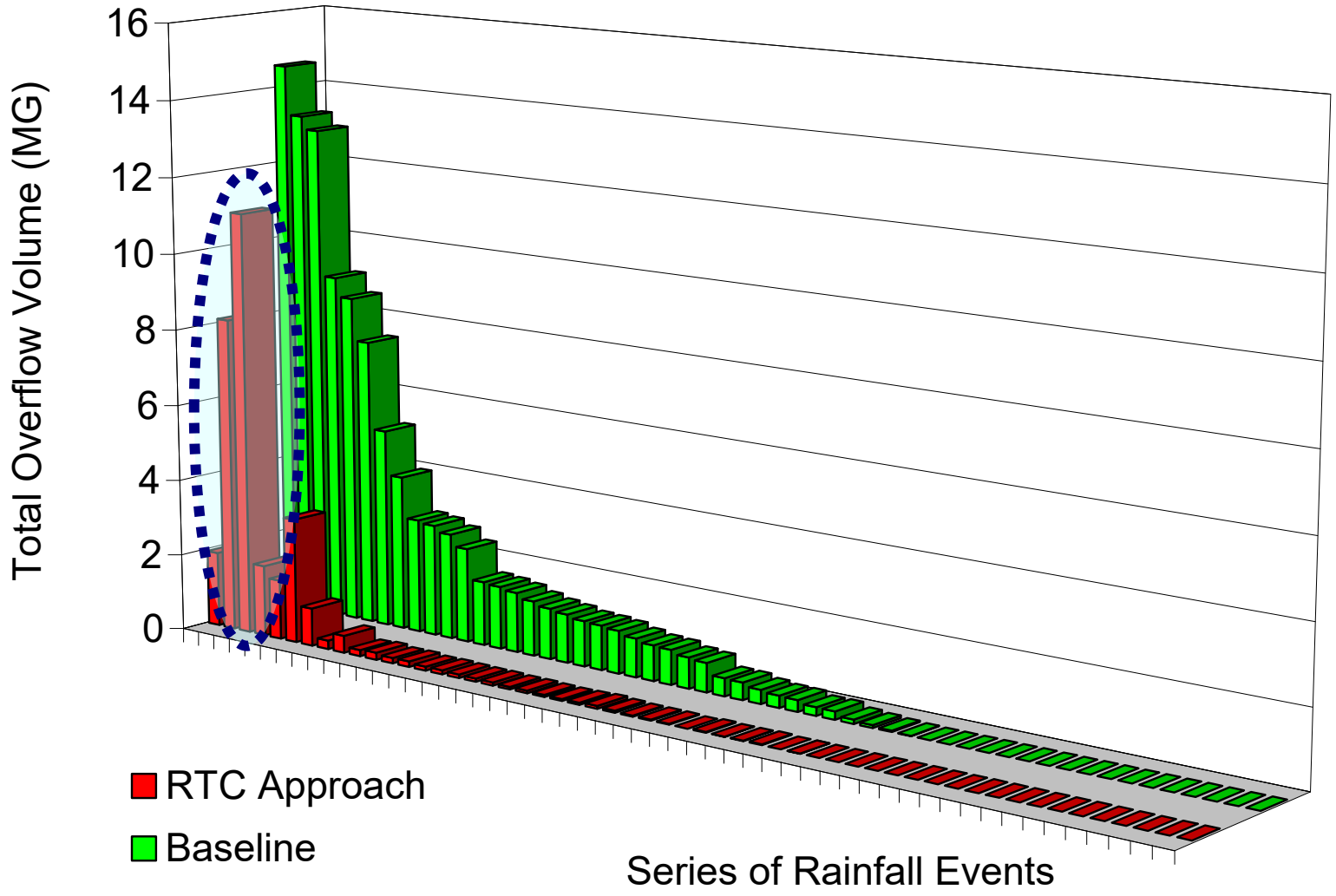
65%

Reduction in CSO

>95%

Wet Weather Capture

Addressing the Frequency of Overflows



How can we further reduce the Frequency of Overflow?

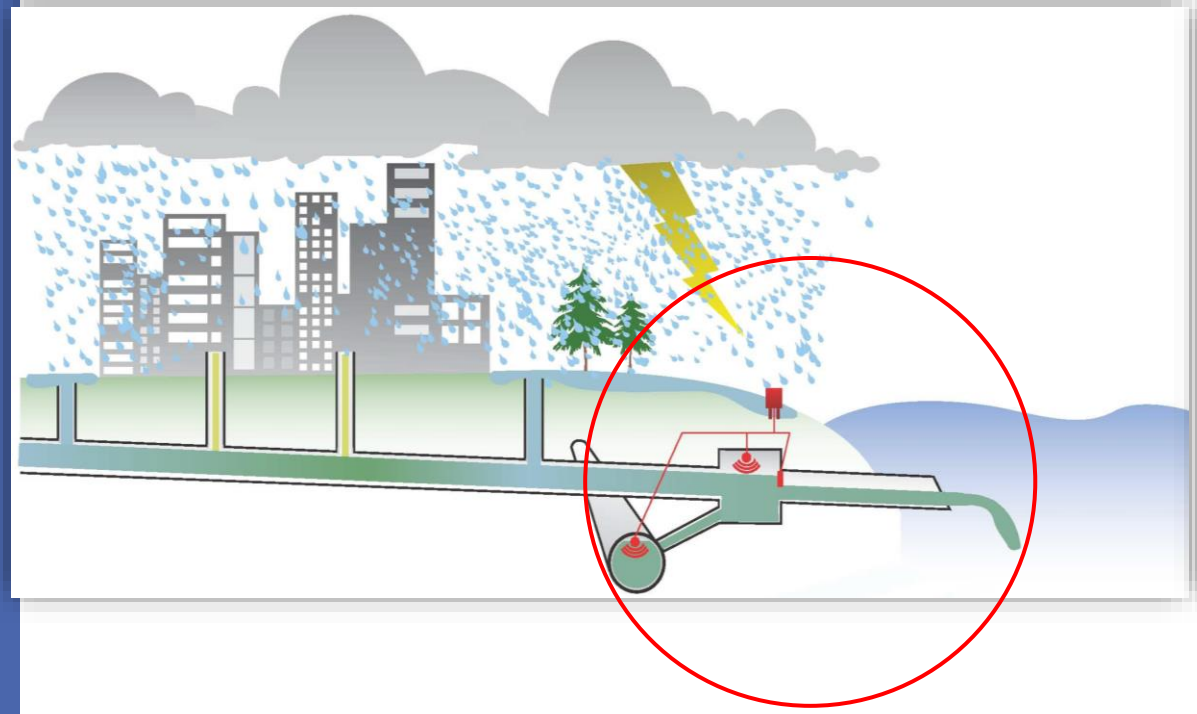
The CSST combine sewer storage tunnel

CSST project – Multiple Benefits

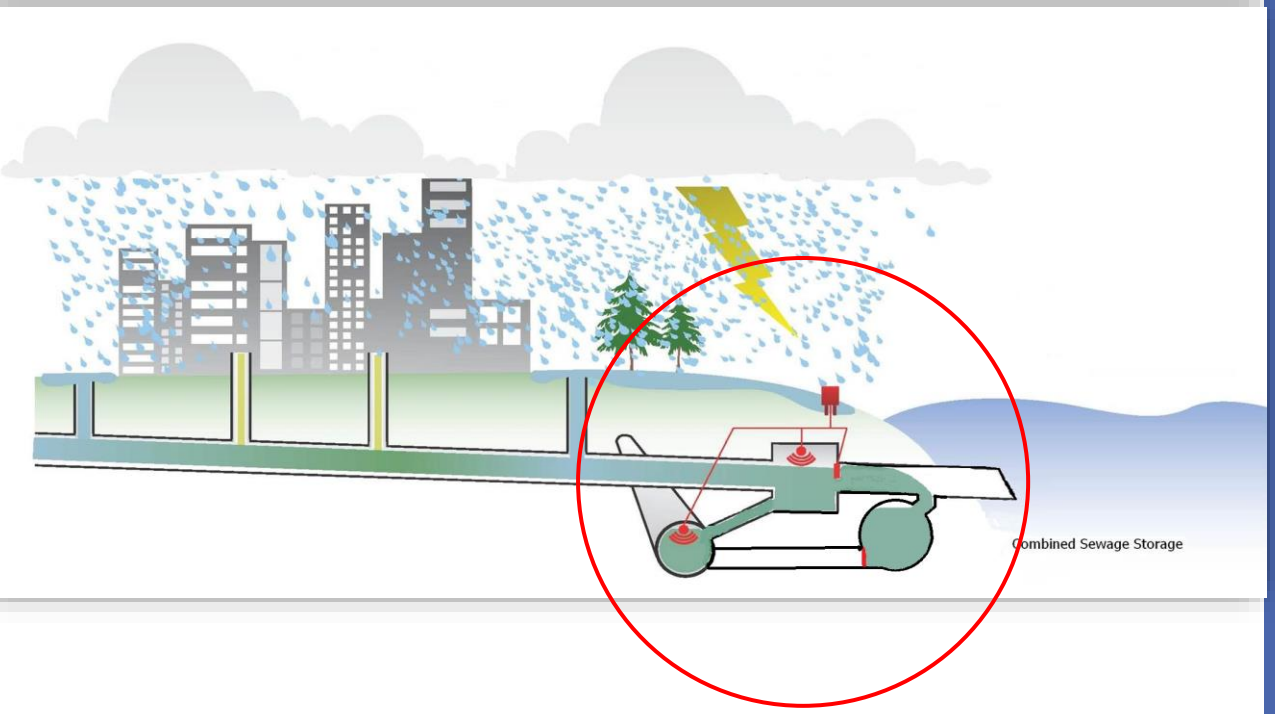
- **Reduce volume** of combined sewage overflow (CSO) to the Ottawa River
- **Reduce frequency of overflow events**
- **Reduce risk of basement flooding**
- **“Twin” a critical downtown sanitary sewer**

The Combined Sewer Storage Tunnel

RTC



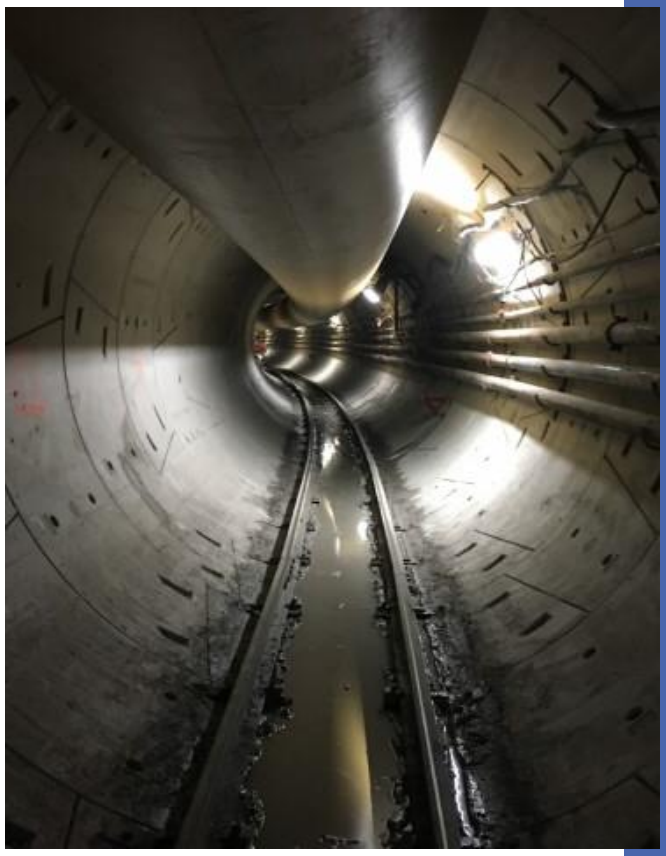
RTC with CSST



North-South (NST) & East-West (EWT) Tunnel

6.2km
Interconnected tunnel

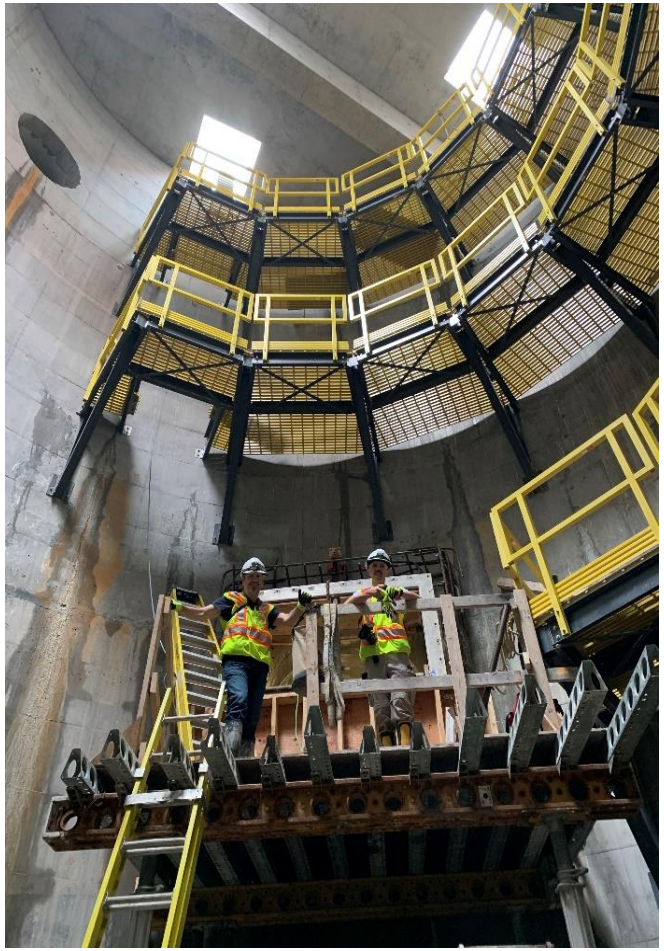
43,000m³
Storage capacity



3m
Pipe diameter

North-South (NST) & East-West (EWT) Tunnel

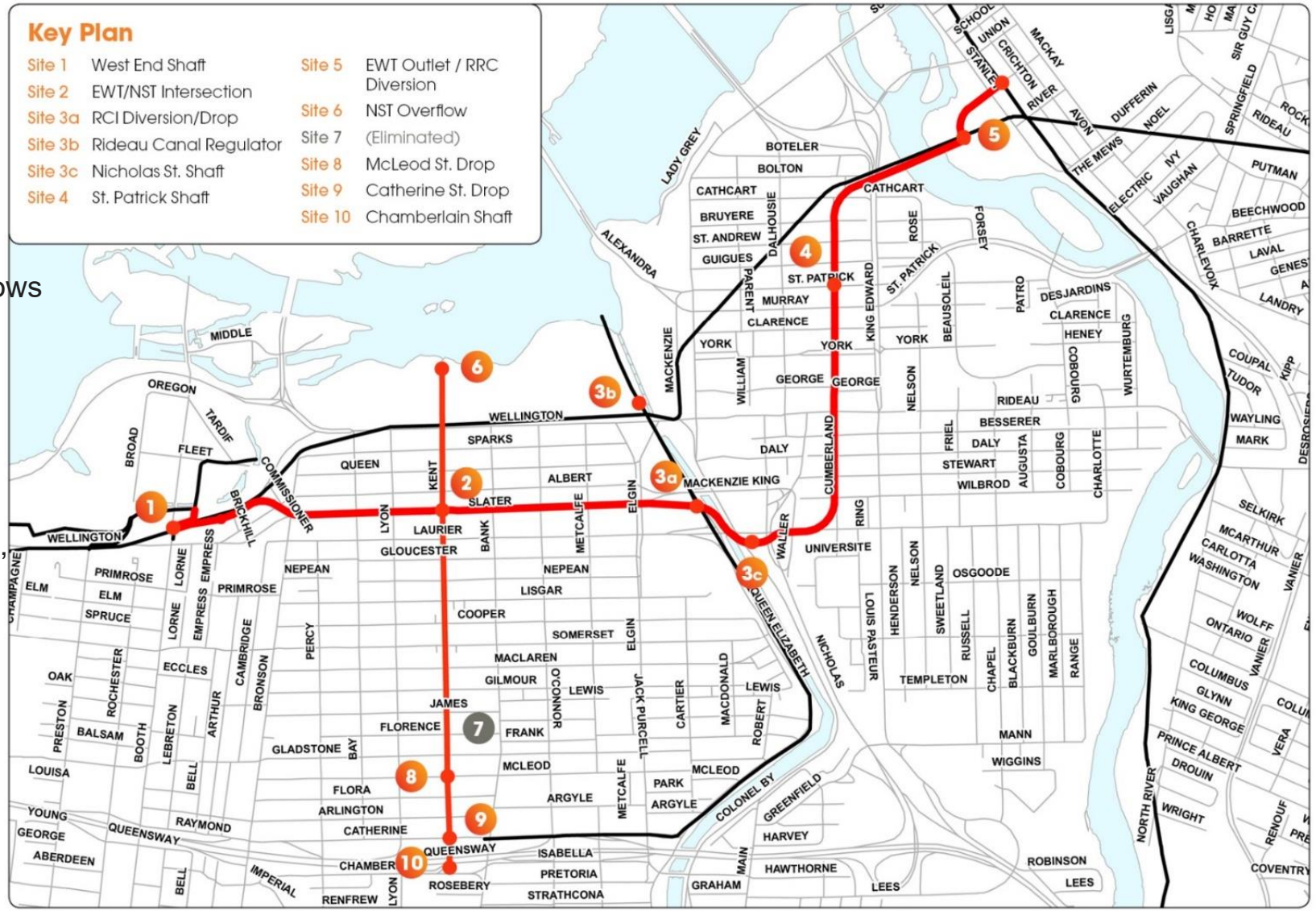
Site 5: East-West Tunnel Outlet and Rideau River Collector Diversion (New Edinburgh)



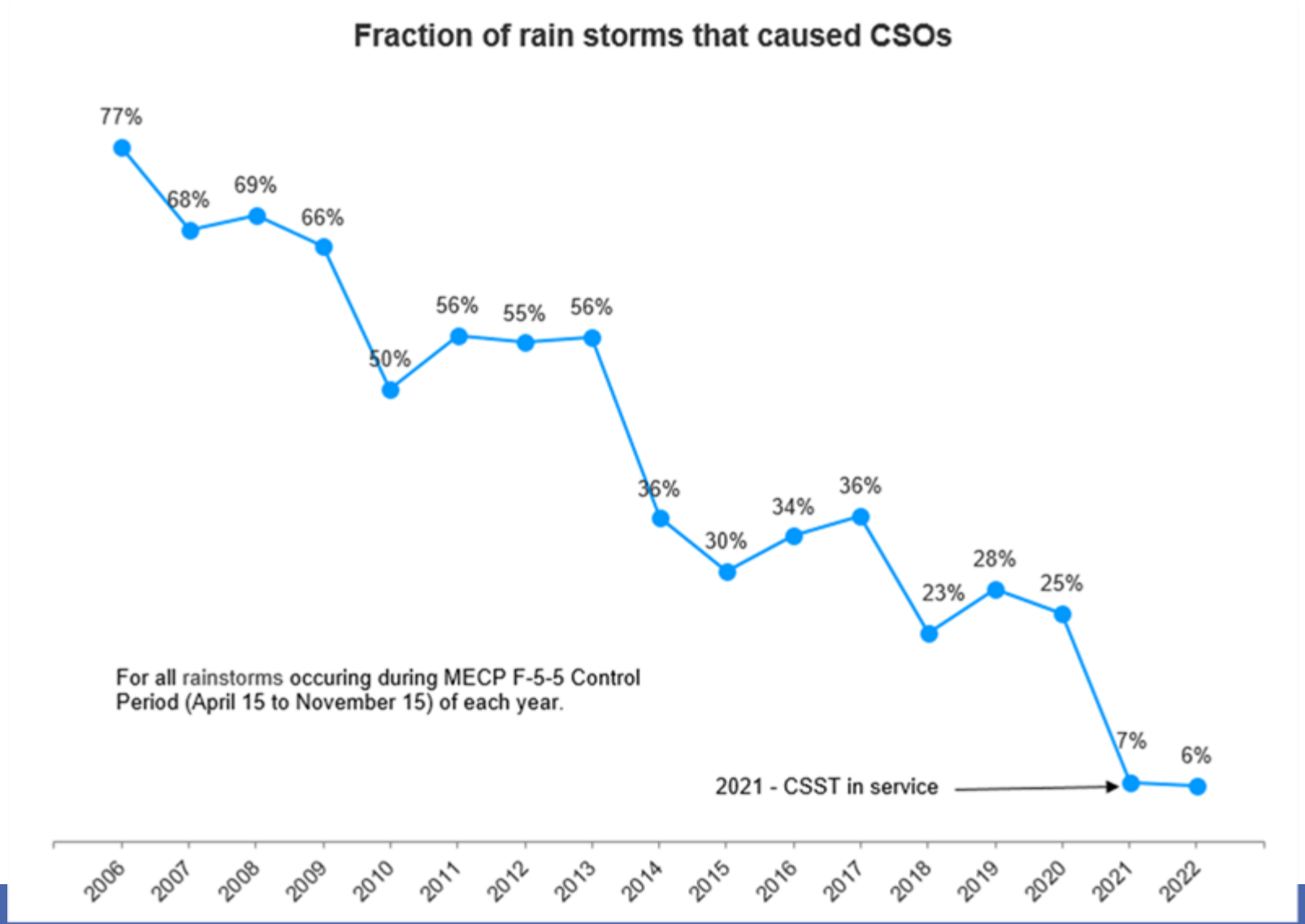
Site 9: Catherine Street Drop – Catherine Street at Kent Street

The Preferred Alternative – **The CSST**

- An **East-West** Tunnel (EWT), capturing overflows from:
  - ❖ the **Lebreton Flats** (from the West End Regulators),
  - ❖ the **Rideau Canal Regulator**, and from
  - ❖ the **Keefer regulator** in New Edinburgh.
- a North-South Tunnel (NST) along Kent Street, interconnected to the Core Tunnel near Slater



CSO Control (F-5-5 Frequency Goal)



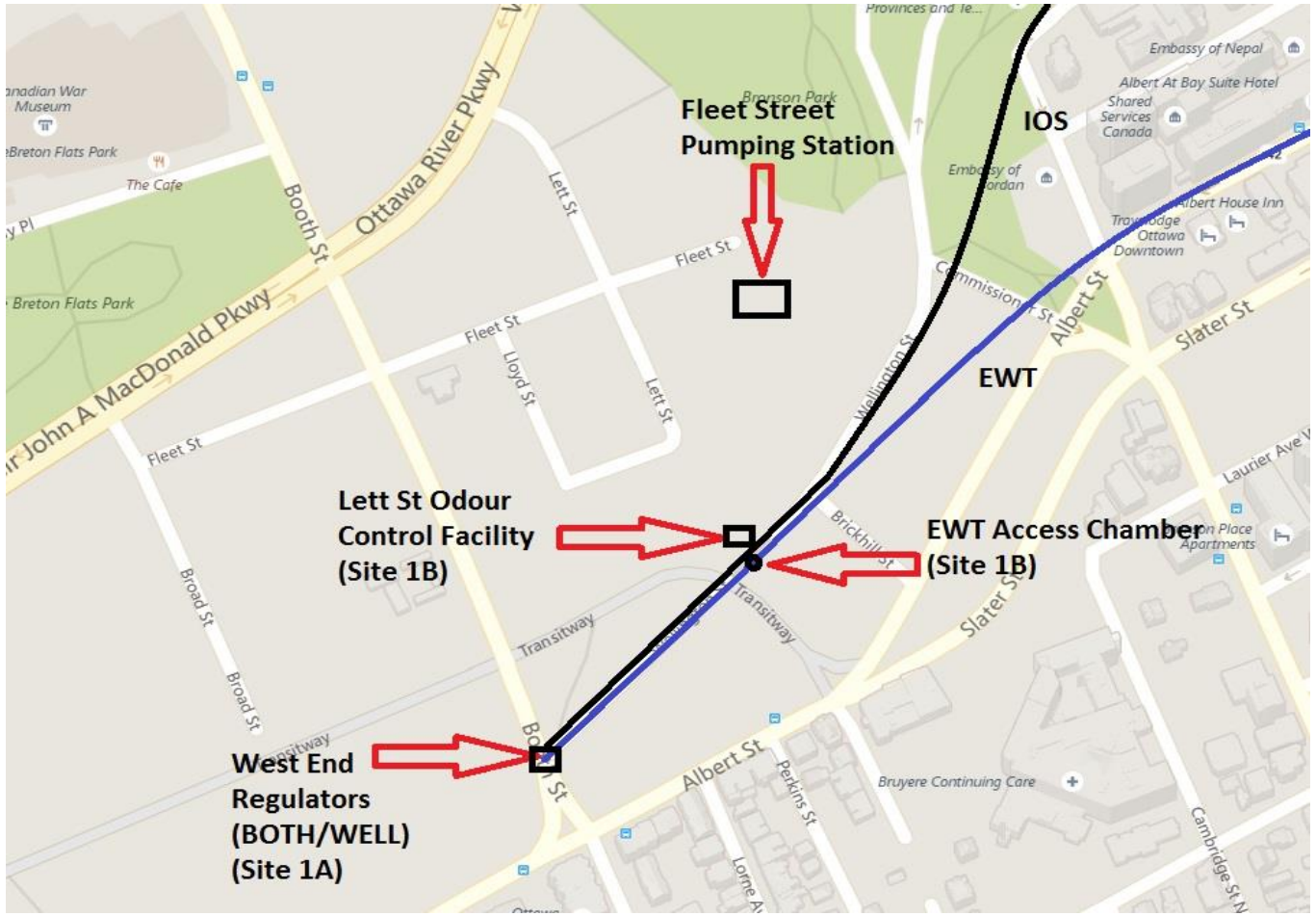
Design Basis

no CSO events for design year (1980)

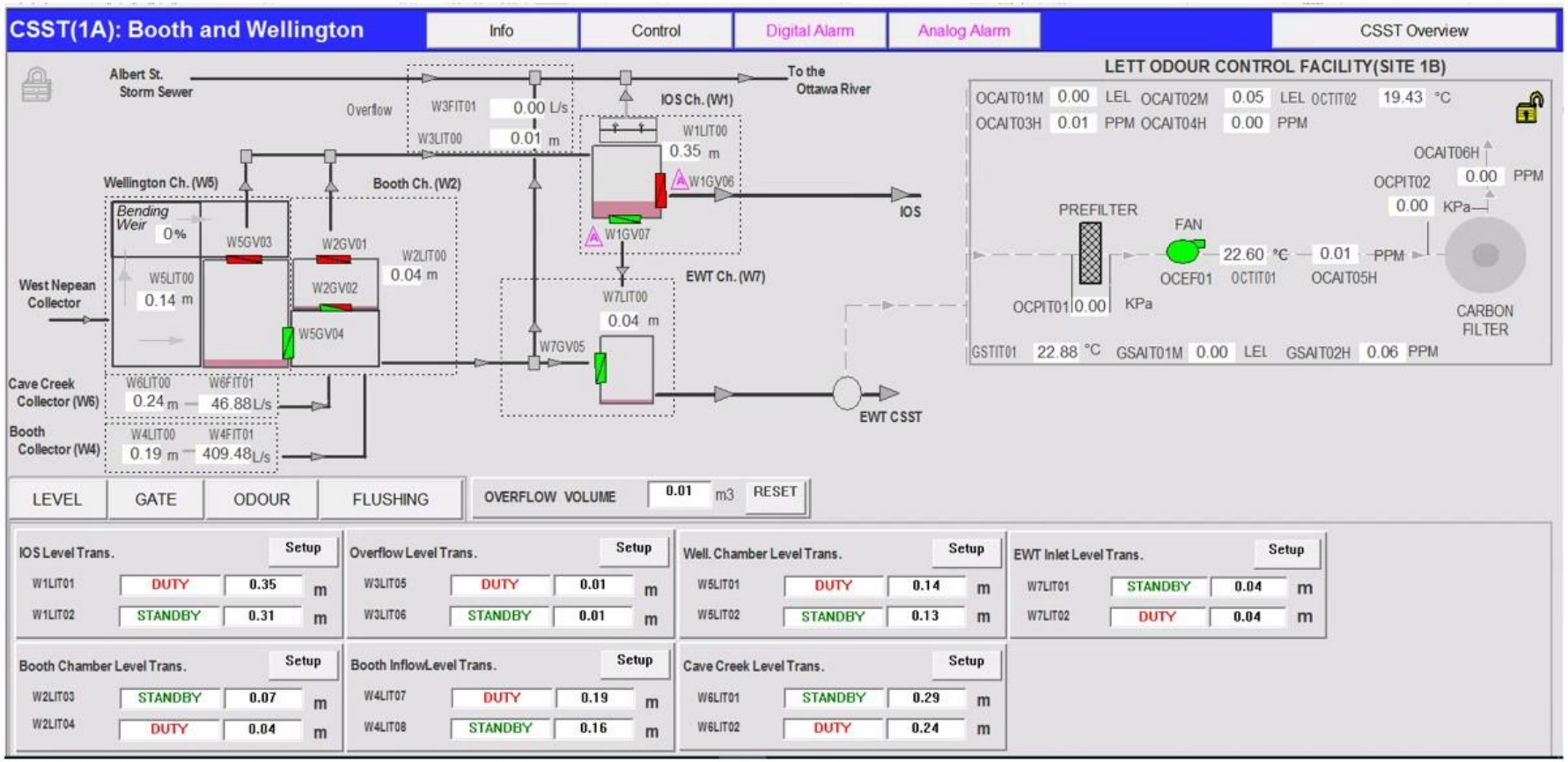
Predicted Performance

<2 CSO events/yr (on average)

Site 1 – Booth Wellington Site Operation and Control



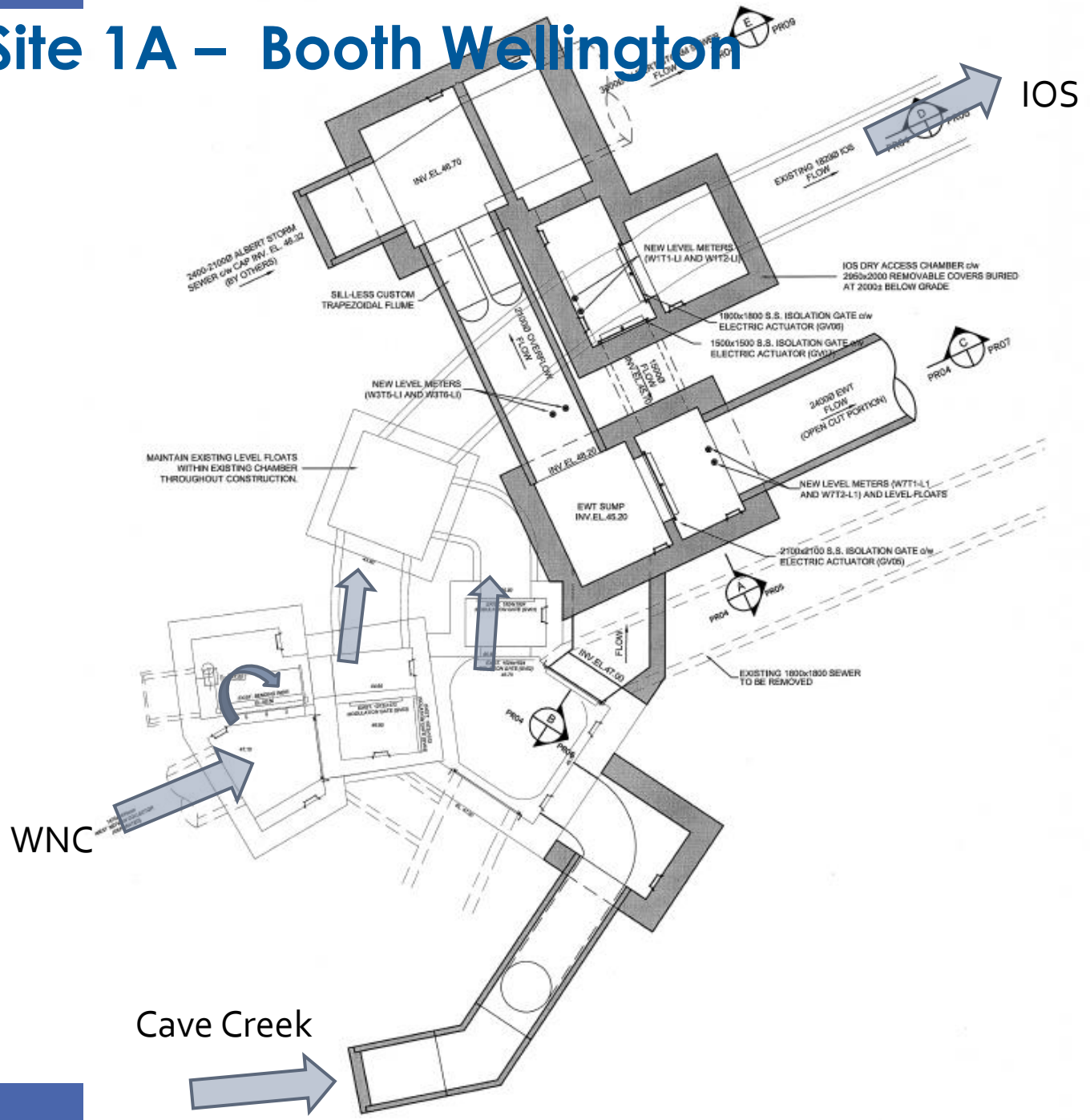
SCADA PAGE


CSST(1A): Booth and Wellington
Info
Control
Digital Alarm
Analog Alarm
CSST Overview
Albert St. Storm Sewer
Overflow
W3FIT01 0.00 L/s
W3LIT00 0.01 m
IOS Ch. (W1)
To the Ottawa River
W1LIT00 0.35 m
W1GV06
IOS
W1GV07
Wellington Ch. (W5)
Booth Ch. (W2)
Bending Weir 0%
W5GV03
W2GV01
W2LIT00 0.04 m
W2GV02
West Nepean Collector
W5LIT00 0.14 m
W5GV04
EWT Ch. (W7)
W7LIT00 0.04 m
W7GV05
Cave Creek Collector (W6)
W6LIT00 0.24 m
W6FIT01 46.88 L/s
Booth Collector (W4)
W4LIT00 0.19 m
W4FIT01 409.48 L/s
EWT CSST
LETT ODOUR CONTROL FACILITY(SITE 1B)
OCAIT01M 0.00 LEL
OCAIT02M 0.05 LEL
OCTIT02 19.43 °C
OCAIT03H 0.01 PPM
OCAIT04H 0.00 PPM
OCAIT06H
OCPIT02 0.00 KPa
0.00 PPM
PREFILTER
FAN
22.60 °C
0.01 PPM
OCEF01
OCTIT01
OCAIT05H
OCPIT01 0.00 KPa
CARBON FILTER
GSTIT01 22.88 °C
GSAIT01M 0.00 LEL
GSAIT02H 0.06 PPM
LEVEL
GATE
ODOUR
FLUSHING
OVERFLOW VOLUME 0.01 m3 RESET
IOS Level Trans. Setup
W1LIT01 DUTY 0.35 m
W1LIT02 STANDBY 0.31 m
Overflow Level Trans. Setup
W3LIT05 DUTY 0.01 m
W3LIT06 STANDBY 0.01 m
Well. Chamber Level Trans. Setup
W5LIT01 DUTY 0.14 m
W5LIT02 STANDBY 0.13 m
EWT Inlet Level Trans. Setup
W7LIT01 STANDBY 0.04 m
W7LIT02 DUTY 0.04 m
Booth Chamber Level Trans. Setup
W2LIT03 STANDBY 0.07 m
W2LIT04 DUTY 0.04 m
Booth InflowLevel Trans. Setup
W4LIT07 DUTY 0.19 m
W4LIT08 STANDBY 0.16 m
Cave Creek Level Trans. Setup
W6LIT01 STANDBY 0.29 m
W6LIT02 DUTY 0.24 m

Site 1A – Booth Wellington

Dry Weather Flow:

All Flow to IOS



Site 1A – LFDC

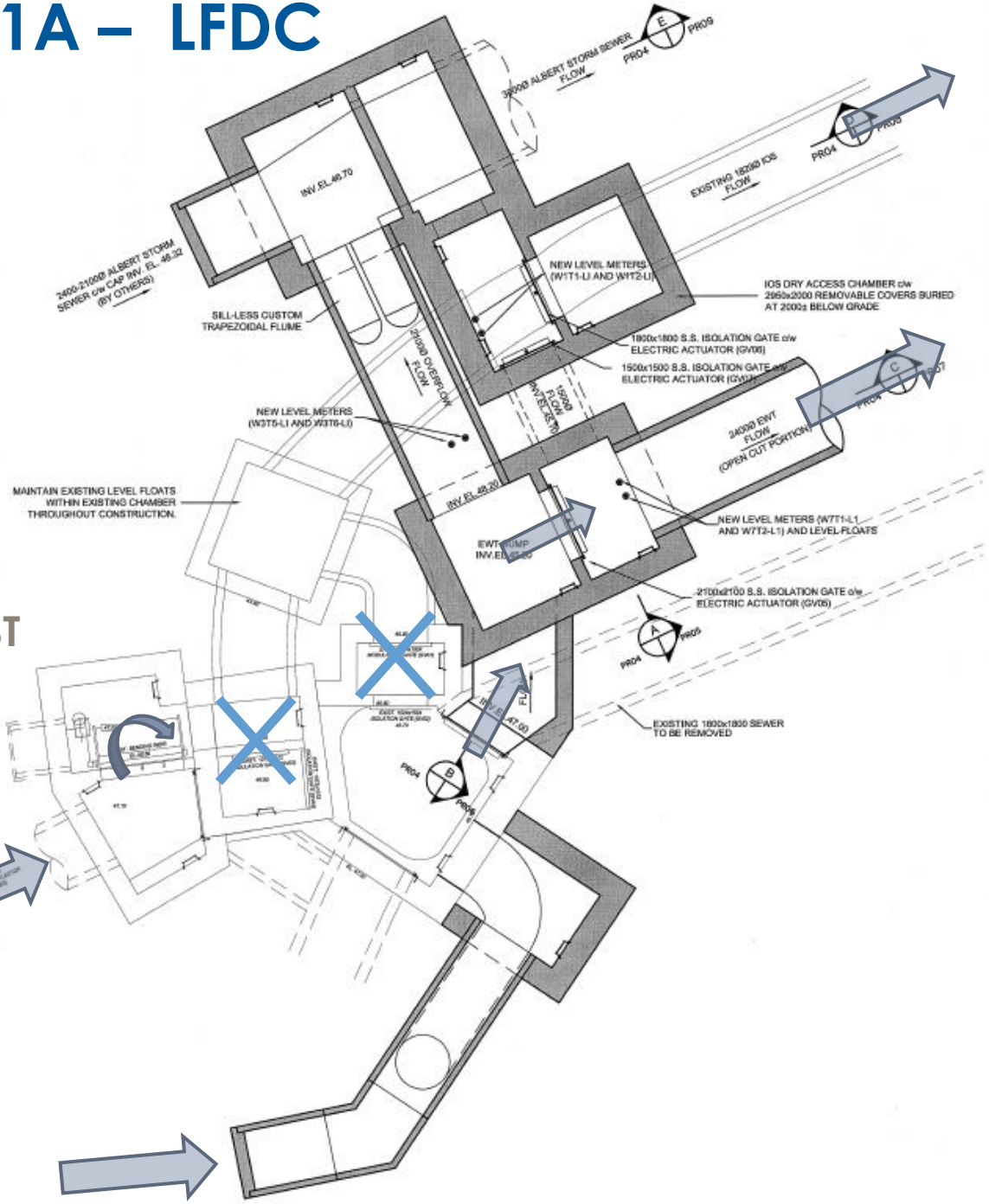
IOS

CSST

Wet Weather Flow:

Overflow intercepted into CSST

WNC

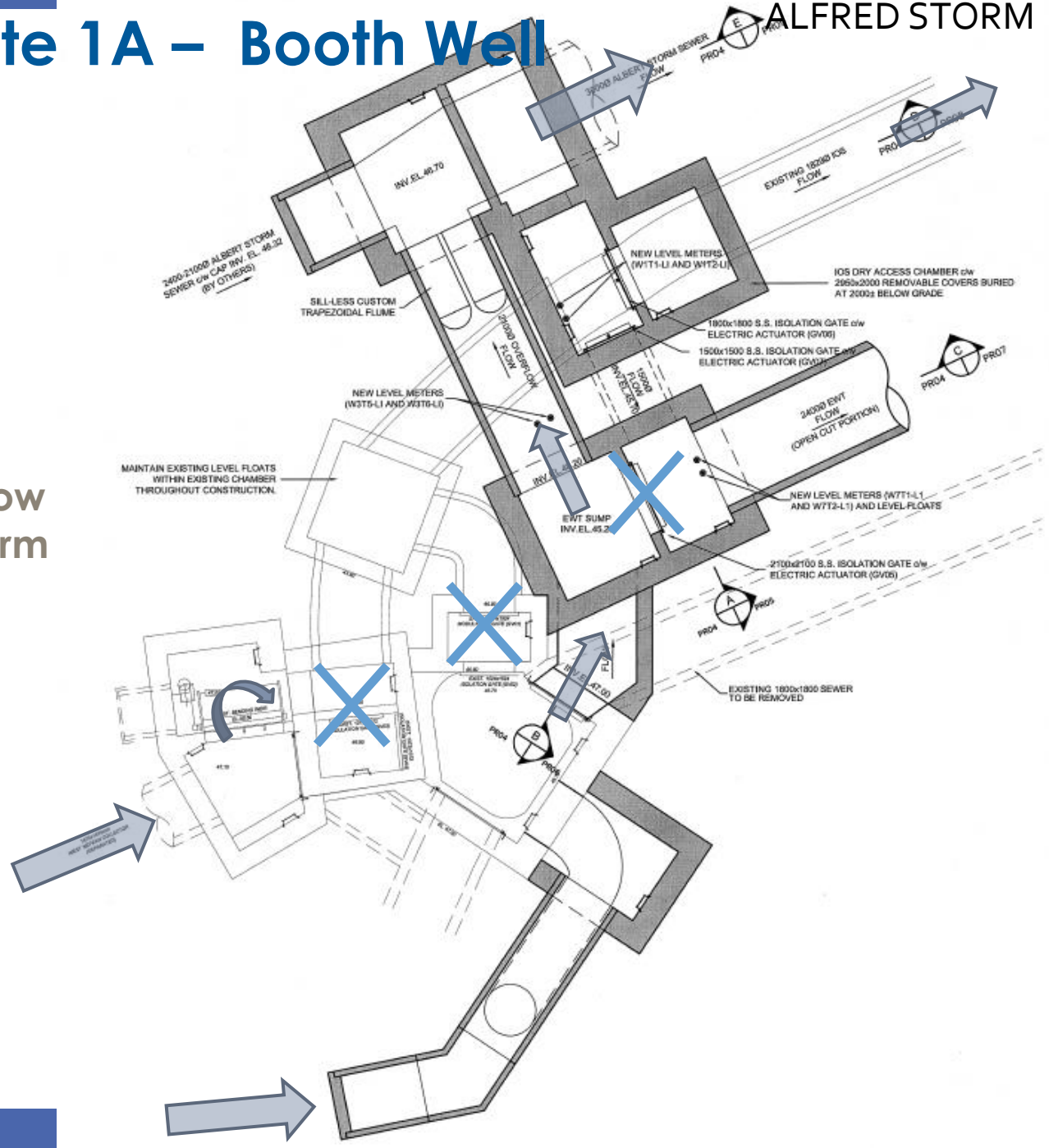


Site 1A – Booth Well

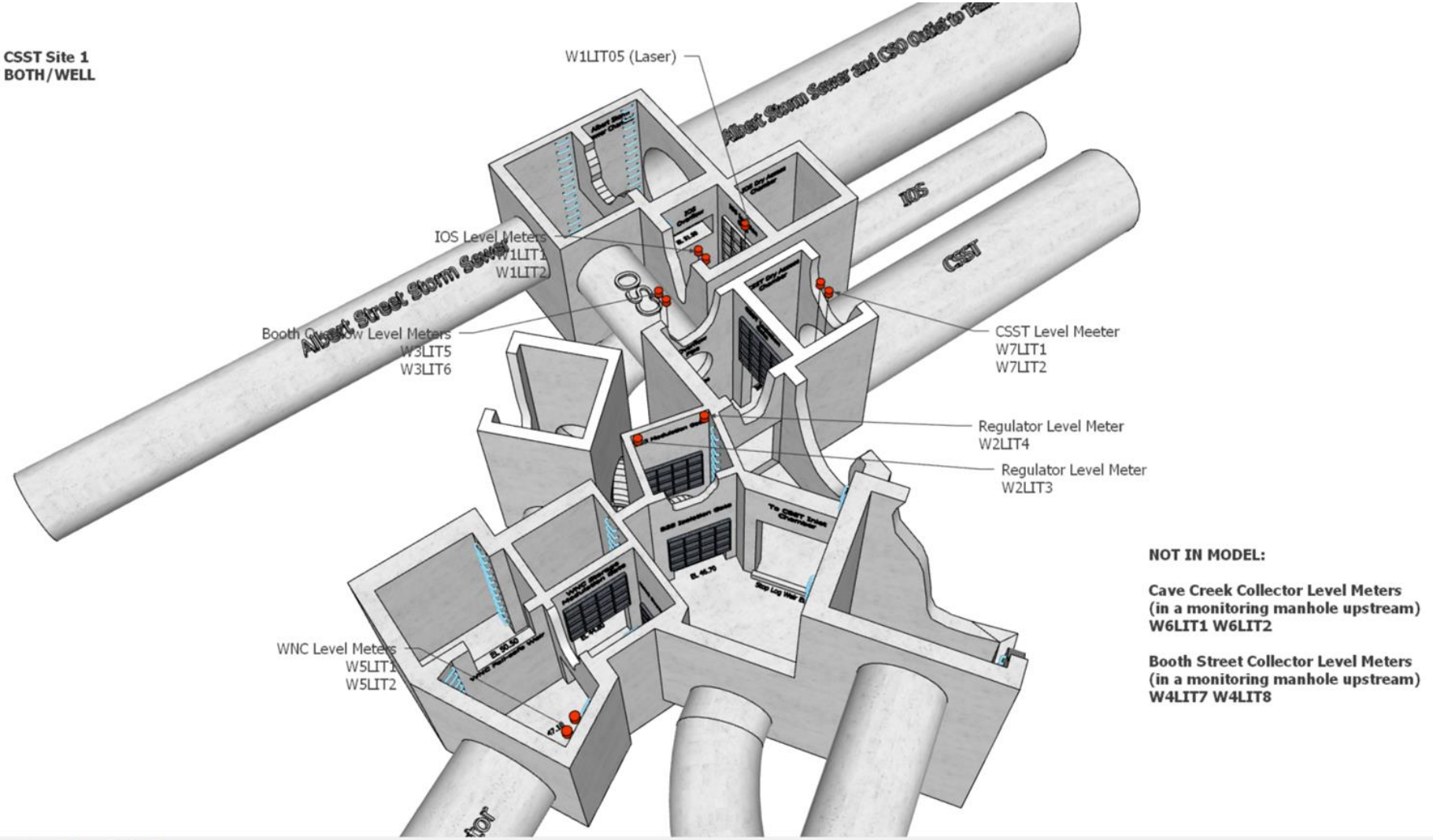
ALFRED STORM

Wet Weather Flow:

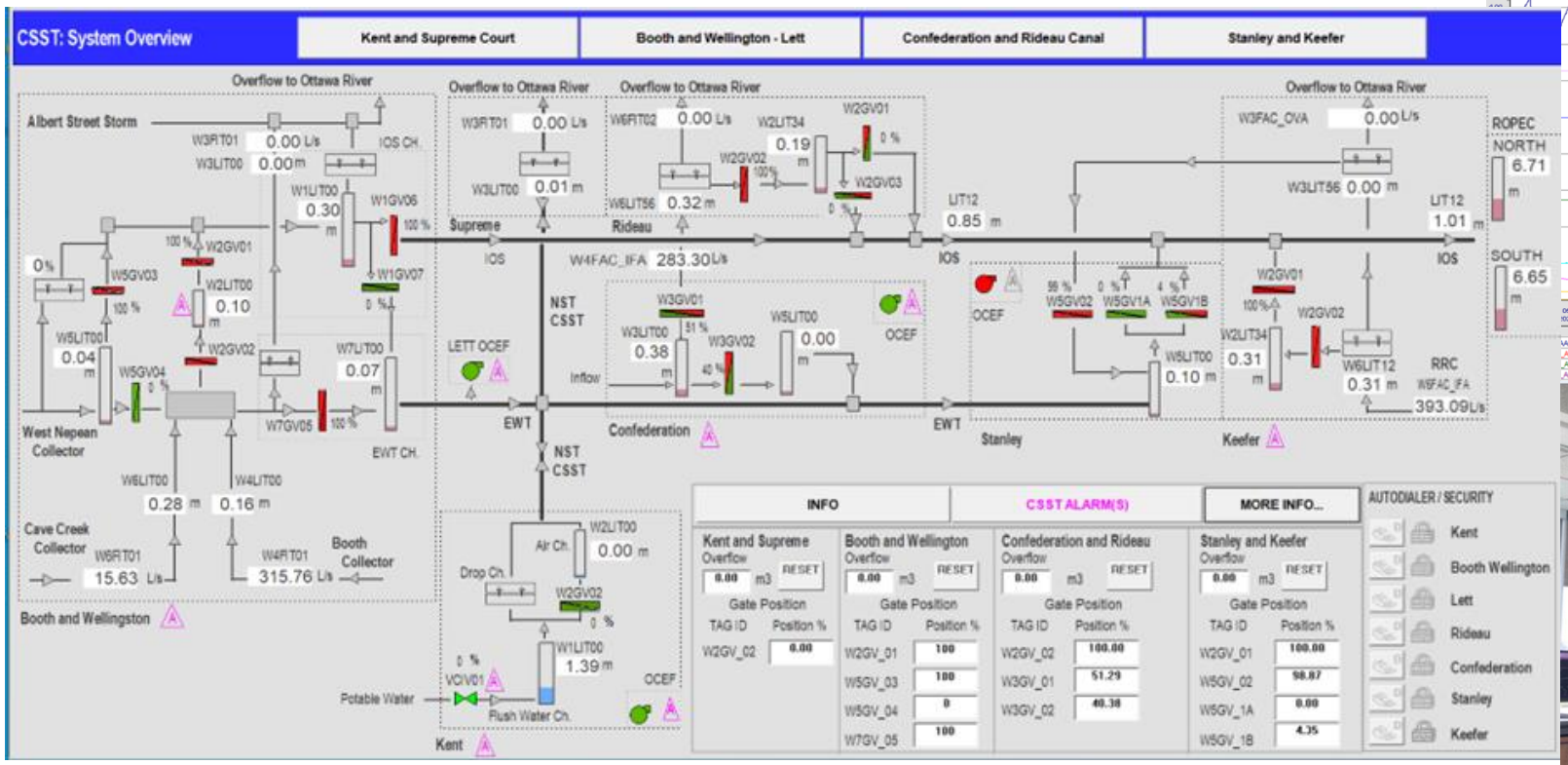
When CSST filled, overflow directed to Albert St Storm Sewer

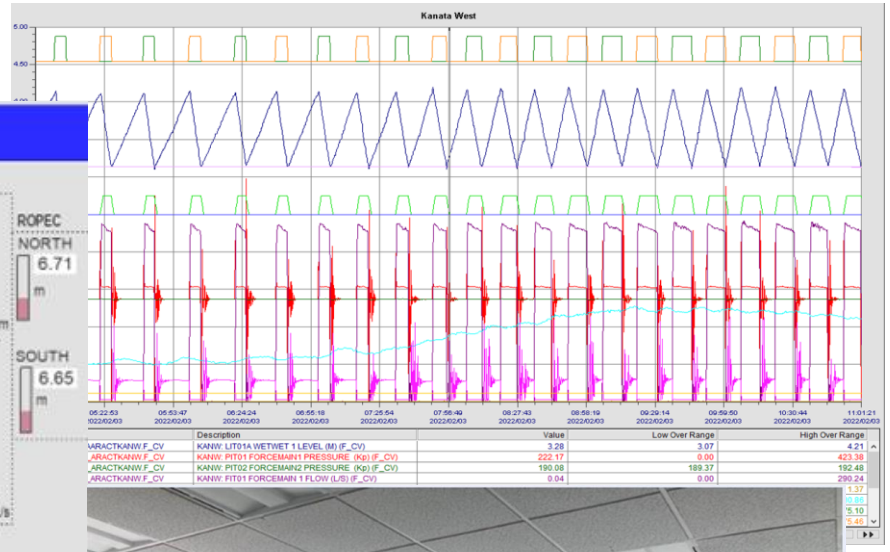


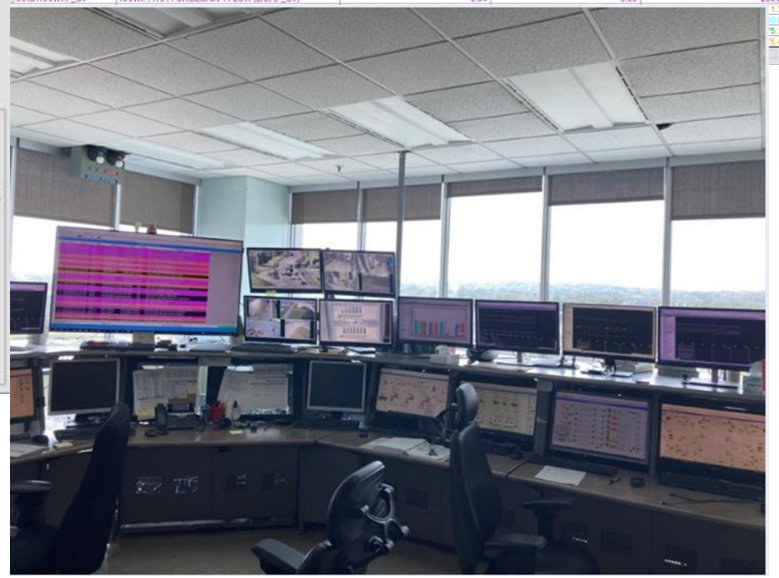
Booth Wellington Regulator



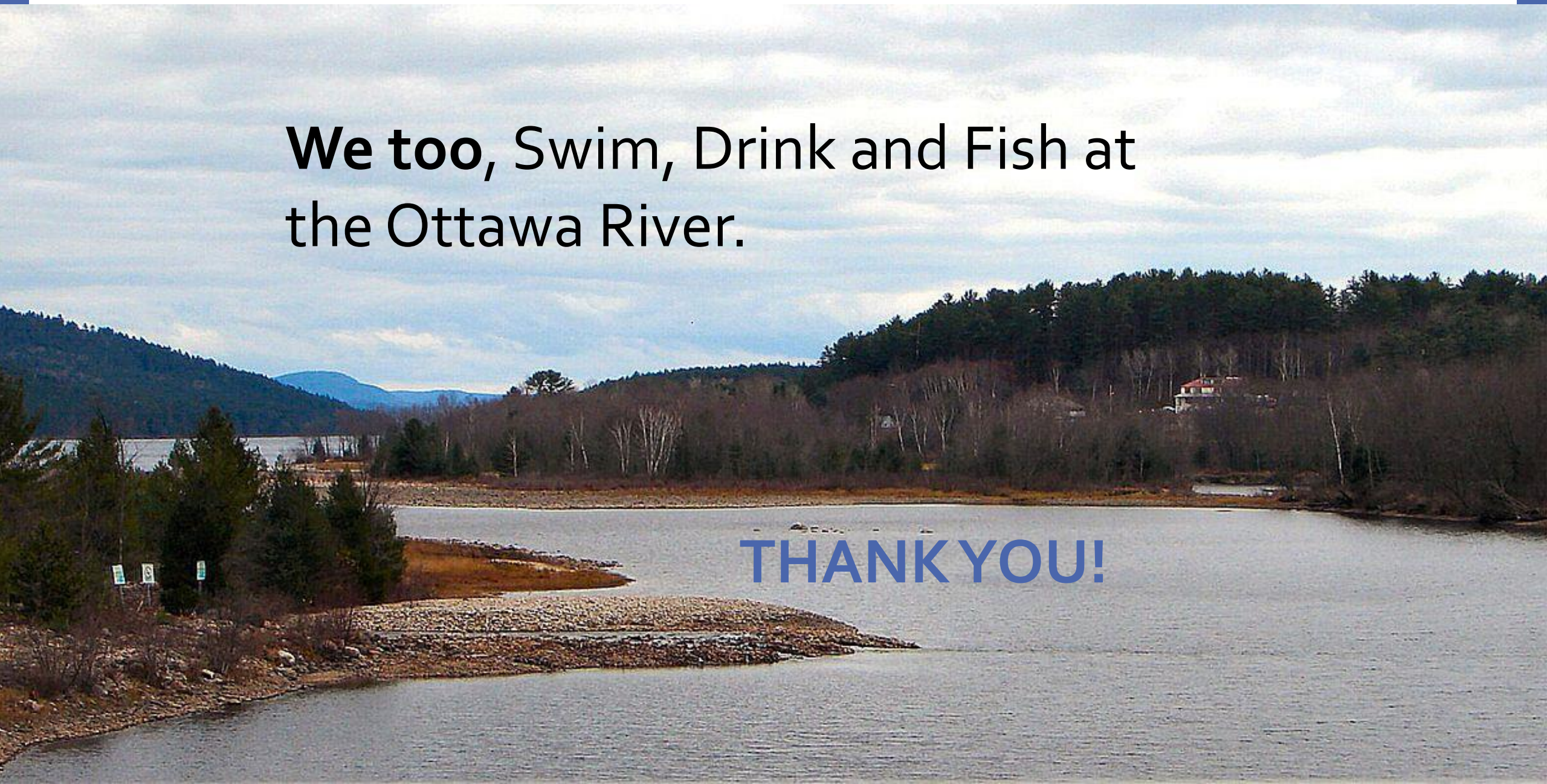
Continuous monitoring of all stations & regulators







The Ottawa River: We Too, we care!




Thank you!