Membertou Flood Study

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First Nations Land Management Resource Centre

Climate Change Workshop

Toronto, ON – December 2019

October 10th, 2016 – Thanksgiving Day Flood

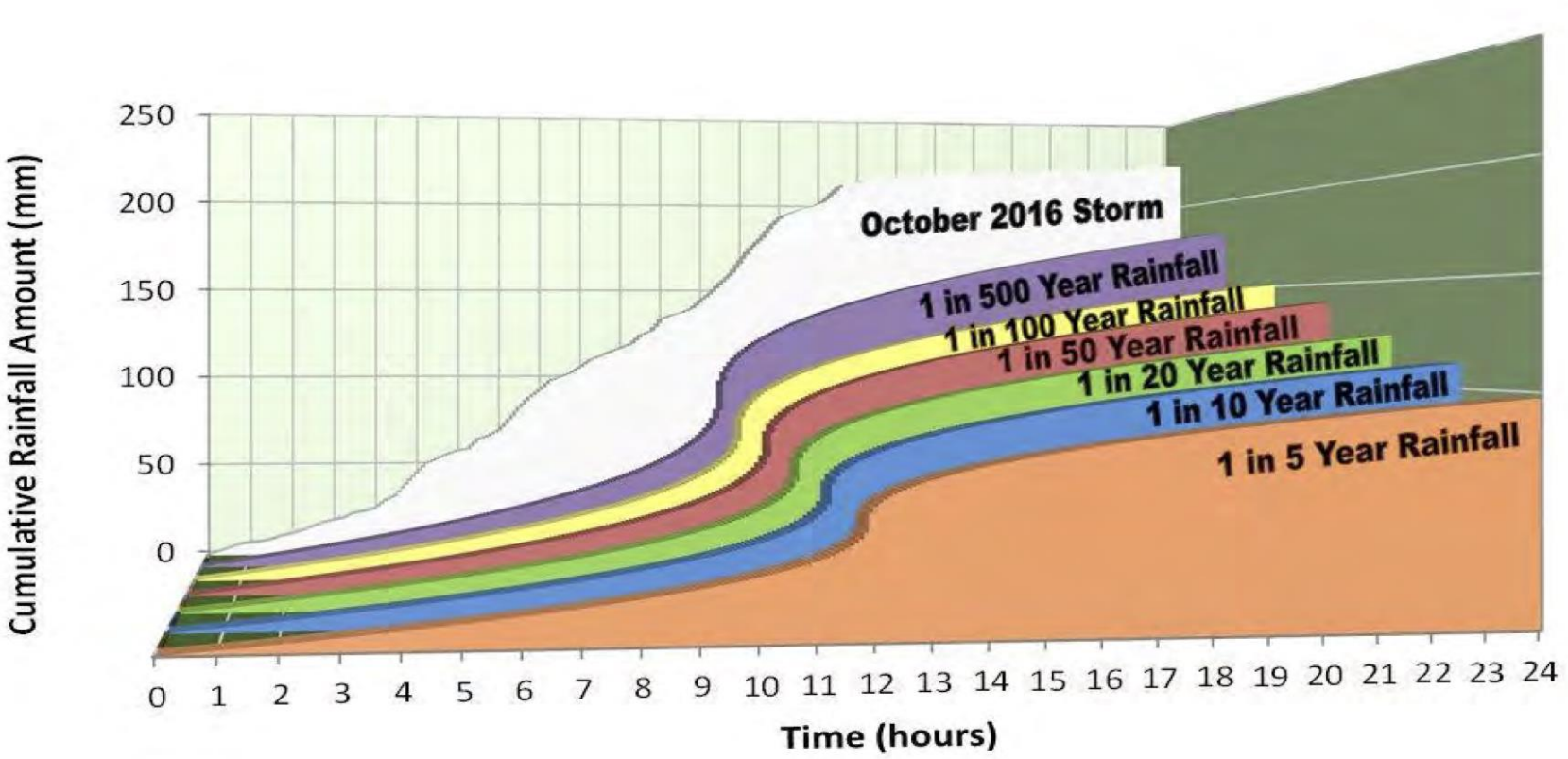


Figure 1.2: Cumulative Rainfall Amounts for Design Storms (based on IDF Curves for Sydney Airport) and the October 2016 Storm

Reservoir Brook
(Wentworth Creek)
&
Wash Brook


Courtesy: Island Aerial Media

What Happened in Membertou?

Localized flooding

Approximately 70 basements flooded with either sewer (blackwater) and/or stormwater

1 in 5 houses in Membertou had basement flooding

Membertou has a housing shortage, so most of these basements were finished with people living in and using these basements

Approximately $3.5 Million in damages

Stantec Flood Study

- Field Investigation
- Asset Inventory
- Flow Monitors & System Analysis
- Identified Key Problem Areas
- Identified Properties at Greatest Risk of Flooding
- Detailed Engineering Plans, Cost Estimates & Recommendations

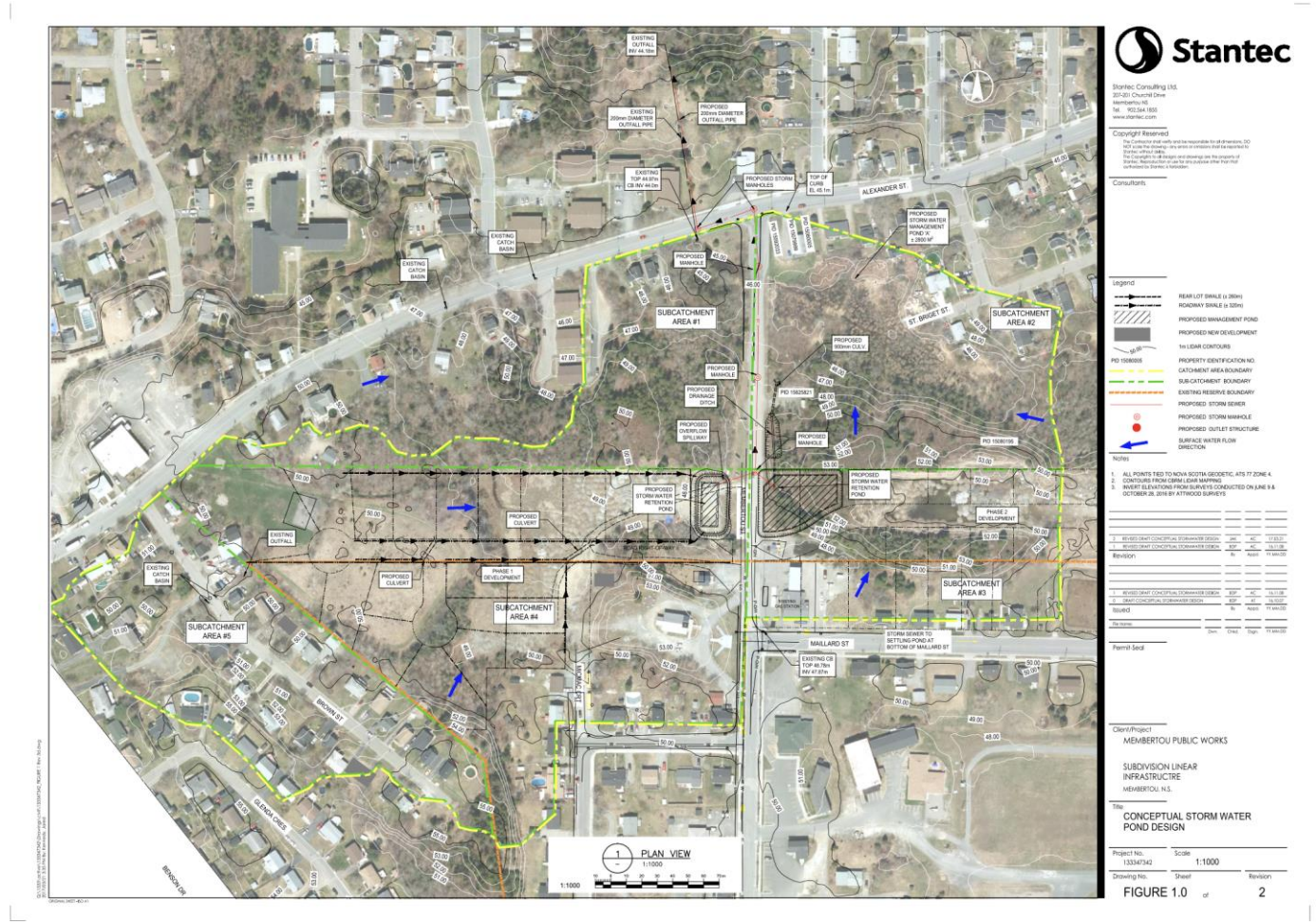
Key Problem Areas

Common Issues

- House Set Too Low
- Reverse Grading (Lot Graded Towards House)
- Shallow Sewers with Minimal Grade
- Sewer Debris & Blockages
- Submerged Storm Outfall
- Overland Drainage Path
- Inflow & Infiltration to Sanitary Sewer

Flow Monitor & Model of Sanitary Sewersheds in Membertou

Area 1: Membertou Street & Muin Awti

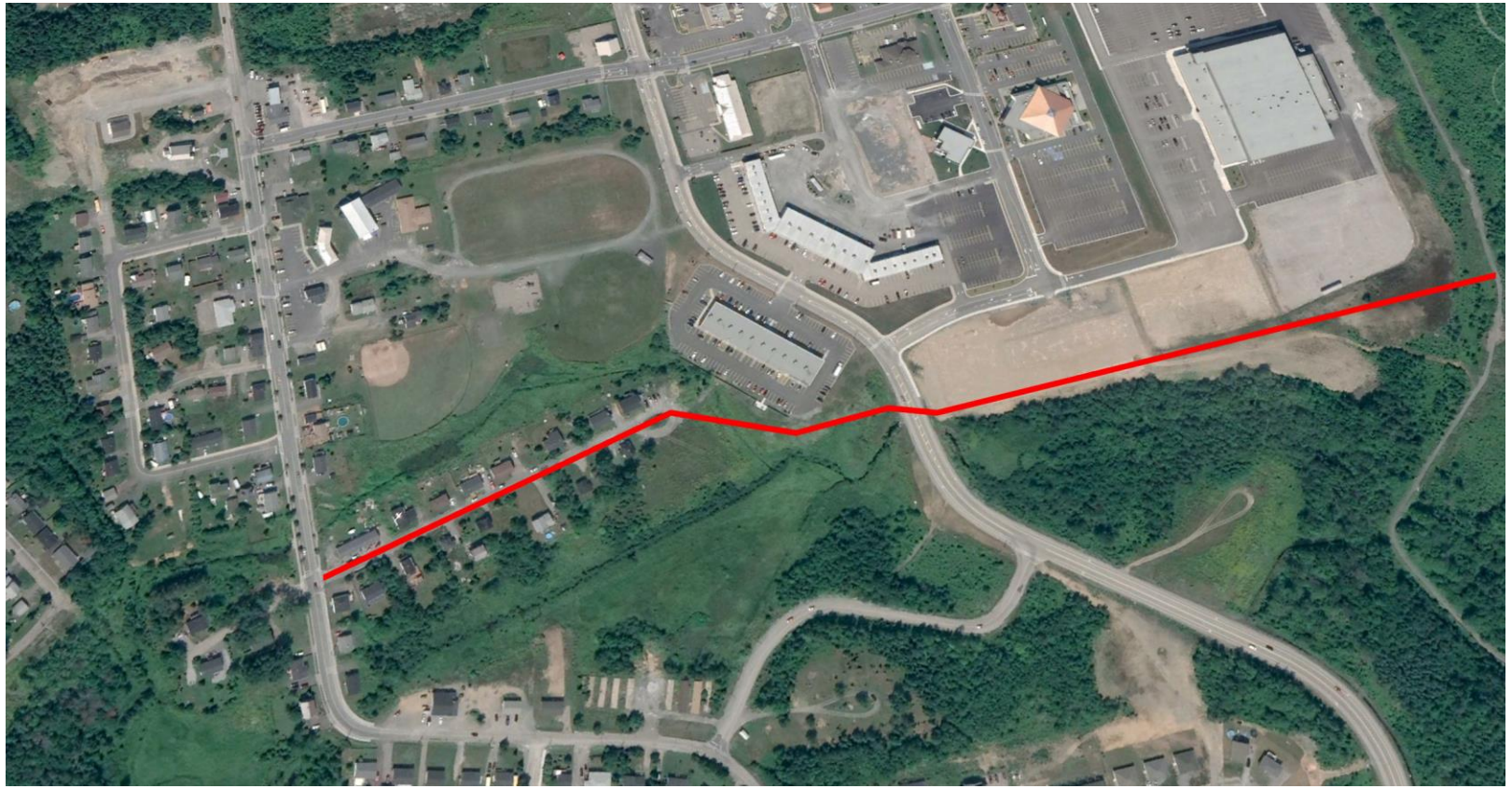


Membertou Street & Muin Awti

- This area is in a bowl with no overland drainage corridor
- New subdivision cannot proceed without new storm sewer installed on Membertou Street
- Cape Breton Regional Municipality currently studying new storm sewer on Alexandra Street that would also include storm sewer on Membertou Street
- New subdivision to be semi-detached slab-on-grade houses for elders

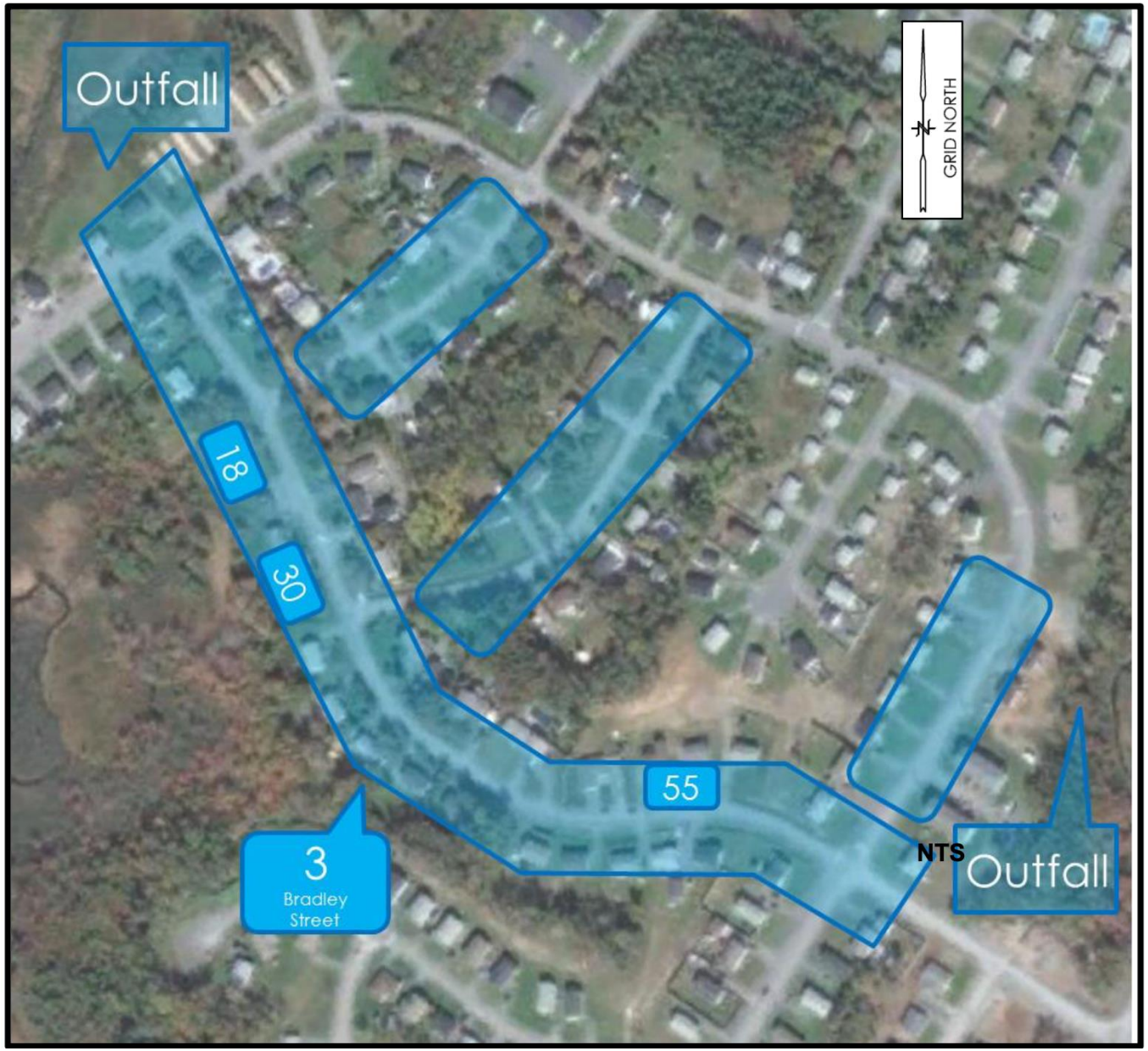
Area 2: Micmac Crescent, Membertou Street & Gallagher Street

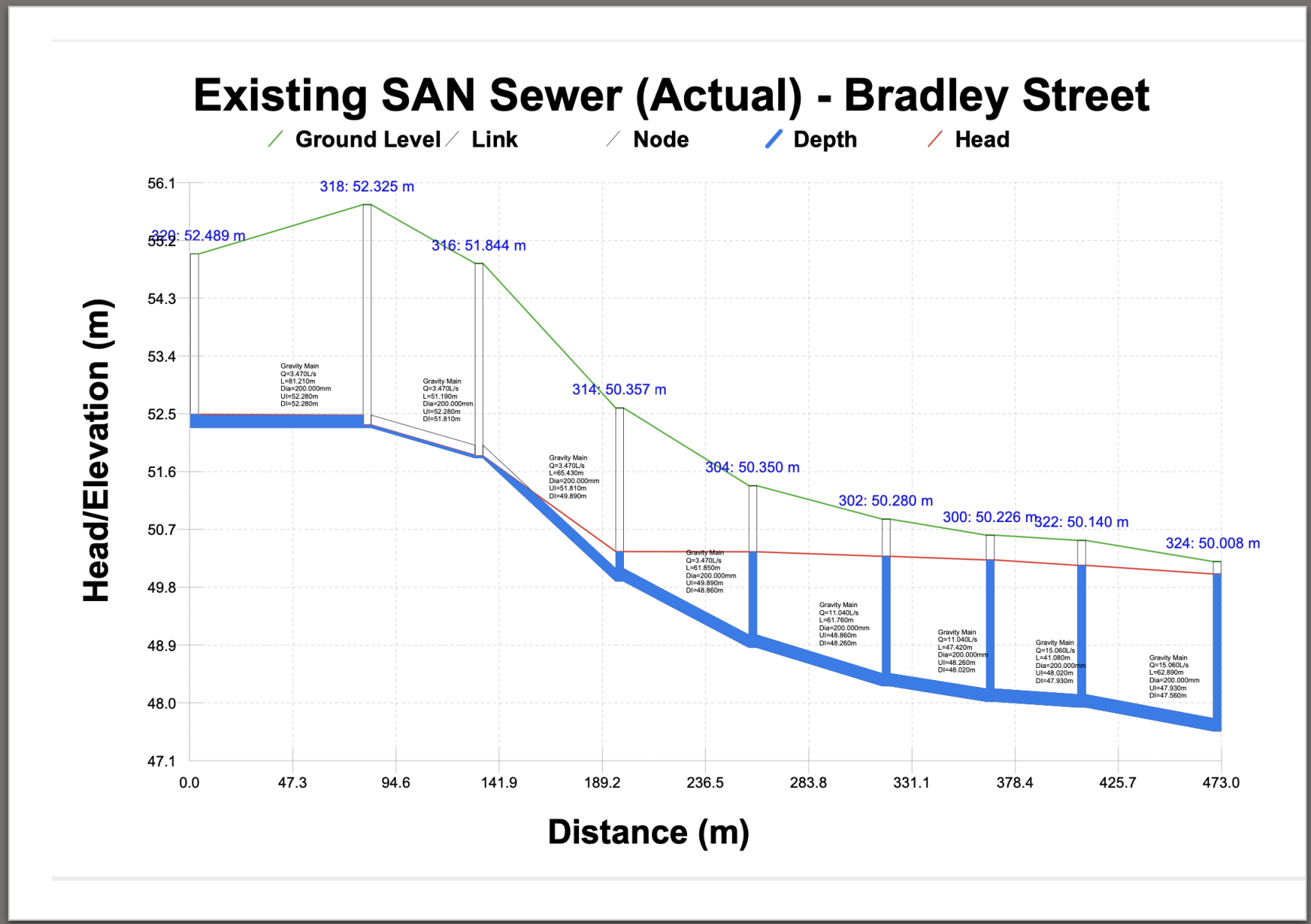
Gallagher Street Cross Country Sewer



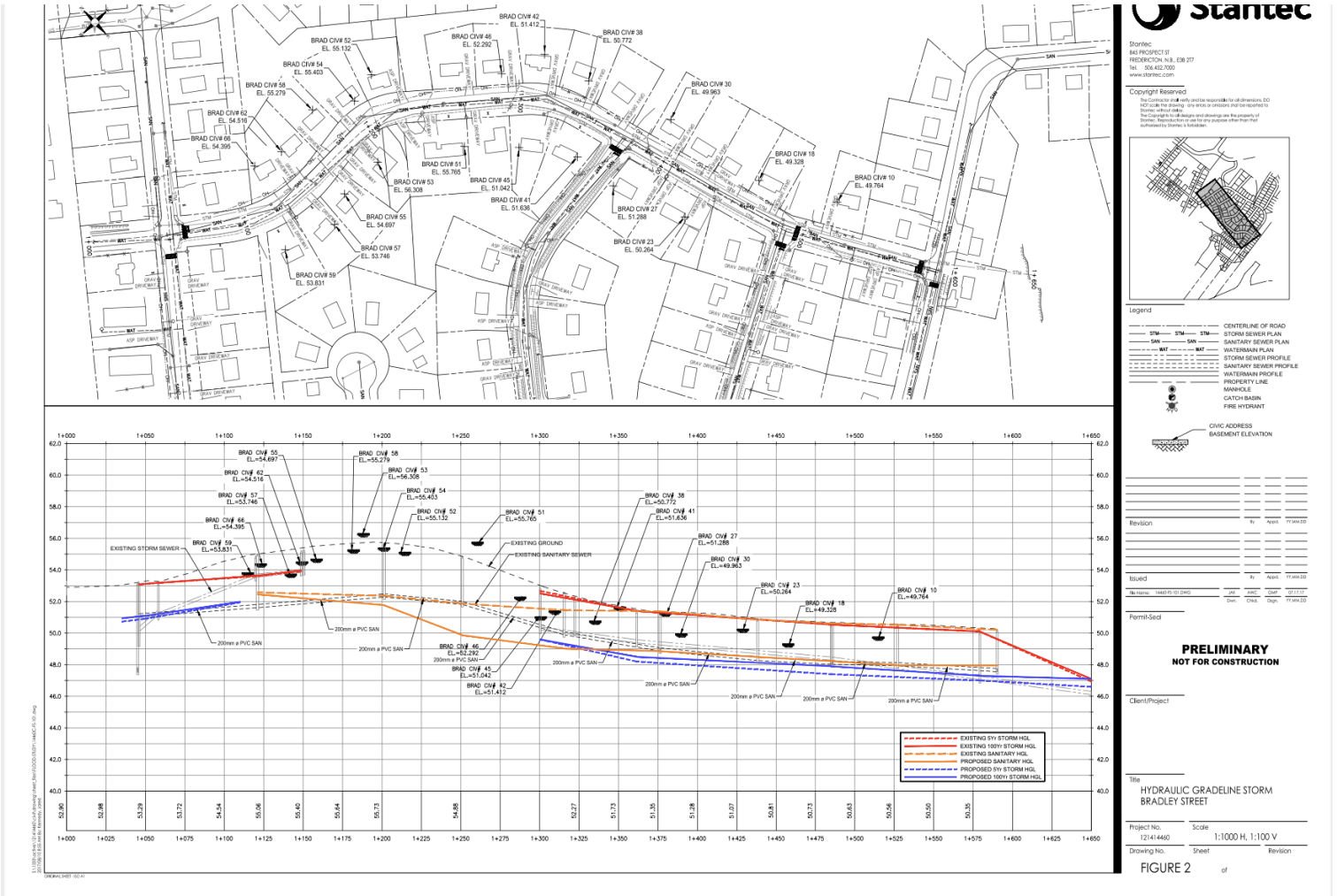
- Proposed cross-country sanitary sewer
- Existing sewer too shallow with lots of I&I
- New sewer to flow in opposite direction
- New sewer to take all flows from Tupsi Drive & Bradley Street
- This reduces load on existing sewers on Membertou Street and Micmac Crescent

Area 3: Bradley Street

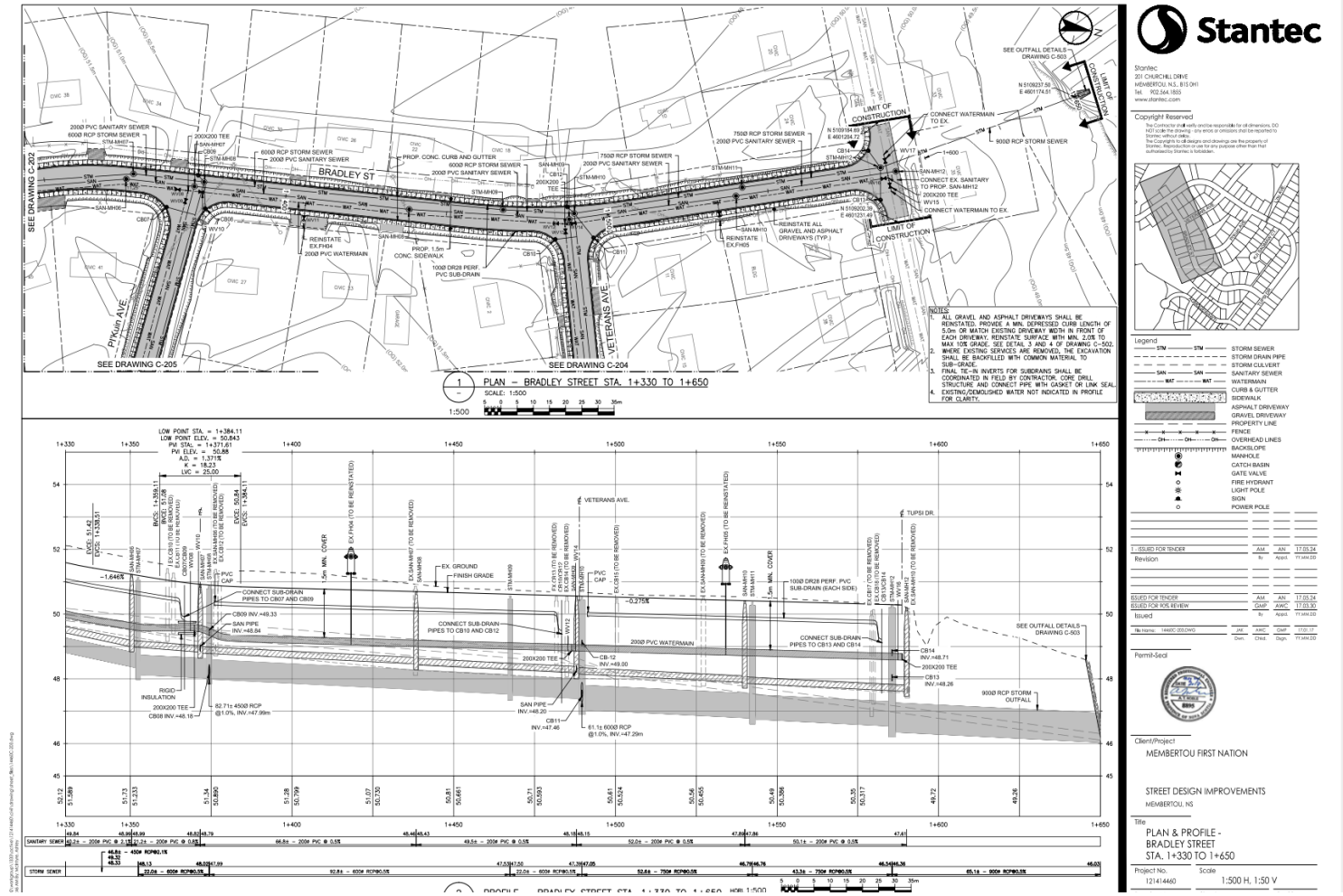




Bradley Street Sanitary Sewer Model



Bradley Street Record Drawings with Modelling Results



Stantec

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Legend
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WATERMAIN
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ASPHALT DRIVEWAY
GRAVEL DRIVEWAY
PROPERTY LINE
FENCE
OVERHEAD LINES
BACKSLOPE
MANHOLE
CATCH BASIN
GATE VALVE
FIRE HYDRANT
LIGHT POLE
SIGN
POWER POLE

No.	Revision	By	Appd.	YY.MM.DD
1	ISSUED FOR TENDER	AM	AN	17.05.24
	ISSUED FOR TCPL REVIEW	AM	AWC	17.03.30
	Issued	GMP	AWC	17.01.17

Permit-Seal

Client/Project
MEMBERTOU FIRST NATION

STREET DESIGN IMPROVEMENTS
MEMBERTOU, NS

Title
PLAN & PROFILE - BRADLEY STREET STA. 1+330 TO 1+650

Project No. 121414460
Scale 1:500 H, 1:50 V

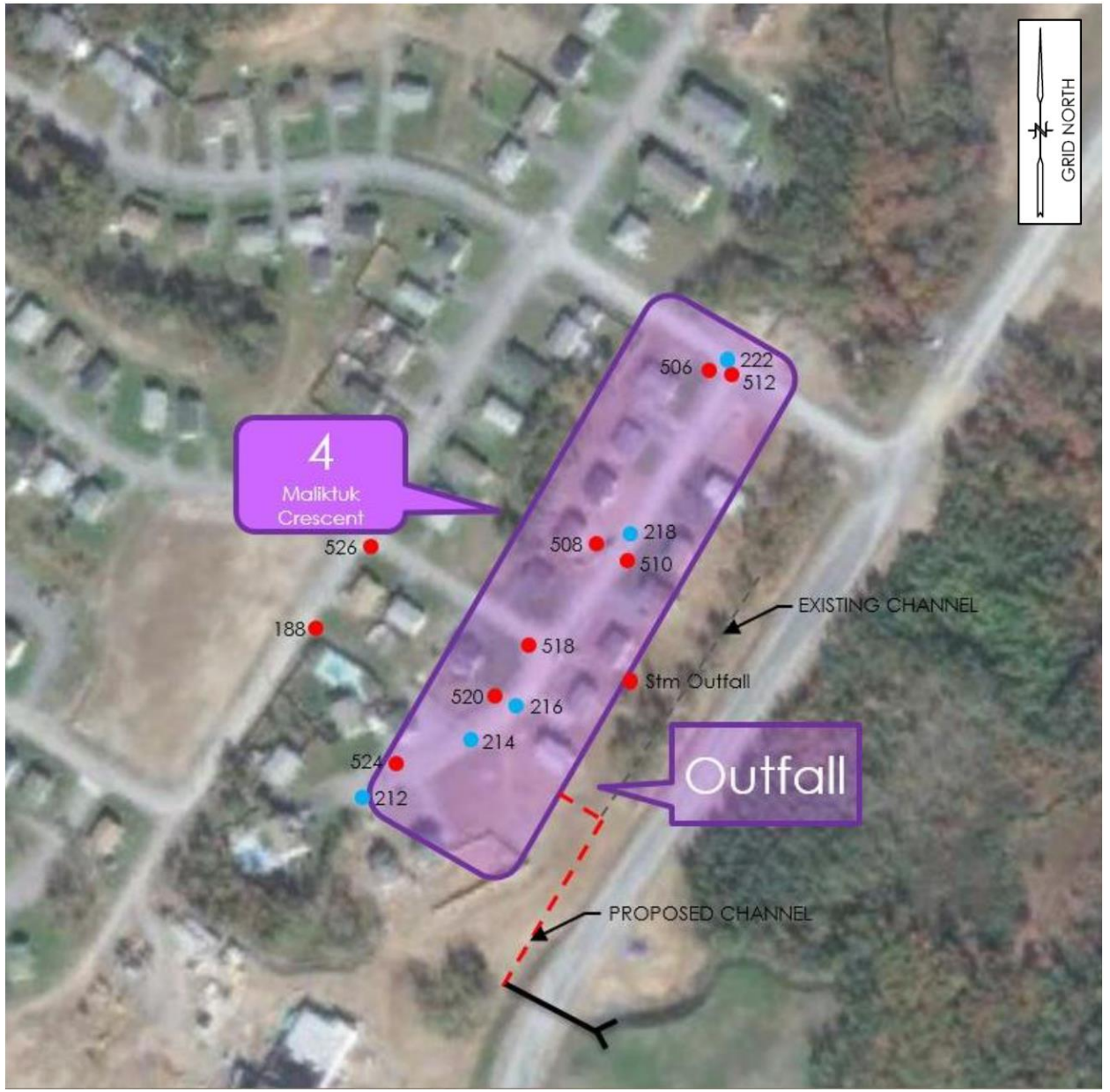
Bradley Street Engineering Plans for Full Reconstruction

Bradley Street Upgrades

- New Curb, Gutter, Sidewalk, and Asphalt
- Existing Storm Sewer Undersized
- Reused Existing Storm Sewer for Weeping Tile Drains Only
- New Storm Sewer and Catch Basins Installed for Surface Water
- Two New Stormwater Outfalls
- Replaced Existing Stormwater Outfall with Larger Pipe at Higher Elevation
- Repairs to Existing Sanitary Sewer to Reduce I&I
- Installed Backflow Valves on Sanitary Laterals
- Regraded Yards
- Full Reconstruction Would Have Cost about $3.5M
- Bradley Street Upgrades/Repairs Cost $1.1M

Bradley Street

Area 4: Maliktuk Court



Maliktuk Court Upgrades

Curb, gutter and asphalt

Installed backflow valves on houses that had sewer back-ups

Improved drainage at storm sewer outfall

Maliktuk Court

Area 5 – MacAuley Subdivision

MacAuley Subdivision

- New French drains and swales added at rear of lots

Membertou Public Works

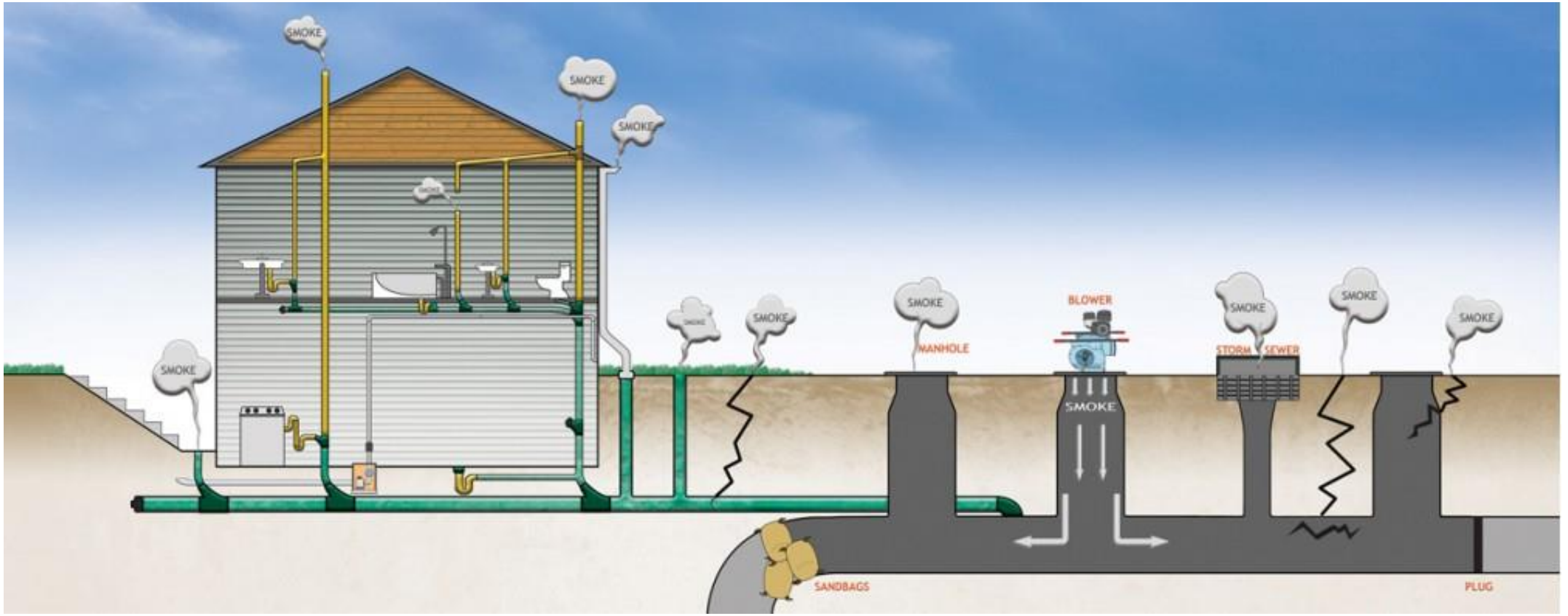
- In-house construction crew
- More than a typical Public Works Deparment
- 35+ employees that are mostly all community members
- Install sewer, water, concrete curb, gutter, sidewalk, building foundations, roadwork, and snow clearing
- Fleet of heavy equipment including; excavators, backhoes, dozer, loaders, dump trucks, skid steer
- In-house mechanic shop to service all equipment

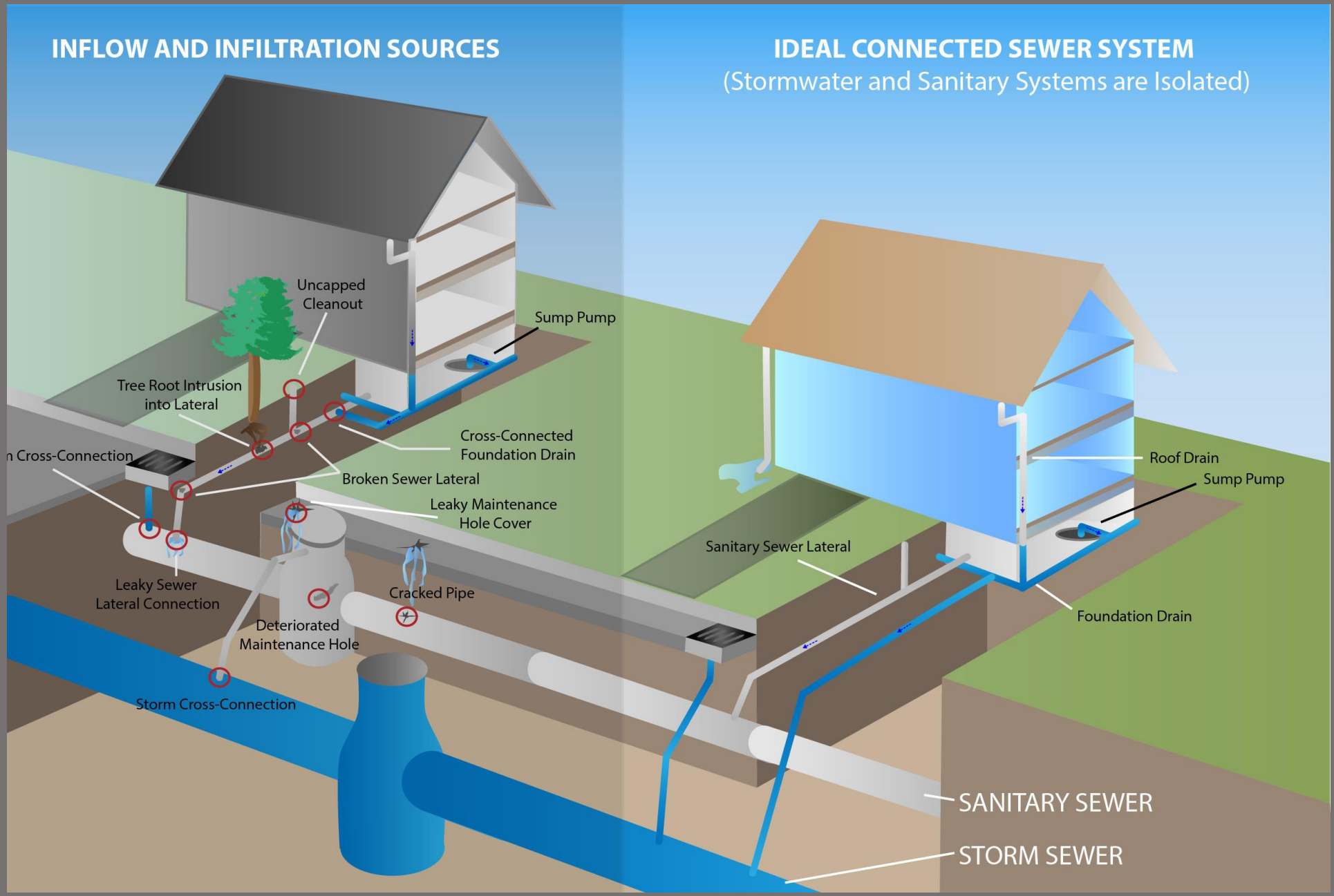
Membertou Public Works

Smoke Testing on Sanitary Sewer

- Cost about $7k for 2 days of testing
- Determined which houses had sump pumps tied into Sanitary Sewer
- Determined which houses had roof gutters tied into Sanitary Sewer
- Determined which houses had weeping tile tied into Sanitary Sewer
- Located buried manholes
- Located leaking manholes
- Received report and drone footage showing all results
- In total, 37 issues identified that need to be addressed

Smoke Testing



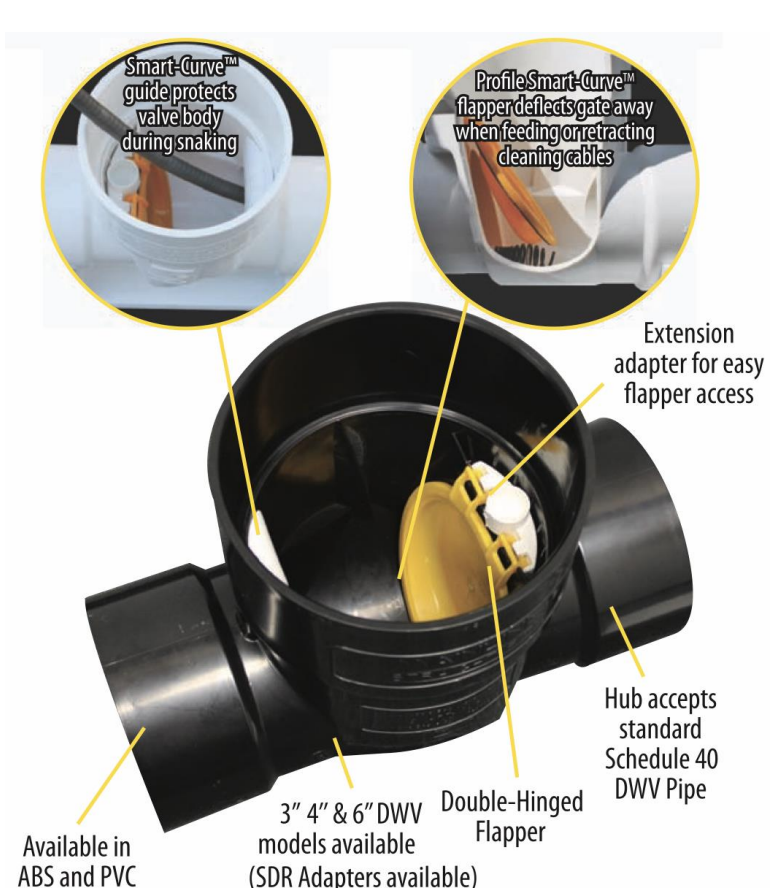

INFLOW AND INFILTRATION SOURCES
Uncapped Cleanout
Sump Pump
Tree Root Intrusion into Lateral
Cross-Connected Foundation Drain
n Cross-Connection
Broken Sewer Lateral
Leaky Maintenance Hole Cover
Leaky Sewer Lateral Connection
Cracked Pipe
Deteriorated Maintenance Hole
Storm Cross-Connection
IDEAL CONNECTED SEWER SYSTEM
(Stormwater and Sanitary Systems are Isolated)
Roof Drain
Sump Pump
Sanitary Sewer Lateral
Foundation Drain
SANITARY SEWER
STORM SEWER

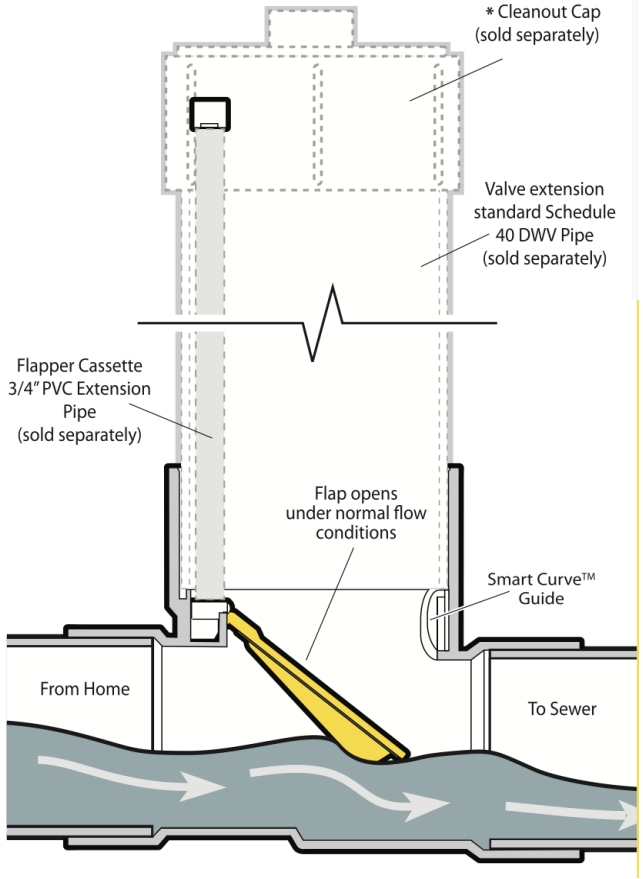
What Can Be Done In Your Community to Prevent Flooding

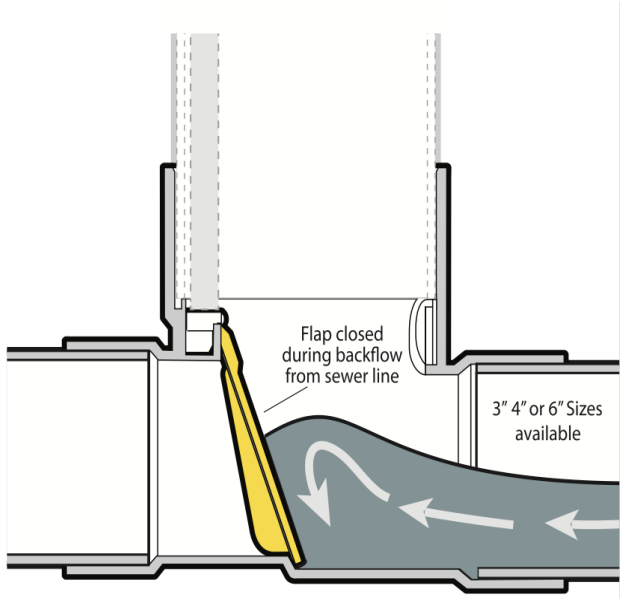
- Proper grading of lots
- Gutters and roof drains to daylight
- Disconnect foundation weeping tile from sanitary sewer (connect to storm sewer if possible)
- Sump pumps to daylight and discharge graded away from house
- As little as 4 houses with sump pump connected to sanitary sewer can cause sewer surcharge and back-ups
- Back flow preventors on sanitary laterals to prevent back-ups
- Preventative maintenance on sanitary and storm sewers. Sewer flushing, jet rodding, clean culverts, outfalls, removed blockages in ditches, etc.

Proper Lot Grading

Mainline Backflow Valve







Questions?