

# **NEW BRITAIN WATER CO. SUMMIT: PAST, PRESENT, & FUTURE**



**JANUARY 28, 2019**

# 2019 NEW BRITAIN WATER SUMMIT

## OVERVIEW

### **AGENDA**

#### **Session 1 – New Britain Water Company**

(9:00 a.m. to 10:00 a.m.)

- \* **Overview** – Mayor Erin Stewart
- \* **History of the Water Department** – Alderman Don Naples
- \* **Status of Operations** – Mark Moriarty, Director of Public Works
- \* **Water Utility System** – Ray Esponda, Deputy Director of Public Works
  - \* **Water Supply System**
  - \* **Water Quality & Treatment**
  - \* **Water Distribution System**
  - \* **Current Projects and Initiative**
  - \* **Water Rate Comparison**



# 2019 NEW BRITAIN WATER SUMMIT

## OVERVIEW

### AGENDA

### **Session 2 –Sanitary and Storm Sewer Systems**

(10:15 a.m. to 11:00 a.m.)

- \* Overview – Mayor Erin Stewart
- \* Sanitary Sewer Collection System – – Mark Moriarty, Director of Public Works
  - \* Sanitary System Components
  - \* Sanitary Sewer Systems Related Programs
    - \* Infiltration and Inflow (I&I)
    - \* Fats, Oils, and Grease (FOG) Program
  - \* US EPA Capacity, Management, Operations, and Maintenance (CMOM) Order
- \* Storm Water Sewer Collection System –Brief Overview
- \* The Mattabassett District – Michelle Ryan, District Engineer



# 2019 NEW BRITAIN WATER SUMMIT

## HISTORY OF THE WATER DEPARTMENT

Origins date back to 1856 when Frederick T. Stanley  
(the City's first Mayor & founder of the Stanley Works)  
had a study performed about the feasibility of securing a water  
supply to the City



# 2019 NEW BRITAIN WATER SUMMIT

## HISTORY OF THE WATER DEPARTMENT

- \* One year later, in 1857, the NB Water Board was given authority to construct a water supply system
- \* Ground breaking for Shuttle Meadow and original 5 miles of water main (4" to 8") started on **July 6, 1857** and the first day water flowed from Shuttle Meadow into the system was **October 6<sup>th</sup>, 1857**
- \* The original bond issued for this construction was for \$50,000

### The Water Department



Laying the city's first water line



# 2019 NEW BRITAIN WATER SUMMIT

## HISTORY OF THE WATER DEPARTMENT

- \* 1857 - NB WATER DEPARTMENT FOUNDED (TOWN POPULATION 4,500)
- \* 1868 - FIRST NEW BRITAIN WATER SHORTAGE, DUE TO RAPID POPULATION & INDUSTRY GROWTH
- \* 1891 - NEW DAM ADDED 10 FEET HEIGHT AT SHUTTLE MEADOW RESERVOIR, BRINGING CAPACITY TO 1 BILLION GALLONS
- \* 1910 - NEW BRITAIN POPULATION GREW TO 43,916
- \* 1910 - SHUTTLE MEADOW RESERVOIR DAM RAISED ANOTHER 4 FEET, BRINGING CAPACITY TO 1.3 BILLION GALLONS, WHERE IT REMAINS TODAY
- \* 1930 - NEW BRITAIN POPULATION GREW TO 68,124
- \* 1938 - CONSTRUCTION BEGAN ON NEW BRITAIN'S FIRST WATER FILTRATION PLANT USING RAPID SAND FILTRATION (MORSE DESIGN); SECOND PLANT IN THE U.S. TO USE THIS DESIGN
- \* 1950 - NEW BRITAIN BECAME THE FIRST CITY IN NEW ENGLAND TO ADD FLUORIDE TO ITS FILTERED WATER



# 2019 NEW BRITAIN WATER SUMMIT

## HISTORY OF THE WATER DEPARTMENT

- \* 1960 - NEW BRITAIN POPULATION GREW TO 82,201  
(City's estimated population peaked in the mid-1960's at approx. 95,000; 73,000 today)
- \* 1961 - ADDITIONAL FILTRATION PLANT, THE B PLANT, PUT INTO OPERATION, BRINGING TOTAL WATER FILTRATION CAPACITY TO 25 MGD
- \* 1964 - 52% OF WATER CONSUMPTION WAS USED BY INDUSTRIAL CUSTOMERS
- \* 1965 - RECORD-HIGH USAGE FOR A SINGLE DAY: 21 MILLION GAL. ON JULY 14<sup>th</sup>
- \* 1967 - WASEL RESERVOIR COMPLETED, ADDING 900 MILLION GAL. WATER STORAGE TO THE NEW BRITAIN SYSTEM.
- \* 1971 - 35% OF WATER CONSUMPTION WAS USED BY INDUSTRIAL CUSTOMERS  
(TODAY INDUSTRIAL USE IS UNDER 15%)
- \* 1990 - NB WATER SYSTEM INCL. 1,973 FIRE HYDRANTS AND 16,920 WATER METERS IN SERVICE, WITH 207 MILES OF DISTRIBUTION & TRANSMISSION MAINS.
- \* 2004 - NEW \$60M WATER FILTRATION PLANT COMPLETED & PLACED IN SERVICE



# 2019 NEW BRITAIN WATER SUMMIT

## HISTORY OF THE WATER DEPARTMENT

### INTERESTING FACTS

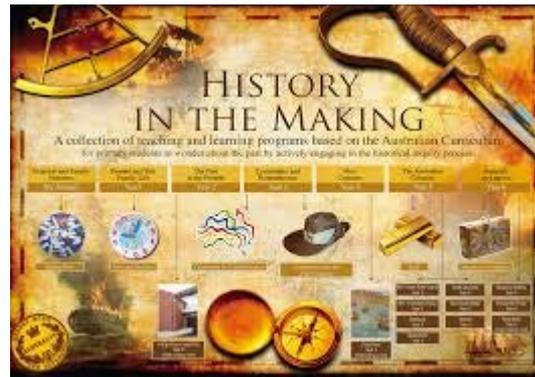


- \* THE WASSEL RESERVOIR IS NAMED FOR NEW BRITAIN NATIVE DAVID WASSEL, A SUBMARINER IN THE U.S. NAVY WHO WAS LOST IN THE ACCIDENTAL SINKING OF THE USS THRESHER OFF THE COAST OF MASSACHUSETTS ON APRIL 10, 1963
- \* THE ORIGINAL NAME OF THE RESERVOIR WAS PANTHER SWAMP



# 2019 NEW BRITAIN WATER SUMMIT

## STATUS OF OPERATIONS



History of New Britain Water continued....



# 2019 NEW BRITAIN WATER SUMMIT

## STATUS OF OPERATIONS

From 1856 to 2011 (155 years!)

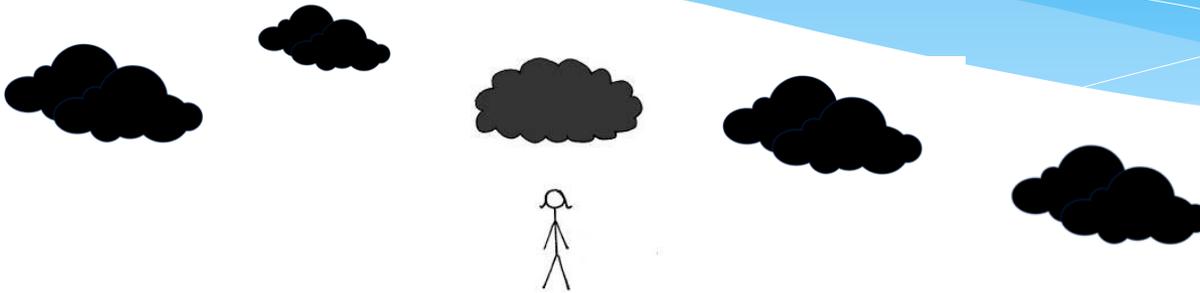
New Britain Water was moving along just fine...

But then in 2012 was thrown  
a pretty big kink...



# 2019 NEW BRITAIN WATER SUMMIT

## STATUS OF OPERATIONS



In 2012 the New Britain Water was merged  
with the City's Public Works Department

&

New Britain Water now including managing the  
City's Sanitary Sewer Systems

&

Storm Water Drainage System



# 2019 NEW BRITAIN WATER SUMMIT

## STATUS OF OPERATIONS

This merger added staff, but also added the following assets to Water:

- \* 333 miles of pipe
- \* 8,490 structures (manholes and catch basins)
- \* Both sanitary and storm sewers require substantial maintenance
- \* Have significant environmental permitting requirements
- \* Require large scale capital investment



# 2019 NEW BRITAIN WATER SUMMIT

## STATUS OF OPERATIONS

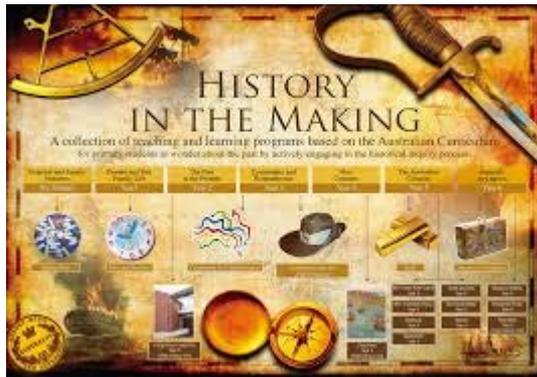
Merging the City's underground utility operations  
has had a number of benefits for  
both the City and NB Water  
&  
has been successful to date!



# 2019 NEW BRITAIN WATER SUMMIT

## STATUS OF OPERATIONS

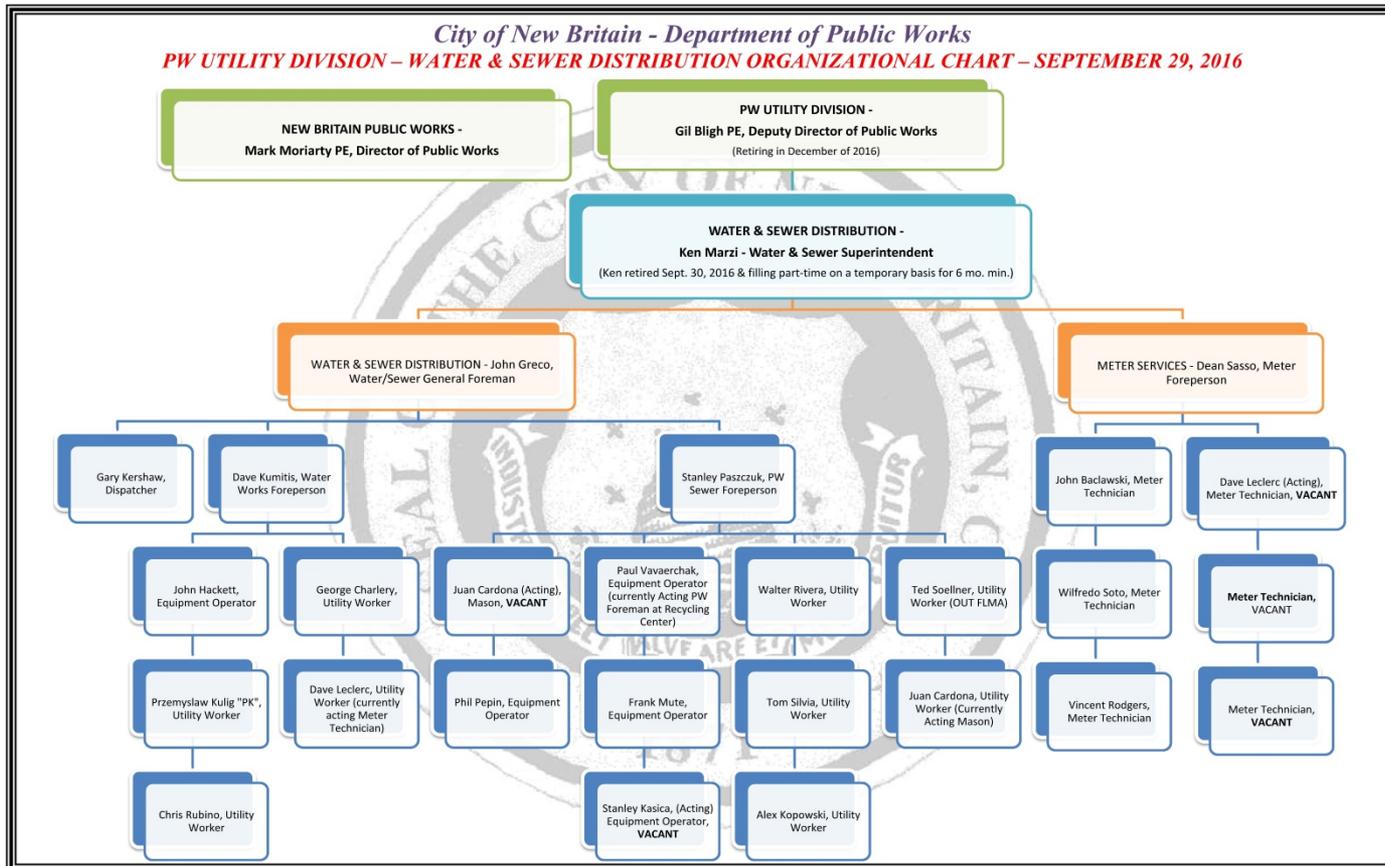
History of New Britain Water continued....



# 2016!



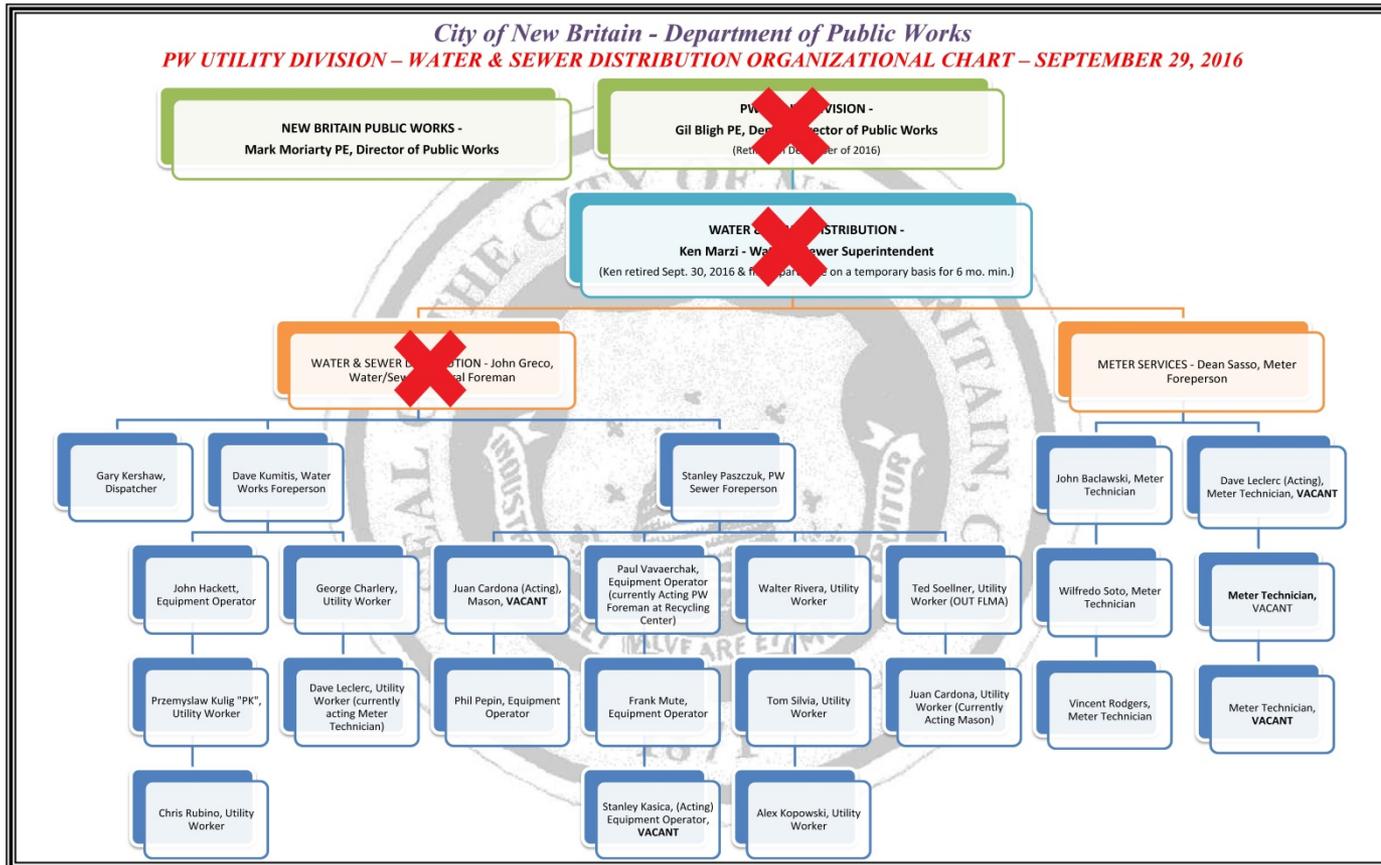
# 2019 NEW BRITAIN WATER SUMMIT STATUS OF OPERATIONS



## PUBLIC WORKS UTILITY DIVISION – DISTRIBUTION SYSTEM ORG. CHART 2016



# 2019 NEW BRITAIN WATER SUMMIT STATUS OF OPERATIONS



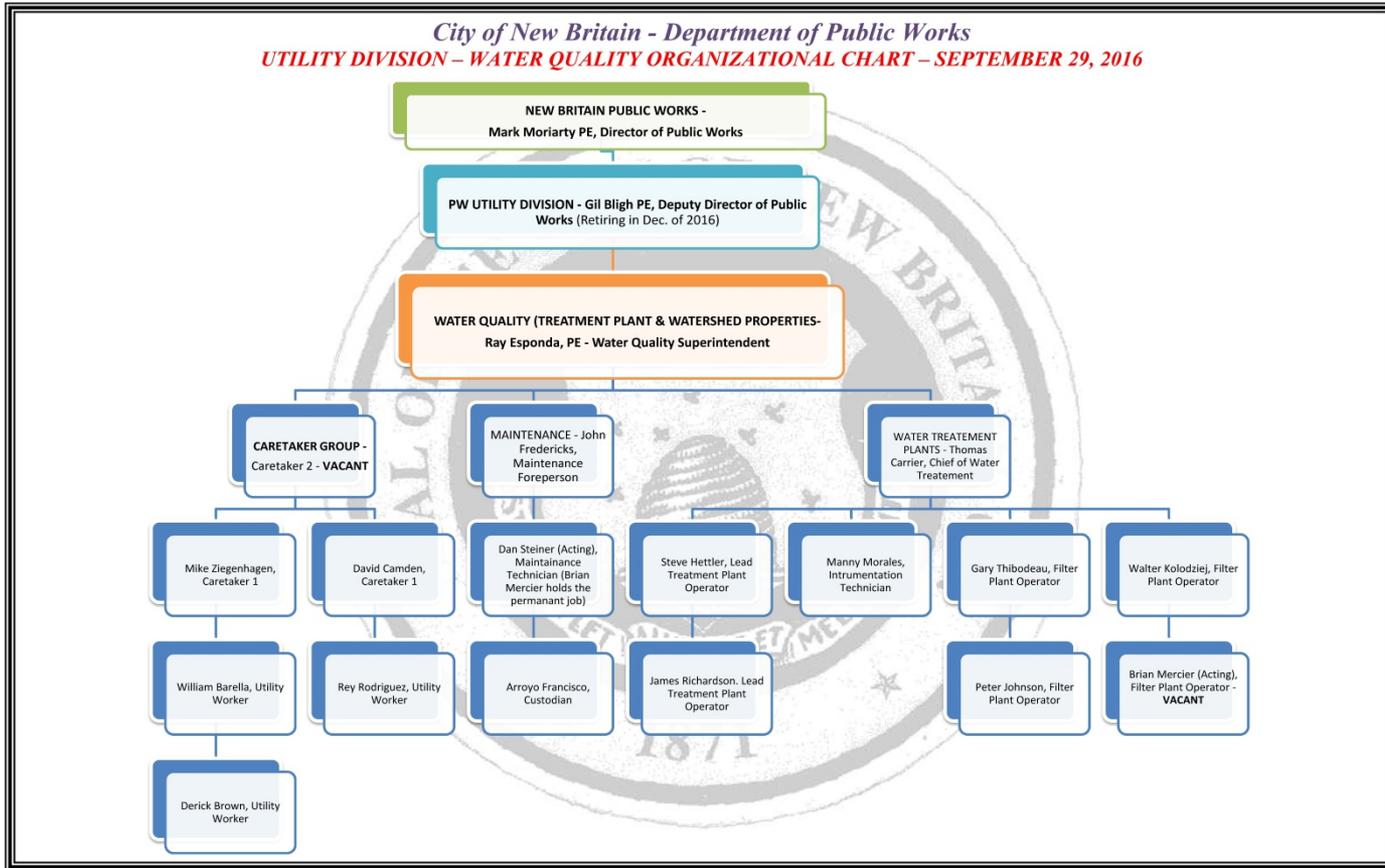
**PUBLIC WORKS UTILITY DIVISION – DISTRIBUTION SYSTEM ORG.  
CHART BEGINNING 2017**



# 2019 NEW BRITAIN WATER SUMMIT

## STATUS OF OPERATIONS

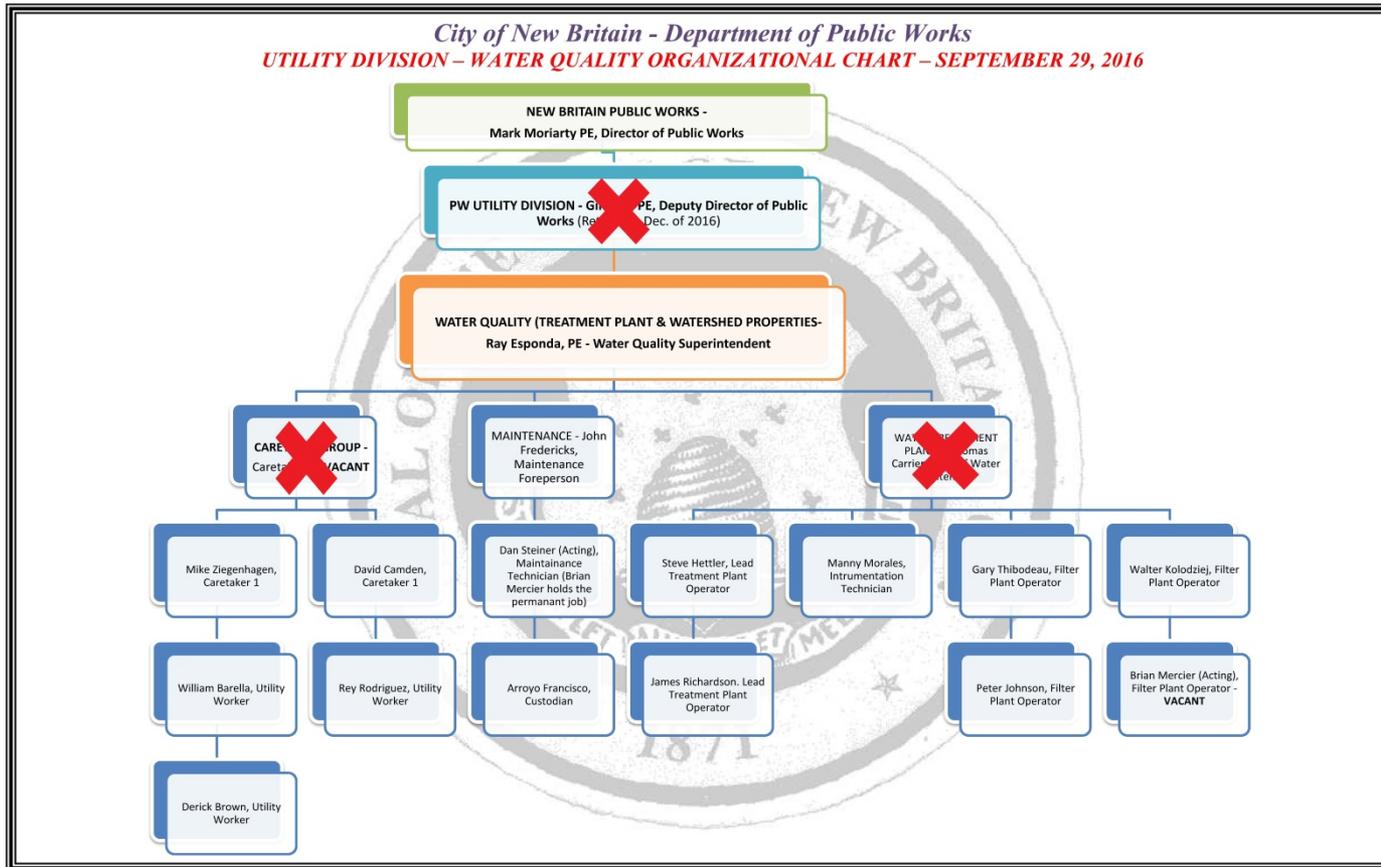
*City of New Britain - Department of Public Works*  
**UTILITY DIVISION – WATER QUALITY ORGANIZATIONAL CHART – SEPTEMBER 29, 2016**



**PUBLIC WORKS UTILITY DIVISION – WATER QUALITY ORG.  
 CHART 2016**

# 2019 NEW BRITAIN WATER SUMMIT

## STATUS OF OPERATIONS



## PUBLIC WORKS UTILITY DIVISION – WATER QUALITY ORG. CHART - 2017

# 2019 NEW BRITAIN WATER SUMMIT

## STATUS OF OPERATIONS

Within one year saw vacancies develop due to retirements in 5 out of 7 top positions including:

- \* Water Director
- \* Chief Treatment Plant Operator
- \* Water/Sewer Superintendent
- \* Chief Caretaker
- \* Water/Sewer General Foreperson



# 2019 NEW BRITAIN WATER SUMMIT

## STATUS OF OPERATIONS



**At this same time on the water side of our operations  
we were face with...**



# 2019 NEW BRITAIN WATER SUMMIT

## STATUS OF OPERATIONS



**The most severe draught since 1960's.....**

**Shuttle Meadow Reservoir at 20%**



# 2019 NEW BRITAIN WATER SUMMIT

## STATUS OF OPERATIONS



**And on the sanitary sewer side of our operations  
we were face with...**



# 2019 NEW BRITAIN WATER SUMMIT

## STATUS OF OPERATIONS



### U.S. Environmental Protection Agency

Region 1 – New England  
5 Post Office Square – Suite 100  
Boston, MA 02109-3912

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

DEC 23 2015

Mark Moriarty, Director  
Department of Public Works  
City of New Britain  
27 West Main Street  
New Britain, CT 06051

Re: In the Matter of the City of New Britain, Connecticut, Administrative Order on Consent,  
Docket No. CWA-01-15-007

Dear Mr. Moriarty,

Enclosed is the fully executed copy of the Administrative Order on Consent ("Order") entered into between the U.S. Environmental Protection Agency and the City of New Britain, Connecticut.

Please let me know if you have any questions. My telephone number is (617) 918-1663 and my email address is [melcher.john@epa.gov](mailto:melcher.john@epa.gov).

Sincerely,

A handwritten signature in black ink, appearing to read "John Melcher".

John Melcher  
Enforcement Officer  
Office of Environmental Stewardship

cc (electronic only): Dennis Greci, Connecticut Department of Energy and Environmental  
Protection ("CT DEEP")  
Gil Bligh, City of New Britain  
Joseph Skelly, City of New Britain



## 2015 CMOM Consent Order from the US EPA for the Management and Maintenance of the Sewer System

# 2019 NEW BRITAIN WATER SUMMIT

## STATUS OF OPERATIONS

### Fast Forward to 2019 – New Water Leadership

- \* Water Director – Raymond Esponda, PE (Deputy Director of Public Works)
- \* Chief Treatment Plant Operator – Jay Richards
- \* Water/Sewer Superintendent – Chris Polkowski
- \* Chief Caretaker – David Camden
- \* Water/Sewer General Foreperson – David Kunitis



2019 NEW BRITAIN WATER SUMMIT

STATUS OF OPERATIONS

# & They're Battle Tested



After Leading Us Through The 2016 Draught, the EPA CMOM  
Consent Order & A Number Of Other Challenges



# 2019 NEW BRITAIN WATER SUMMIT

## STATUS OF OPERATIONS

Another challenge faced by NB Water has been an unbalanced work workforce in terms of age

Physicality of the field work can be taxing on a person's body

Unbalanced staff ages makes succession planning difficult



# 2019 NEW BRITAIN WATER SUMMIT

## STATUS OF OPERATIONS

**This is an area we've made significant progress with over the past several years as vacancies have been filled**



# 2019 NEW BRITAIN WATER SUMMIT

## WATER DISTRIBUTION SYSTEM



### NB Water Staffing

- 48 Positions w/ 4 Vacancies

- \* Water Distribution – 6 people
- \* Water Treatment Plant- 7 people
- \* Meter Service – 5 people
- \* Sanitary and Storm Sewer – 8 people
- \* Caretaker Group -6 people
- \* Maintenance - 4 people

\*Over 400 years of combined experience



# 2019 NEW BRITAIN WATER SUMMIT

## STATUS OF OPERATIONS

- ❖ Rest of this presentation you'll get a complete overview of our operations
- ❖ You'll also see that New Britain Water is making great progress on all fronts
- ❖ Not satisfied with maintaining the status quo
- ❖ Motivated staff showing leadership and committed to making things even better



# 2019 NEW BRITAIN WATER SUMMIT

## WATER UTILITY SYSTEM

### Water Utility System (Ray Esponda, Deputy Director of Public Works)

- \* Water Supply System
- \* Water Quality & Treatment
- \* Water Distribution System
- \* Current Projects and Initiative
- \* Water Rate Comparison



# 2019 NEW BRITAIN WATER SUMMIT

## WATER SUPPLY SYSTEM

### City's Water Supply System (2 Branches: North & West)

- \* Safe yield 17.6 MGD
- \* Seven Reservoirs (owned)
- \* 8 Class C High Hazard Dams
- \* Rights of withdrawal to MDC's Nepaug Reservoir
- \* Two Groundwater water supplies
- \* 6,600 Acres of Watershed Properties in 6 towns
- \* Miles of pipes feeding Shuttle Meadow and Wassel Reservoirs



# 2019 NEW BRITAIN WATER SUMMIT

## WATER SUPPLY SYSTEM

### North Water Supply System

#### Shuttle Meadow Reservoir

- \* 1.4 **billion** gal. capacity
- \* 2.8 sq. mi. watershed area
- \* 204.8 acres surface area
- \* Class C High Hazard Dam

#### White Bridge Pond and pump station (impoundment)

- \* 6 million gal. capacity
- \* 11 Sq.Mi. watershed area
- \* 1.3 acres surface area
- \* Captures water from Polkville and Coppermine Brooks

#### White Bridge Wellfield SY=4.5MGD

#### Whigville Reservoir

- \* 65 million gal. capacity
- \* 3.96 sq. mi watershed area.
- \* Class C High Hazard Dam

#### Nepaug Reservoir

(owned By MDC)

- \* surface area 28.8 acres
- \* City allowed 10 MGD peak withdraw
- \* Average withdraw allowed 5 MGD



# 2019 NEW BRITAIN WATER SUMMIT

## WATER SUPPLY SYSTEM

### West Water Supply System

#### Wassel Reservoir

- \* 900 million gal. capacity
- \* 0.38 sq. mi. watershed area
- \* 102.4 acres surface area
- \* Class C High Hazard Dam

#### Hart's ponds (upper and lower)

- \* 57.7 million gal “upper” capacity
- \* 1.56 sq. mi watershed area
- \* 145.7 acres surface area
  
- \* 166.8 million gal. “lower” capacity
- \* 0.43 sq. mi. watershed area
- \* 63.8 acres surface area
- \* Class C High Hazard Dams

#### Wolcott Reservoir

- \* 171 million gal. capacity
- \* 2.5 sq. mi. watershed area
- \* 51.2 acres surface area
- \* Class C High Hazard Dam

#### Patton Brook Well

\*(SY=1MGD)



# 2019 NEW BRITAIN WATER SUMMIT

## WATER QUALITY AND TREATMENT

### City's Water Treatment Plant Process

- \*Staff- 6 operators and 1 Instrument Tech
- \*Ozone disinfection
- \*PACl added at rapid mixers
- \*Water flows through three plate settlers and five GAC/BAC filters
- \*Final chemical addition of lime, carbon dioxide, fluoride, and sodium hypochlorite



# 2019 NEW BRITAIN WATER SUMMIT

## WATER QUALITY AND TREATMENT

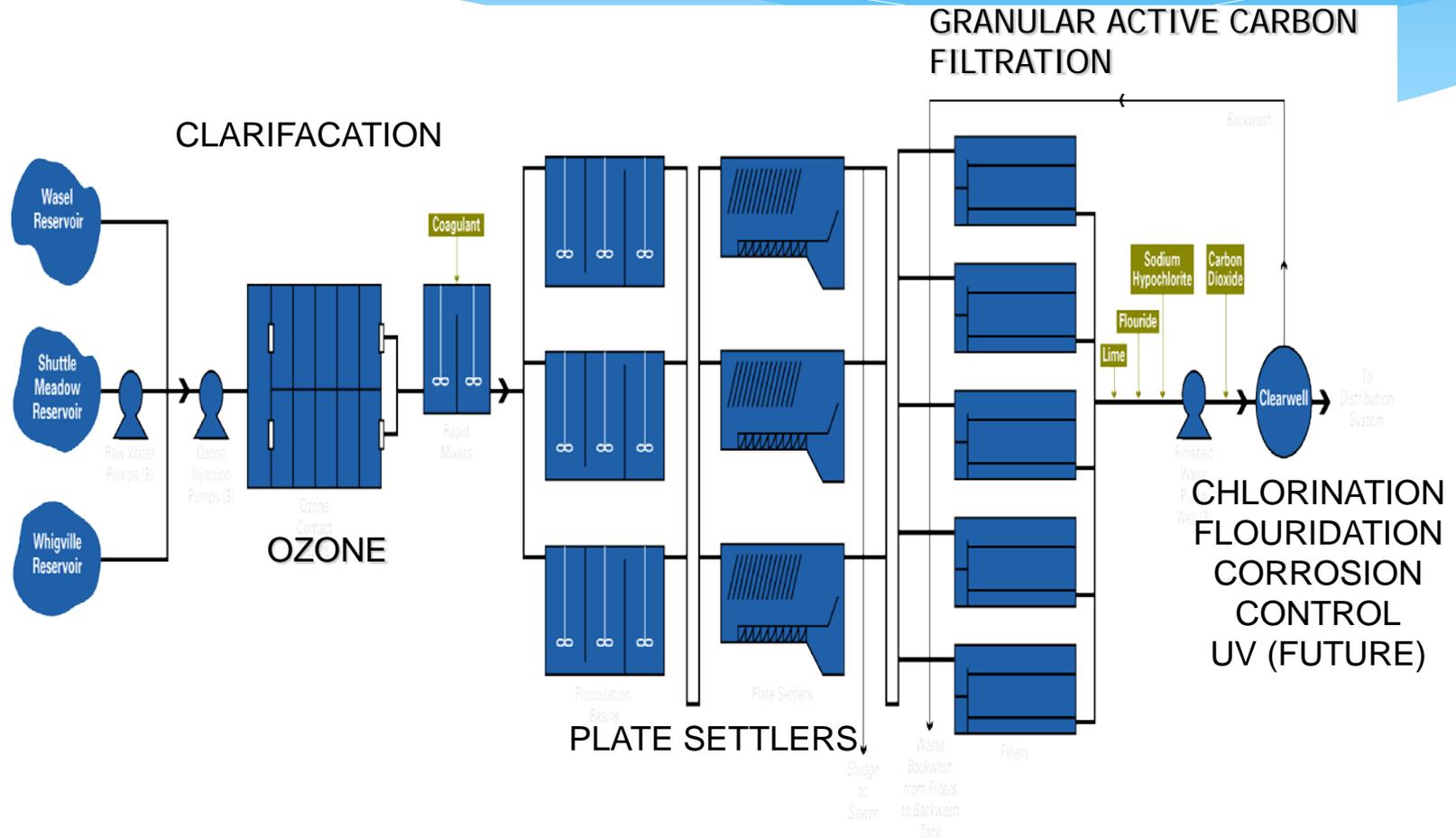
### City's Water Treatment Plant Process

- \*Raw water can be supplied directly from three sources directly
- \*Ozone Disinfection
- \*PACl added at rapid mixers
- \*Water flows through three plate settlers and five GAC/BAC filters
- \*Final chemical addition of lime, fluoride, and sodium hypochlorite



# 2019 NEW BRITAIN WATER SUMMIT

## WATER QUALITY AND TREATMENT



# 2019 NEW BRITAIN WATER SUMMIT

## WATER QUALITY AND TREATMENT

**STEP 1** in the Treatment Process

### Ozone Disinfection

#### 1) Powerful Oxidant

- Kills bacteria , giardia, viruses and cryptosporidium to a lesser extent
- Removes metals
- Aids in turbidity removal
- Removes taste, odors, and color



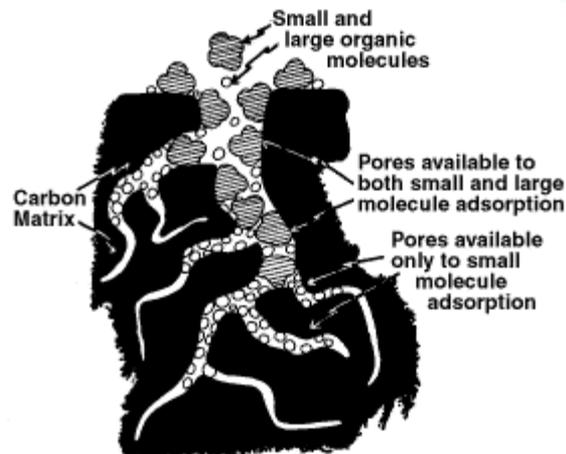
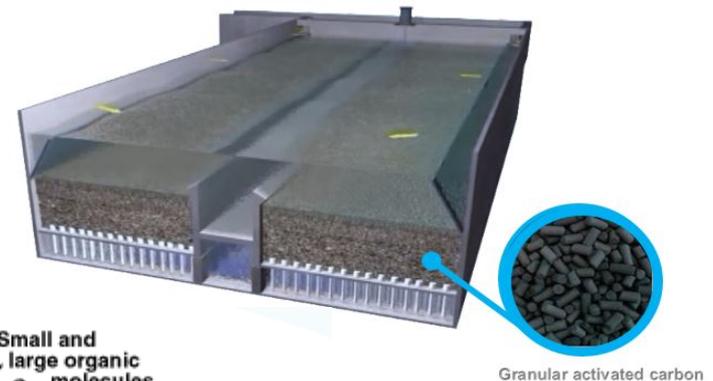
# 2019 NEW BRITAIN WATER SUMMIT

## WATER QUALITY AND TREATMENT

**STEP 3** in the Treatment Process

### GAC/BAC Filter Media

1. Removes DBP pre-cursors
2. Removes VOC's and SOC's
3. Removes taste and odor compounds



1 lb of activated carbon has 200 miles of pores and fissures, and offer the adsorbing surface area of 4 million ft<sup>2</sup>.



# 2019 NEW BRITAIN WATER SUMMIT

## WATER QUALITY AND TREATMENT

Part of **STEP 4** in the Treatment Process

### Sodium Hypochlorite Liquid

1. Provides residual disinfectant
2. Safer and easier to use than chlorine gas

### Poly-aluminum Chloride (PACl)

1. Uses less alkalinity which reduces amount of lime
2. Works over greater pH range
3. Works well in cold temperatures
4. No need for adding organic polymers



# 2019 NEW BRITAIN WATER SUMMIT

## WATER QUALITY AND TREATMENT

Part of **STEP 4** in the Treatment Process

### Lime

- ❖ pH adjustment
- ❖ Corrosion control
- ❖ Fluoride
- ❖ Required in CT for dental health for systems over 20,000 customers
- ❖ Potassium Permanganate
- ❖ Used Seasonally for Iron & manganese removal

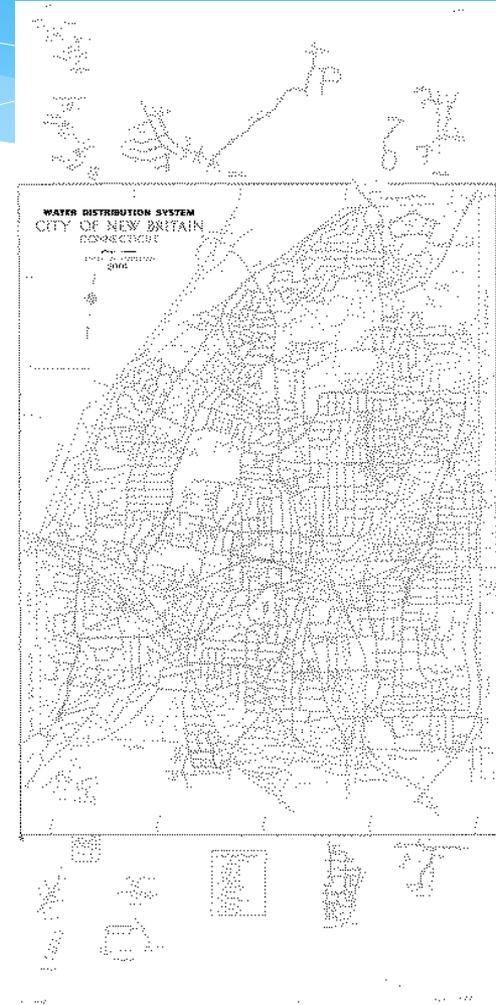


# 2019 NEW BRITAIN WATER SUMMIT

## WATER DISTRIBUTION SYSTEM

### City's Water Distribution System

- 274 miles of Water Main
- 2,078 Fire Hydrants
- Pipe diameters – 30” transmission mains to 4” distribution mains
- Age of pipes vary with original pipes dating back to 1860's and new installations in the 2010's
- 3 Water Storage Tanks & 4 Pump Stations
- Servicing 85,000 people
- Approximately 18,000 service connections



# 2019 NEW BRITAIN WATER SUMMIT

## WATER DISTRIBUTION SYSTEM

### City's Service Areas

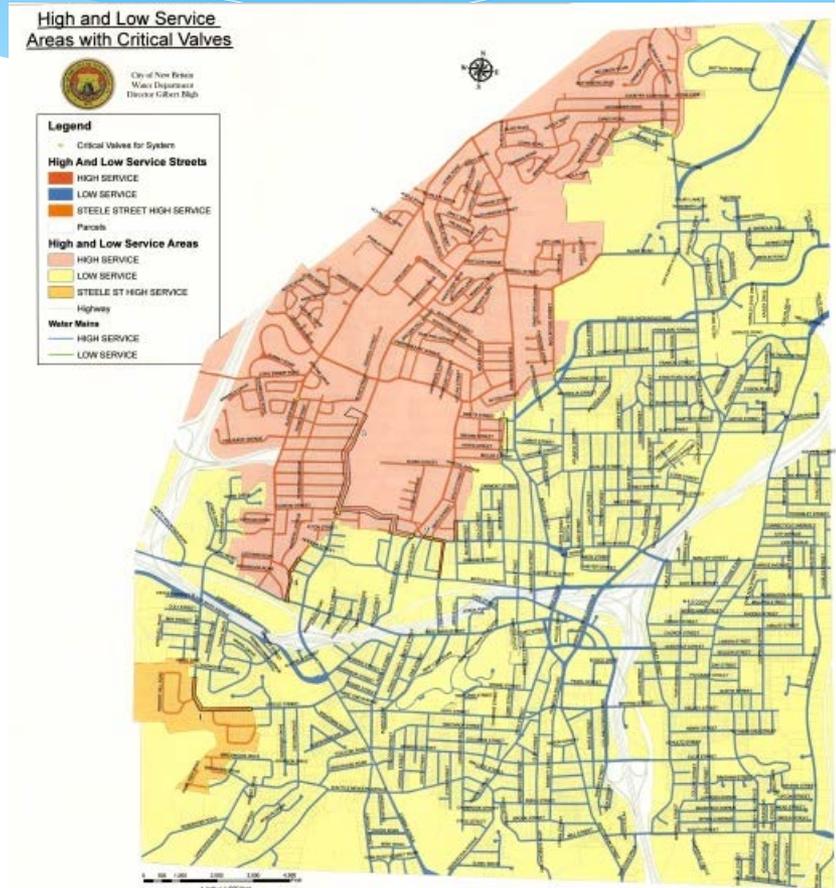
- \* Low Service Area Gravity Fed from 2 storage tanks
- \* High Service fed by Elam Street Elevated Storage Tank and 3 Pump stations
- \* Steele St High Service fed by 1 Pump Station

### High/Low Pressure Valves define Service Areas

- \* Open
- \* Closed
- \* Throttled
- \* Back feeding during shutdowns

### Water Mains

- \* Distribution
- \* Transmission



# New Britain Water Summit Water Storage tanks

## Plant Storage Tank / Clear well

- \* Capacity 4.25 Million Gallons
- \* Provides Contact Time for Proper Disinfection
- \* Design is tank within tank to allow for maintenance



# New Britain Water Summit Water Storage tanks

## Elam Street Low Service Tank – Online In 2015

- \* Capacity 2 Million Gallon
- \* Provides Fire Protection
- \* Monitors pH and Chlorine levels in system



# New Britain Water Summit Water Storage tanks

## Elam Street Elevated Tank

- \* Capacity 1 million gallons
- \* Provides pressure and water for areas of city at high elevations
- \* Used as an antenna to improve radio communications throughout the city



# New Britain Water Summit Pump Stations

## Corbin Avenue Pump Station

- \* Pumping capacity 4 million Gallons per day
- \* Recent upgrade in 2015
- \* Include new generator
- \* Variable frequency drive
- \* Automated Scada operation
- \* All pumps replaced



# New Britain Water Summit Pump Stations

## Broad Street Pump Station

- \* 2 constant speed in line pumps in under ground
- \* Provides water to high service tank and high service distribution system
- \* Redundant system provides for back up operation for Corbin Avenue



# New Britain Water Summit Pump Stations

## Elam Street Pump Station

- \* 2 constant speed in pumps
- \* Capacity 500 gallons per minute
- \* Used to provides water to high service tank from low service tanks and high service distribution system Redundant system provides for back up operation



# New Britain Water Summit Pump Stations

## Steel Street Pump Station

- \* Provides water and pressure to separate small high service area
- \* 2 pumps constant operation providing pressure to service area.



# 2019 NEW BRITAIN WATER SUMMIT

## WATER DISTRIBUTION SYSTEM

### Regular Work Activities

- \* Water (Pipe) Crew
  - \* Water Main Installation
  - \* Fire Hydrant Replacement
  - \* Water Service Cuts/Repairs
  - \* Pressure Tests
  - \* Disinfection of Water Mains
  - \* Contractor Assistance
  - \* Neighboring Water Company Assistance
  - \* Emergency Response
  - \* Annual Maintenance Programs



# 2019 NEW BRITAIN WATER SUMMIT

## WATER DISTRIBUTION SYSTEM

### Water Distribution System

### Annual Maintenance Programs

- \* Hydrant Maintenance
  - \* Flushing
  - \* Greasing
  - \* Painting
  - \* Pumping
- \* Valve Maintenance
  - \* Exercising
  - \* Cleaning
  - \* Locating



# 2019 NEW BRITAIN WATER SUMMIT

## WATER DISTRIBUTION SYSTEM

### **Chestnut Street Water Main Break** (Dec. 19<sup>th</sup>, 2018)

- \* Filter plant lost approx. 1.0 Mil. of treated water within 45 min. period
- \* New Britain Police Department left without water
- \* Dialysis Center left without water & basement flooded
- \* 8" distribution main break
  - \* Off of 16" transmission main
- \* 2-day repair with all in-house staff including road reconstruction
- \* Cost of repair ~ \$25,000
- \* Age of pipe 1975



# 2019 NEW BRITAIN WATER SUMMIT

## WATER DISTRIBUTION SYSTEM

### **Chestnut Street Water Main Break**

(Dec. 19<sup>th</sup>, 2018)

- \* 2-day repair with
- \* all in-house staff including road reconstruction
- \* Cost of repair ~ \$25,000



# 2019 NEW BRITAIN WATER SUMMIT

## AGING WATER UTILITY SYSTEM - PROJECTS

- \* December 6<sup>th</sup>, 2017 – Southington CT
  - \* 30” raw water transmission main break
  - \* Equipment rentals
  - \* Material loans (MDC)
  - \* All in-house staff used
  - \* 3 day repair
  - \* Cost of repair ~ \$20,000
  - \* 20 foot segment replaced
  - \* Age of pipe 1892



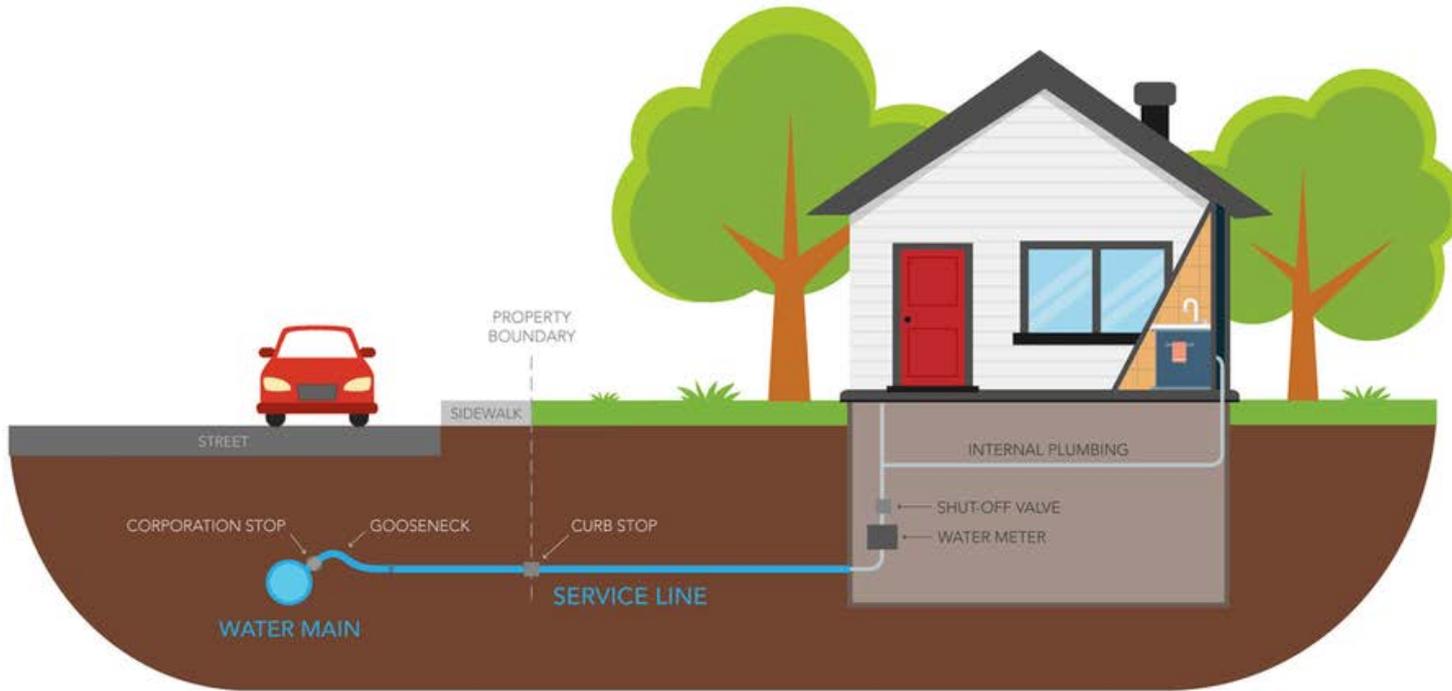
# 2019 NEW BRITAIN WATER SUMMIT

## WATER DISTRIBUTION SYSTEM



# 2019 NEW BRITAIN WATER SUMMIT

## WATER DISTRIBUTION SYSTEM



# 2019 NEW BRITAIN WATER SUMMIT

## WATER DISTRIBUTION SYSTEM

### Meter Crew Regular Work Activities

- \* Meter Replacement (Commercial & Residential)
- \* Meter Reading Equipment Repairs
- \* High Bill Investigations
- \* Call Before You Dig (CBYD) Markouts
- \* Water Line Repairs
- \* Meter Testing
- \* Water Main Taps
- \* Meter Reads for Billing
- \* Customer Service Interactive
- \* Service Leak Investigations



# 2019 NEW BRITAIN WATER SUMMIT

## CURRENT PROJECT AND INITIATIVES

### Water Distribution System Leak Detection Audit & Repairs

- \* Implemented in 2018
- \* Approx. 1.5 Mil. difference of water leaving treatment plant & water being billed
- \* Identified 1.4 MGD of leaks in the distribution system
- \* Examined entire distribution system for leaks
- \* Types of leaks found:
  - \* Service Leaks
  - \* Water Main Breaks
  - \* Valve Leaks
  - \* Hydrant Leaks
- \* Over 110 leaks found across the entire system
- \* Repaired so far approximately 500,000 gallons per day
- \* Currently in the process of addressing leaks in private service laterals



# 2019 NEW BRITAIN WATER SUMMIT

## FUTURE OF WATER POTABLE WATER SUPPLY

### FUTURE PROJECTS

- \* Back up potable drinking water wells
- \* Plant automation
- \* Pump station up grades
- \* West Canal up grade
- \* White Bridge Surface Supply up grade
- \* Distribution System Pipe Replacement



- \* Continued Investment in the City's Water Infrastructure Needed
- \* Leak Audits will be commonplace
- \* Cross training staff across all construction disciplines
- \* Water is essential for human existence



# 2019 NEW BRITAIN WATER SUMMIT

## CURRENT PROJECT AND INITIATIVES

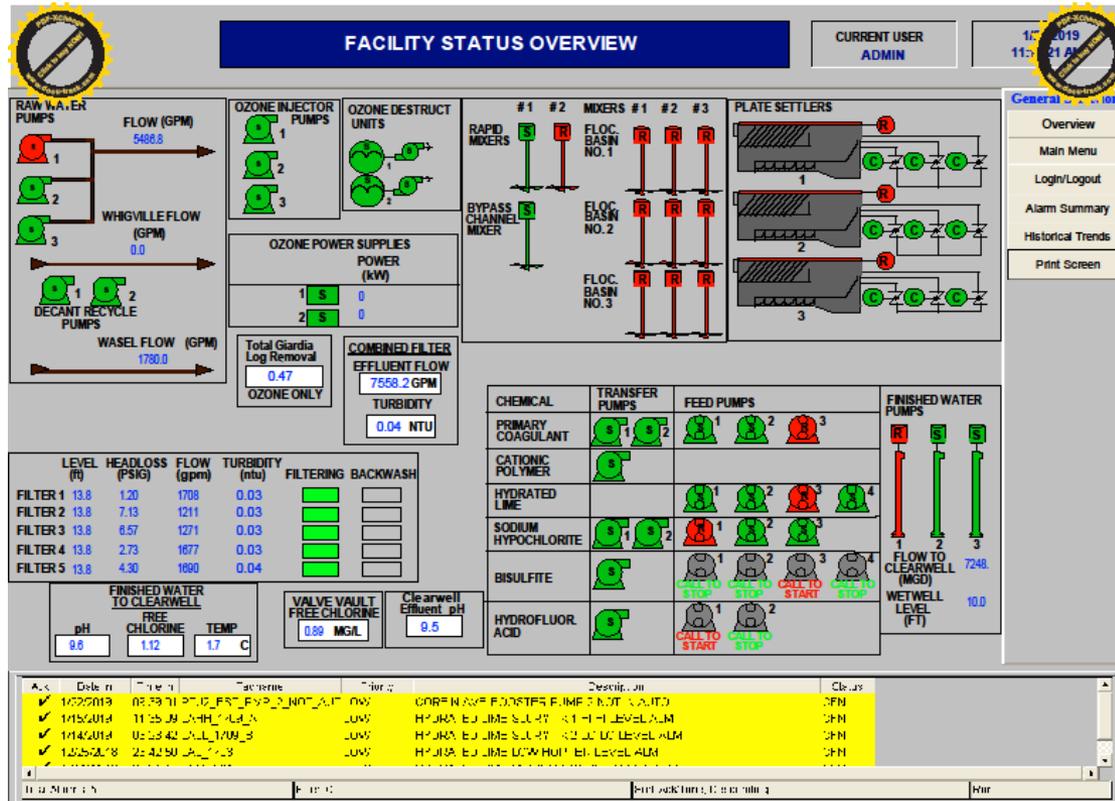


### Dam Rehabilitation and Repairs



# 2019 NEW BRITAIN WATER SUMMIT

## OPERATION UPGRADES

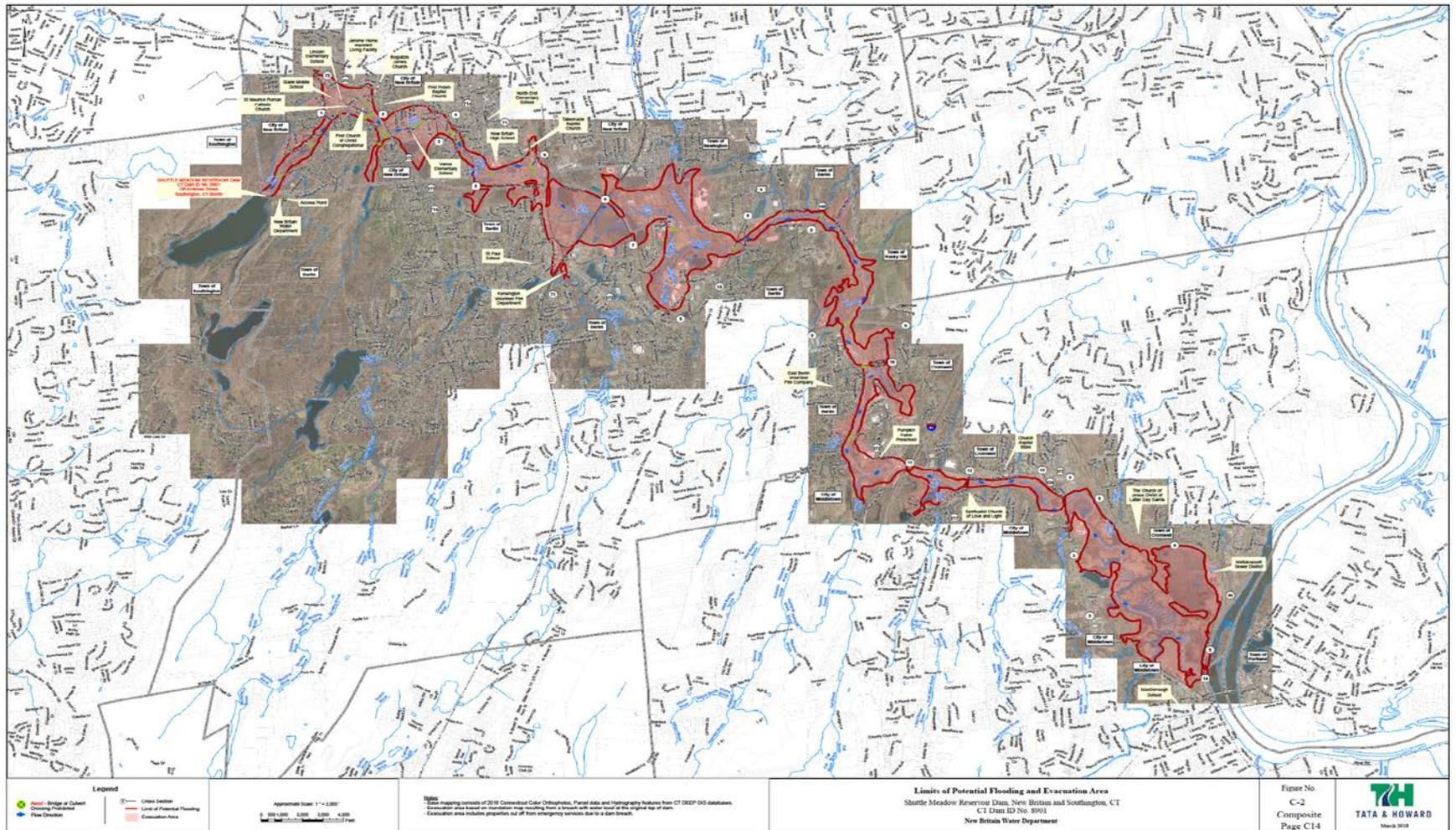


## Supervisory Control and Data Acquisition (SCADA)

- \* Future plans include full automation of plant for remote monitoring and operation, upgrade of plant security

# 2019 NEW BRITAIN WATER SUMMIT

## DAM INUNDATION STUDIES



# 2019 NEW BRITAIN WATER SUMMIT BRISTOL WELLFIELD FUTURE WATER POTABLE WATER SUPPLY



# 2019 NEW BRITAIN WATER SUMMIT

## WATER MAIN EXTENSION

- \* Eliminate dead end in the Water Main Distribution System
- \* Looping system enhances water quality
  - \* Project planned near Batterson Park & may use in-house staff



# 2019 NEW BRITAIN WATER SUMMIT

## WATER RATE COMPARISON

Typical 2018 Bi-annual (6-month) Residential Water Bill  
(5/8" Meter & 2,000 cubic ft. of water usage)

Provider	consump chg per 100 cuft	2000 cuft chg	total
Valley Water	\$ 2.68	\$ 53.60	\$ 129.20
MDC member towns	\$ 3.50	\$ 70.00	\$ 159.88
MDC -Farmington	\$ 3.14	\$ 62.80	\$ 153.58
MDC - Glastonbury	\$ 3.14	\$ 62.80	\$ 161.14
MDC - South Windsor	\$ 3.14	\$ 62.80	\$ 154.36
MDC - non-member towns	\$ 3.14	\$ 62.80	\$ 152.68
Cromwell	\$ 6.58	\$ 131.60	\$ 210.80
Middletown	\$ 3.12	\$ 62.44	\$ 82.97
Southington	\$3.19/\$2.98	\$ 61.70	\$ 107.34
Bristol	\$ 2.50	\$ 50.00	\$ 102.00
Manchester	\$ 3.28	\$ 65.60	\$ 80.48
CT WATER Unionville Div includes Farmington	\$ 3.62	\$ 72.36	\$ 143.38
Meriden	\$ 4.50	\$ 90.00	\$ 113.14
<b>New Britain</b>	<b>\$2.921</b>	<b>\$58.42</b>	<b>\$ 82.42</b>

# 2019 NEW BRITAIN WATER SUMMIT

## OVERVIEW

### AGENDA

### Session 2 – Sanitary and Storm Sewer Systems

(10:15 a.m. to 11:00 a.m.)

- \* **Overview** – Mayor Erin Stewart
- \* **Sanitary Sewer Collection System** – Mark Moriarty, Director of Public Works
  - \* Sanitary Sewer Collection
  - \* Sanitary Sewer Systems Related Programs
    - \* General Maintenance
    - \* Fats, Oils, and Grease (FOG) Program
    - \* Infiltration and Inflow (I&I)
  - \* US EPA Capacity, Management, Operations, and Maintenance (CMOM) Order
- \* **Storm Water Sewer Collection System** – Brief Overview
- \* **The Mattabassett District** – Michelle Ryan, District Engineer

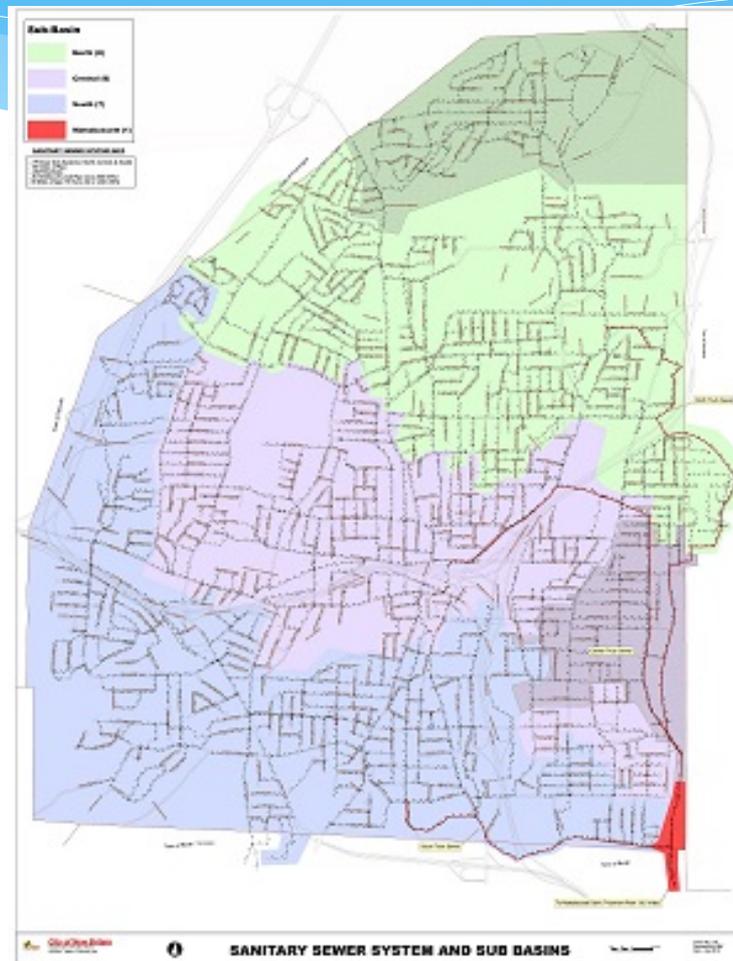


# 2019 NEW BRITAIN WATER SUMMIT

## SANITARY SEWER SYSTEM

### Sanitary Sewer Collection System

- \* Separated System (as opposed to combined which collects both storm and sanitary sewer)
- \* 179 Miles of Pipe
- \* 3,616 Sanitary Sewer Manholes
- \* 3 Sub-Systems & Trunk Lines (North, South, and Central)
- \* Gravity System (1 pump station – Nancy Road)
- \* 68 Miles (38%) of sewer piping 75 year or older
- \* Pipes types: Older: Vitrified Clay, Orangeburg (bitumenized fiber), Newer: PVC
- \* Sanitary Sewer Laterals privates owned and maintained
- \* System includes a section of Newington (MDC), Kensington (KFD), and a few customers in Berlin and Farmington
- \* 9.5 Mile Trunk-line delivers Sewage from New Britain to Mattabassett District's treatment Plant in Cromwell



# 2019 NEW BRITAIN WATER SUMMIT

## SANITARY SEWER SYSTEM

### Tree Root Damage

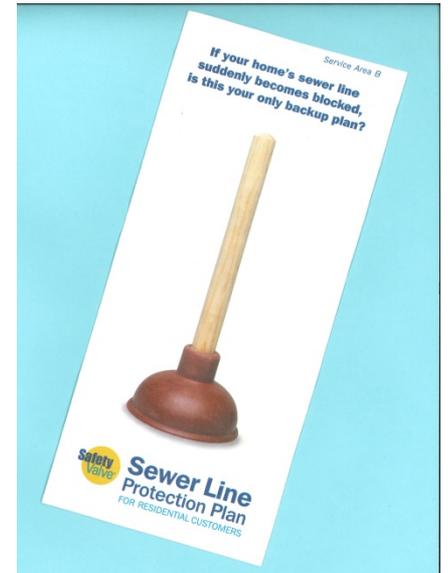
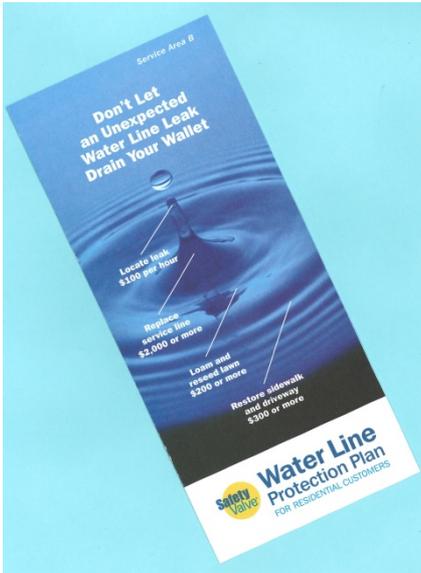


Typical Examples Sanitary Sewer System Tree Root Damage

# 2019 NEW BRITAIN WATER SUMMIT

## SANITARY SEWER SYSTEM

**PURCHASE  
SAFETY VALVE  
WATER & SEWER  
LATERAL  
INSURANCE  
REMINDER!!!!**



(Brochures available here today or go to the City's Website)



## SANITARY SEWER SYSTEM

### Fats, Oils, and Grease Program (FOG)

- \* Fats, Oils and Grease (FOG) is a leading cause of sewer backups into basements. FOG occurs when cooking fats are poured down the drain and coat the inside of the pipes, eventually forming a blockage.

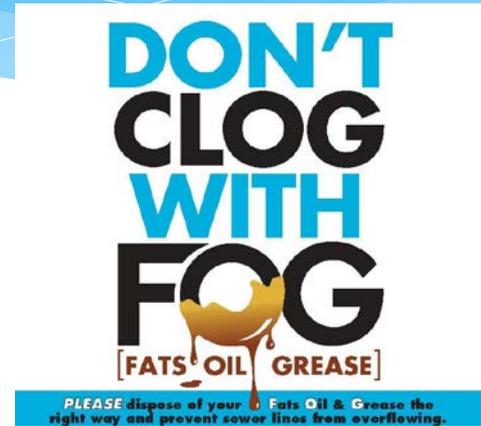


# 2019 NEW BRITAIN WATER SUMMIT

## SANITARY SEWER SYSTEM

### Fats, Oils, and Grease Program (FOG)

- \* Joint effort between Public Works & Health Departments
- \* Combined inspection to ensure proper FOG prevention devices installed (grease traps)
- \* Approx. 250 Food Establishments (mostly restaurants)
- \* CT DEEP / EPA Req'd Program



# 2019 NEW BRITAIN WATER SUMMIT

## SANITARY SEWER SYSTEM

### Sanitary Sewer - Regular Maintenance & Activities

- \* Jet Rodding – Trouble Spots
- \* Fats, Oils, and Grease Program (F.O.G.)
- \* Tree Root Control
- \* Structure Repairs and Adjustments
- \* Illicit Discharge Detection and Elimination (MS4 Program)
- \* Inflow and Infiltration (I&I)



# 2019 NEW BRITAIN WATER SUMMIT

## SANITARY SEWER SYSTEM

### Sewer Maintenance - Jet Rodding & Related

- \* Monthly, Quarterly, and Tri-Annual Jetting Location
- \* Primary issues FOG, flat mains, sags in the mains, non-flushable products
- \* Tree root issues – added attachment to jet rodder that cuts tree roots, roots treated with chemical to inhibit re-growth



# 2019 NEW BRITAIN WATER SUMMIT

## SANITARY SEWER SYSTEM

### Illicit Discharge Detection and Elimination

- \* On-going program
- \* Program detects and eliminates illegal sanitary sewer lateral connections into the City's Storm Water System & other similar illicit connections
- \* Environmental concern for polluting water bodies
- \* Involves dry weather and wet weather testing of storm and sanitary lines, field investigation, smoke and dye testing, and pipe removal and relocation
- \* CT DEEP MS4 Program Requirement



# 2019 NEW BRITAIN WATER SUMMIT

## SANITARY SEWER SYSTEM

### Inflow & Infiltration (I&I)

- \* The Big Issue with older sanitary sewer collection systems
- \* Involves “**already clean water**” getting into the sanitary sewer system, and getting routed to a sewage treatment plant to get treated “cleaned”
- \* Problematic environmentally because Sewage Treatment Plants only have limited capacity to treat sewage flows & when that capacity is exceeded untreated, or only partially sewage, get discharged into water bodies
- \* Problematic fiscally for NB because we’re billed based on sewage flows sent to the Mattabassett District’s Sewer Treatment Plant in Cromwell
- \* About ½ of the sewage NB sends to the Mattabassett District treatment Plant is from I&I = **about 6 MGD on average**
- \* The City is under a consent order from the US EPA to reduce our I&I flows



# 2019 NEW BRITAIN WATER SUMMIT

## SANITARY SEWER SYSTEM

### Inflow & Infiltration (I&I)



Sewer Cover Coming off due Excessive I&I



Sewer Main Infiltration



# 2019 NEW BRITAIN WATER SUMMIT

## SANITARY SEWER SYSTEM

### Inflow & Infiltration (I&I)

#### Infiltration

- \* Bigger issue, Estimated at 5 MGD for NB an average day
- \* Groundwater seeps into cracks and joints in the sewer lines.
- \* Water enters via holes caused by tree root penetration.
- \* Water enters via manhole covers that have holes or gaps due to a poor fit.
- \* Water is forced from the storm to sanitary lines when both are in the same trench, without proper separation.
- \* Infiltration increases during rain storms & periods of high ground water



# 2019 NEW BRITAIN WATER SUMMIT

## SANITARY SEWER SYSTEM

### Inflow & Infiltration (I&I)

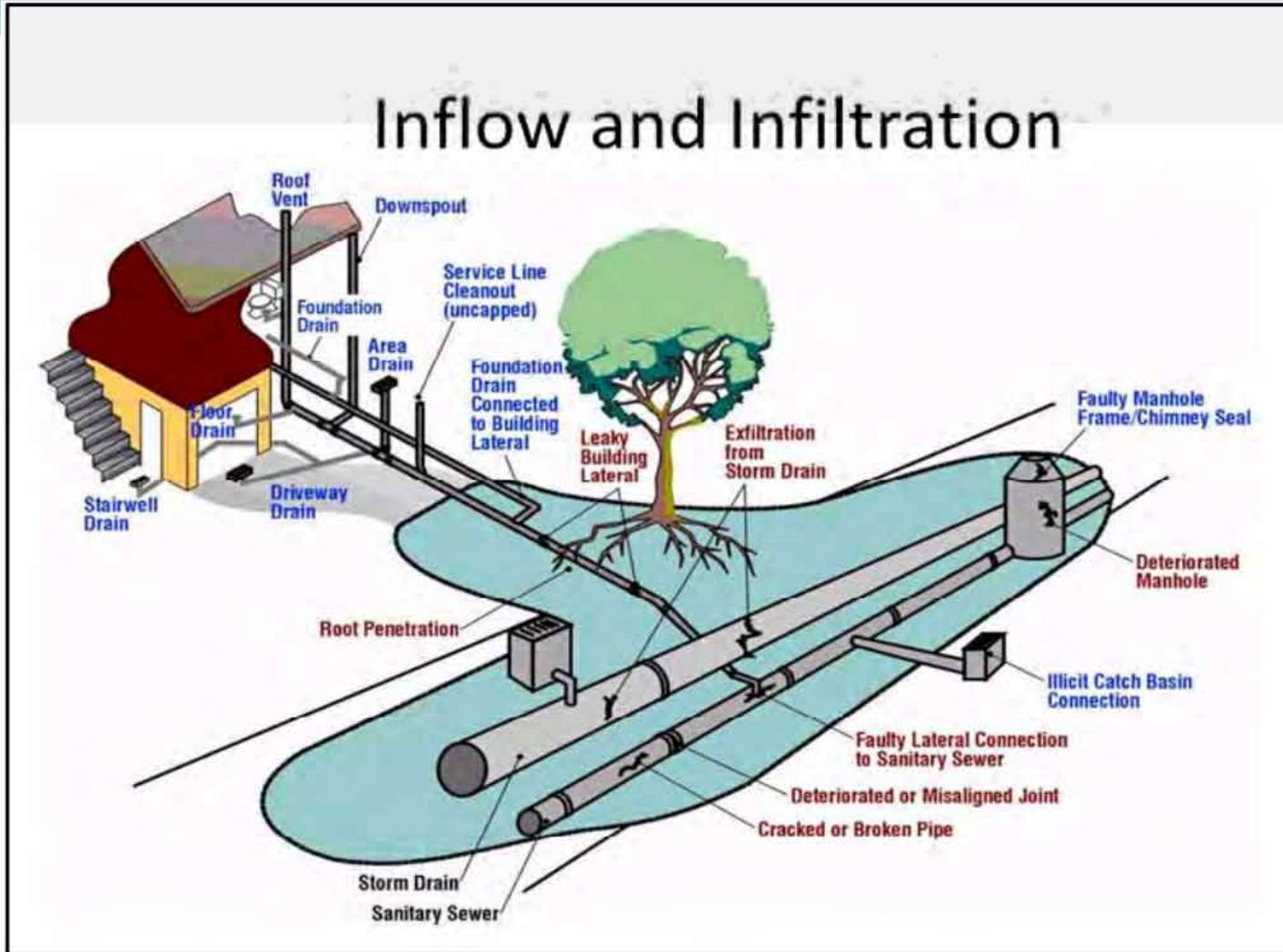
#### Inflow

- \* Lesser Issue but still significant, Estimated at 1.0 MGD for NB an average day
- \* Inflow is when a storm drain is improperly or illegally connected directly into a sewer line.
- \* Inflow sources include: sump pumps, downspouts, and drains for roofs, foundations, window wells, basement stairs, and driveways.



# 2019 NEW BRITAIN WATER SUMMIT

## SANITARY SEWER SYSTEM



# 2019 NEW BRITAIN WATER SUMMIT

## SANITARY SEWER SYSTEM

### Inflow & Infiltration (I&I)

#### PEAK FLOW - Environmental Concern

- \* 2018 NB Peak Flow – 45.8 MGD

#### Mattabassett District Treatment Plant

- \* Primary Treatment Flow (*removes solids, greases, and oils*) – 110 MGD
- \* Secondary Treatment (*biological treatment*) – 55 MGD

#### AVERAGE DAILY FLOW- Financial Concern

- \* 2018 Average Daily Flow – 12.24 MGD & 62.7% Total Matt. District Flow
- \* 2019 New Britain Mattabassett District Cost - \$6,123,989 (55% of City's Sewer Budget)



# 2019 NEW BRITAIN WATER SUMMIT

## SANITARY SEWER SYSTEM

### Inflow & Infiltration (I&I) – Flow Metering

- \* Performed to determine most problematic areas in the system
- \* Needed to help determine where you get the most bang for your buck



Sanitary Sewer Manhole Flow Meter



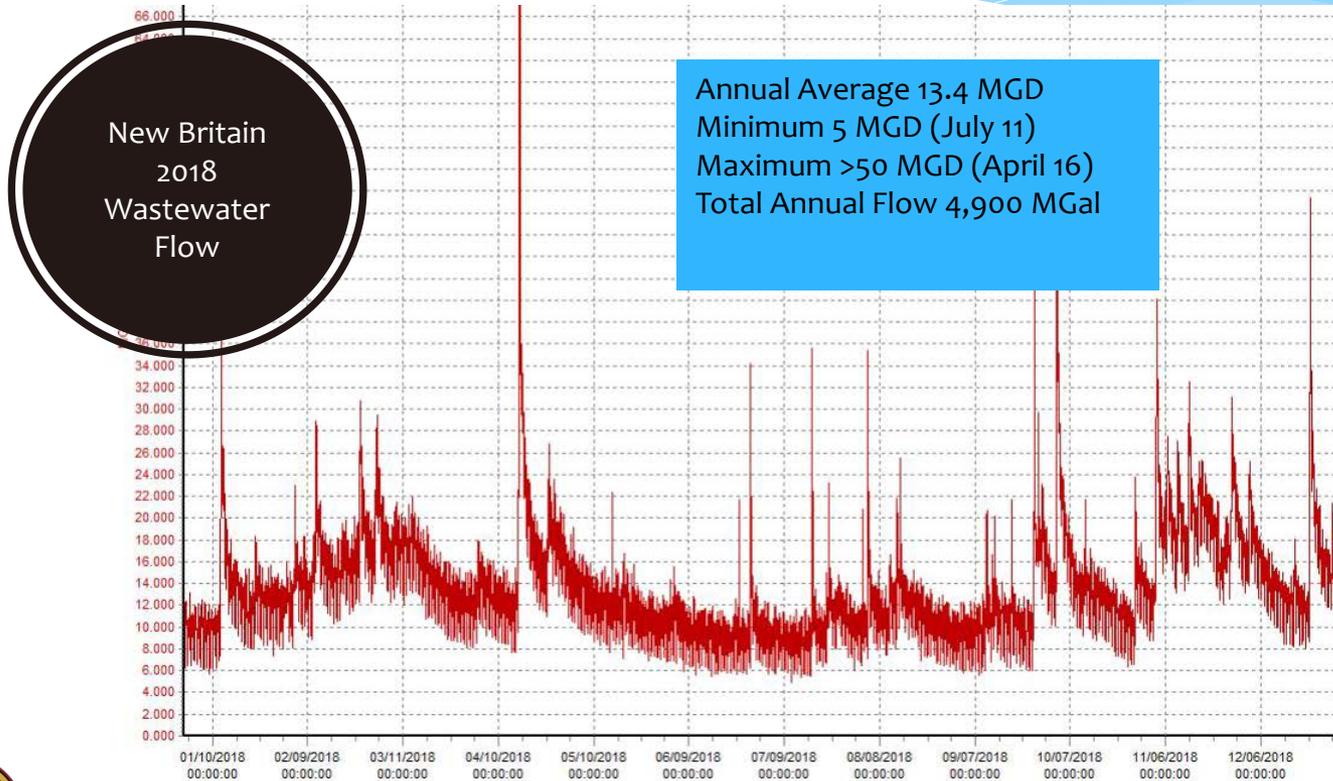
Sewer Main Flow Meter



# 2019 NEW BRITAIN WATER SUMMIT

## SANITARY SEWER SYSTEM

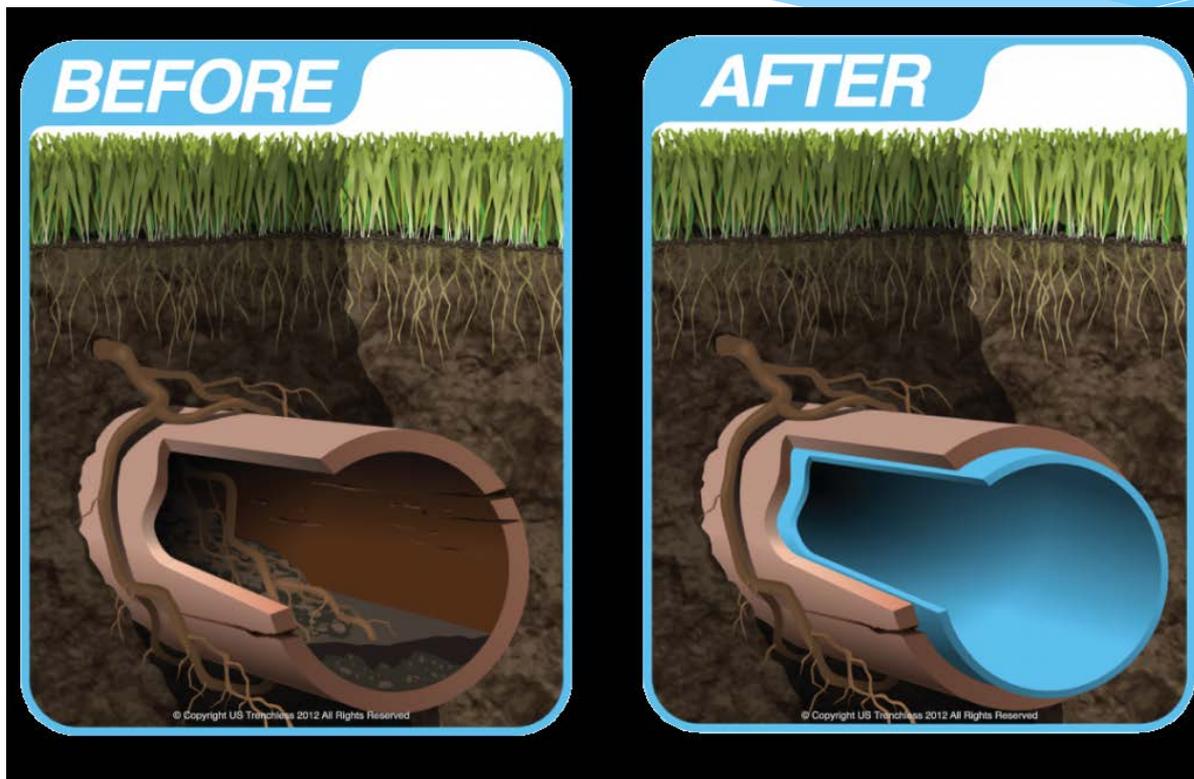
### Inflow & Infiltration (I&I) – Sewer Flows



# 2019 NEW BRITAIN WATER SUMMIT

## SANITARY SEWER SYSTEM

### Inflow & Infiltration (I&I) Elimination



### Sewer Lining Includes:

- \* Sewer Mains
- \* Sewer Manholes
- \* Sewer Laterals

Sewer Lining – Primary Method of Eliminating I&I



# 2019 NEW BRITAIN WATER SUMMIT

## SANITARY SEWER SYSTEM

### Inflow & Infiltration (I&I) - Elimination



\*\* Added benefit to lining is that also serves as a structural repair



**Sewer Lining – Cured-in Place Sewer Lining**

# 2019 NEW BRITAIN WATER SUMMIT

## SANITARY SEWER SYSTEM

### Inflow & Infiltration (I&I) - Elimination



### Comprehensive Sewer Rehabilitation Process:

1. Sewer Main Lining
2. Sewer Lateral Lining
3. Sump Pump Reduction
4. Manhole Lining



# 2019 NEW BRITAIN WATER SUMMIT

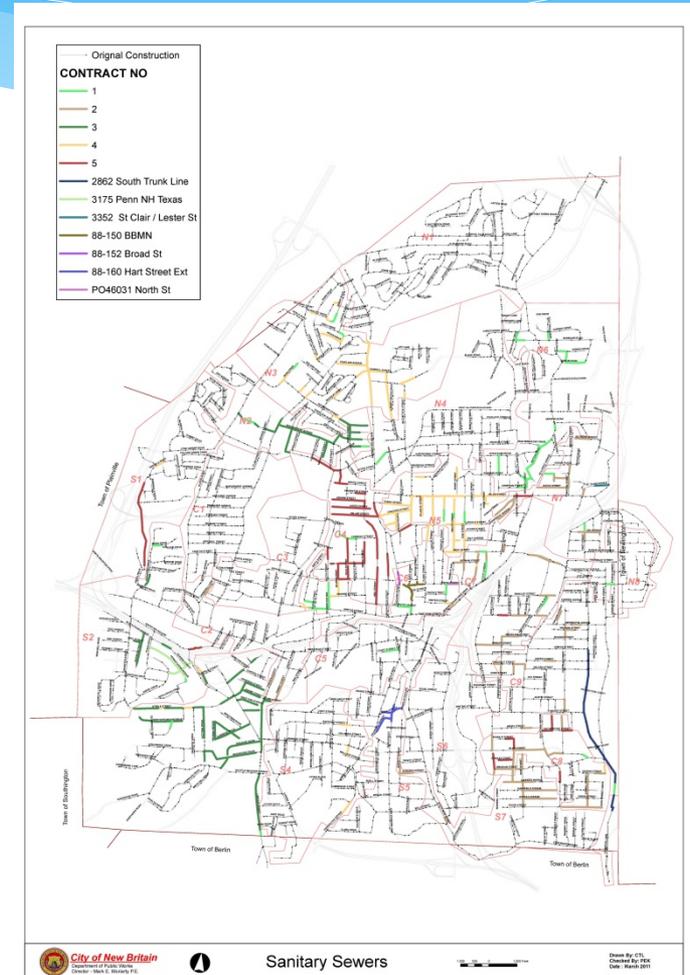
## SANITARY SEWER SYSTEM

### Sanitary Sewer Rehabilitation History

- \* 7 specific projects between 2000 & 2012
- \* 5 street projects with sewer system upgrades
- \* 28.15 miles lined (16%)
- \* Over a \$15 Mil. investment

### 2018 Sewer Rehabilitation Project

- \* 1<sup>st</sup> Comprehensive Rehab. Project (includes service laterals)
- \* Focus on Areas C9 and N1
- \* Public Bid 3940, \$2.5 Mil. Construction
- \* Green Mountain Pipeline Services Contractor



# 2019 NEW BRITAIN WATER SUMMIT

## SANITARY SEWER SYSTEM

### US EPA CMOM Order

- \* CMOM stands for “Capacity, Management, Operations and Maintenance”
- \* New Britain wasn’t targeted –
  - \* US EPA investigated the Sanitary Sewer Systems for the primary Mattabassett District Communities (New Britain, Berlin, Cromwell and Middletown)
  - \* Investigations were related to the federal funding the Mattabassett District received for the recent upgrades to the treatment plant ( approx. \$100 Mil)
  - \* CMOM Compliance Orders issued for all four communities
  - \* Biggest impact is the specific I&I reductions targets established
  - \* Will require a \$20 Mil. investment in the City’s Sanitary Sewer System over the next 10 years
  - \* City required to file annual report to the US EPA



# 2019 NEW BRITAIN WATER SUMMIT

## WATER RATE COMPARISON

### FY-19 Sewer Rates Comparison

Community	Sewer Rate per Hundred Cubic Feet (\$/hcf)
Manchester	\$5.11 / HCF
Meriden	\$4.69 / HCF
MDC Communities (Hartford, East Hartford, Newington, Wethersfield, Rocky Hill, Bloomfield, Windsor, West Hartford)	\$4.64 / HCF (mostly paid "Ad Valorem as part of their property taxes)
Berlin	\$5.72 / HCF
<b>New Britain</b>	<b>\$4.30 / HCF</b>



# 2019 NEW BRITAIN WATER SUMMIT

## SANITARY SEWER SYSTEM

### The Sanitary Sewer System – Moving Forward

- \* Our aging sanitary system will continue to require a lot maintenance & investment to sustain
- \* Taking steps to achieve compliance US EPA CMOM Order
- \* Aggressive Comprehensive Sewer Rehabilitation Process planned that involves:
  1. Sewer Main Lining
  2. Sewer Lateral Lining
  3. Sump Pump Reduction
  4. Manhole Lining
- \* Trying to achieve EPA Compliance without overly burdening the City's residents and businesses with sewer rate increases

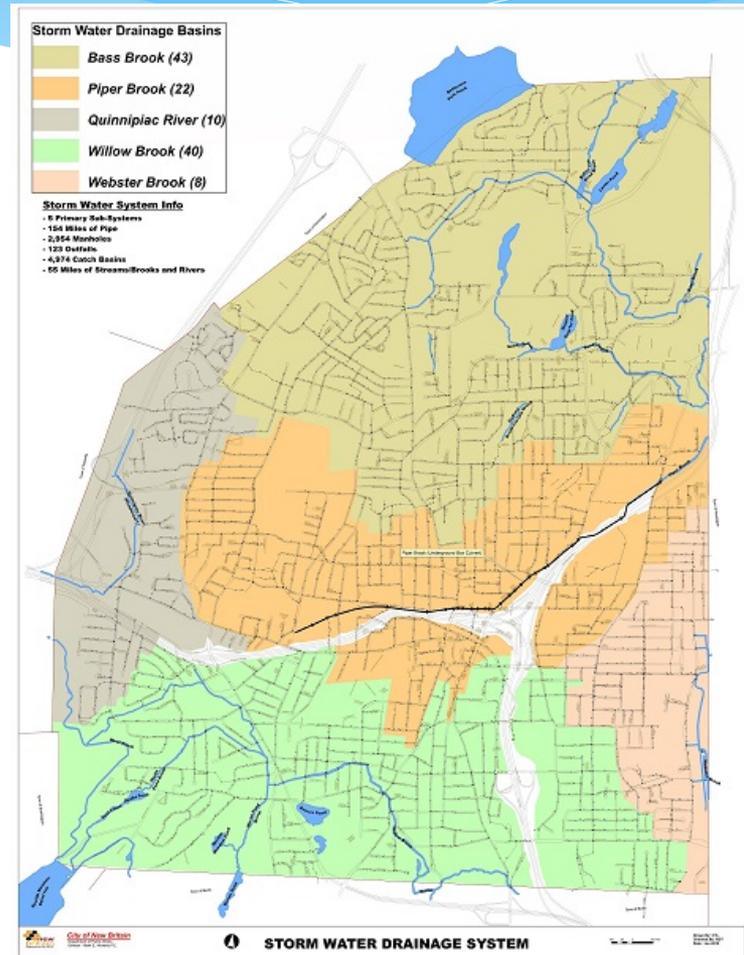


# 2019 NEW BRITAIN WATER SUMMIT

## STORM WATER COLLECTION SYSTEM

### Storm Water Drainage Collection System

- \* 5 Sub-basins:
  - Bass Brook
  - Piper Brook
  - Quinnipiac River
  - Willow Brook
  - Webster Brook
- \* 123 Systems & Outfalls
- \* 154 Miles of Pipe
- \* 2,954 Storm Sewer Manholes
- \* 4,974 Catch Basins
- \* 55 Miles of Streams & Brooks



# 2019 NEW BRITAIN WATER SUMMIT

## STORM WATER COLLECTION SYSTEM

### Storm Sewer Regular Maintenance & Activities

- \* Catch Basin Cleaning Program
  - \* Approx. 100 Priority Catch Basins in Areas prone to Flooding (clear grate)
  - \* Catch Basin interior cleaning, Performed by Snow Route, Completed approx. 350 in 2018
- \* Structure Repairs, Adjustments, and Replacement
- \* Annual Paving Program Related Structure Work
- \* Tree Root Related Cutting & Cutting
- \* Right-of-Way Maintenance
- \* CT DEEP MS4 Permit Compliance
  - Illicit Discharge Detection and Elimination
  - Dry weather and Wet weather storm runoff sampling
  - Stream & Brook maintenance (flooding related)



# 2019 NEW BRITAIN WATER SUMMIT

## STORM WATER COLLECTION SYSTEM



City Mason Installing New Catch Basin Top



PW Utility Worker Clearing Blocked Storm Drain During Flooding

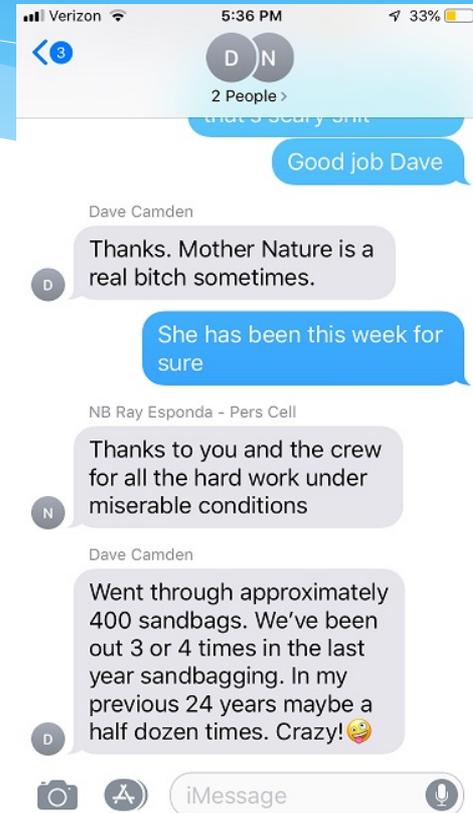


# 2019 NEW BRITAIN WATER SUMMIT

## STORM WATER COLLECTION SYSTEM

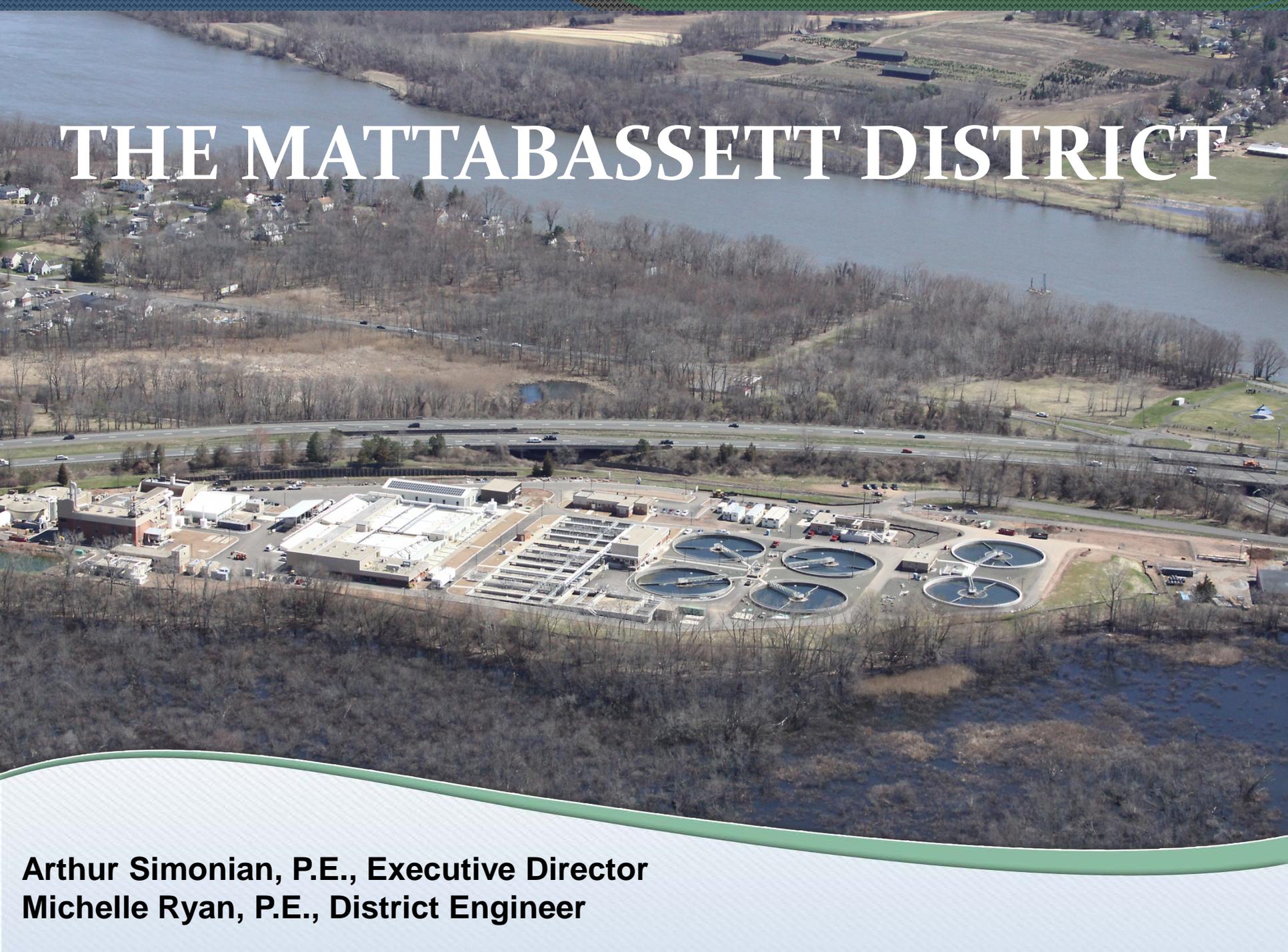


Sand Bagging on the West Canal that feeds Shuttle Meadow Reservoir (January 24, 2019)



Flooding Frequency Increasing  
Sign of the Times



An aerial photograph of a wastewater treatment plant. The plant features several large, circular aeration tanks with mechanical mixers, arranged in a grid-like pattern. To the left of these tanks are several large, rectangular buildings, likely housing control rooms and administrative offices. The facility is situated near a large body of water, possibly a river or lake, which is visible in the upper and lower portions of the image. A multi-lane highway runs horizontally across the middle of the image, just above the plant. The surrounding area includes residential neighborhoods with houses and trees, some bare, suggesting a cooler season. The overall scene is a mix of industrial infrastructure and natural landscape.

# THE MATTABASSETT DISTRICT

**Arthur Simonian, P.E., Executive Director**  
**Michelle Ryan, P.E., District Engineer**

# WASTEWATER TREATMENT

**1968 PRIMARY TREATMENT &  
MULTI HEARTH INCINERATOR**

**1989 SECONDARY TREATMENT &  
FLUIDIZED BED INCINERATOR  
(\$30 MIL)**

**2012 NITROGEN UPGRADE AND  
INCLUSION OF CITY OF  
MIDDLETOWN (\$110 MIL)**



# DISTRICT MEMBER & CONTRACTURAL TOWNS

- NEW BRITAIN,
- BERLIN,
- MIDDLETOWN,
- CROMWELL,
- portion of MDC & FARMINGTON  
(CONTRACTURAL)



# TREATMENT DESIGN

- PRIMARY TREATMENT 35 MGD AVE, 110 MGD PEAK FLOW
- SECONDARY TREATMENT 55 MGD PEAK FLOW
- WET WEATHER TREATMENT 110 MGD PEAK FLOW



THE MATTABASSETT DISTRICT

# NEW BRITAIN FLOWS

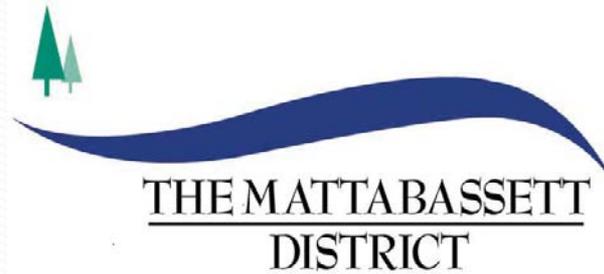
- ACCOUNTS FOR APPROX 62% OF COMMUNITY FLOWS
- RESERVE CAPACITY 46 MGD (TOTAL PEAK FLOW)  
WITH 22.5 MGD (SECONDARY TREATMENT)

Resulting in.....

- WET WEATHER SECONDARY EXCEEDANCE  
(INFILTRATION AND INFLOW)

# **DISTRICT BUDGET- NEW BRITAIN'S CONTRIBUTION**

- **MAKES UP 40% OF DISTRICT'S BUDGET**
- **MAKES UP 51 % OF ALL ASSESSMENTS  
COLLECTED FROM THE MEMBER TOWNS  
(\$ 6.1 mil assessment due July 1, 2019)**



# **Why is Wastewater Treatment Important?**

# Importance of Clean Water

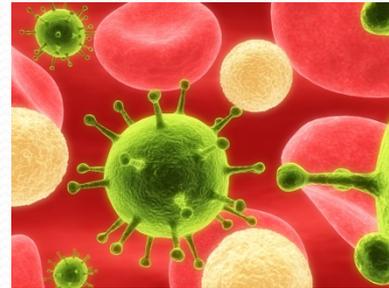
- 70% of Earth's surface is covered by water
- Less than 1% of world's total water supply is usable
- Clean Water is important for human use :
  - Public Health
  - Environment



# What is being done to get clean water

Significant advancement in 20<sup>th</sup> century in Wastewater Treatment resulting in reduction in pollution to our environment:

- Significant decline in water related death and illness
- The United States saw the virtual elimination of waterborne diseases such as typhoid, cholera, and hepatitis A.





- Wastewater Treatment provides our communities with clean waters for rivers and beaches for recreational activity and for fish and animals

**HOWEVER.....**

- In Connecticut and many other states across the country, these systems are in need of repair or in need of expansion/improvement due to community growth and increasing regulations.

# TREATMENT

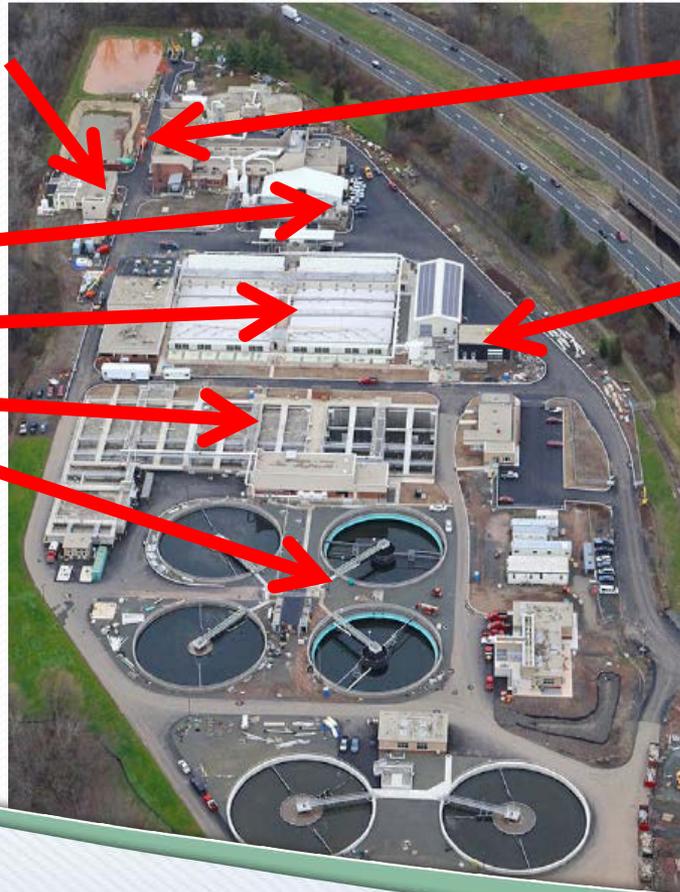
- INFLUENT SCREENING

- GRIT REMOVAL

- PRIMARY SETTLING

- ACTIVATED SLUDGE

- FINAL CLARIFICATION



- SOLIDS HANDLING & INCINERATION
- DISINFECTION

THE MATTABASSETT DISTRICT

# 2012 NITROGEN UPGRADE



THE MATTABASSETT  
DISTRICT

THE MATTABASSETT DISTRICT

# ADDITIONAL FACILITIES

- **ODOR CONTROL SYSTEMS**
- **UNDERGROUND DIESEL FUEL STORAGE TANKS**
- **EMERGENCY GENERATORS**
- **SEPTAGE AND SLUDGE HANDLING FACILITY**

# FLUDIZED BED INCINERATOR

- MEETS LATEST EPA SSI EMISSIONS REGULATIONS
- AUTOMATED DEWATERING & SLUDGE FEED EQUIPMENT
- INCINERATE SLUDGE, SEPTAGE & GREASE
- INCINERATED ASH IS LANDFILLED



# ENERGY EFFICIENCY



60 kW  
Solar  
Panels



Aeration  
Blowers

Waste Heat  
Recovery from  
Fluidized Bed  
Incinerator



# ENVIRONMENTAL COMPLIANCE



**PLANT OPERATES IN COMPLIANCE WITH EPA & CT DEEP PERMITS :**

- **WATER DISCHARGE PERMIT**
- **INCINERATOR OPERATING PERMIT**
- **AIR PERMIT**
- **STORMWATER PERMIT**
- **LANDFILL OPERATING PERMIT**
- **UNDERGROUND STORAGE TANK REGULATIONS**

**THE MATTABASSETT DISTRICT**

# PLANT MAINTENANCE & OPERATIONS

- **ADMINISTRATION STAFF - 6**  
PLANT MANAGEMENT, PLANNING, BILLING, ENVIRONMENTAL COMPLIANCE
- **OPERATIONS STAFF - 16**  
PROCESS EQUIPMENT MONITORING AND OPERATIONS
- **MAINTENANCE STAFF - 9**  
EQUIPMENT REPAIR
- **LABORATORY STAFF - 2**  
SAMPLING AND REPORTING

# WORKER SAFETY

- PLANT STAFF OPERATES IN COMPLIANCE WITH OSHA REQUIREMENTS AND
- EH&S PROGRAMS



THE MATTABASSETT DISTRICT

# CONSTRUCTION



THE MATTABASSETT DISTRICT



# THE MATTABASSETT DISTRICT

**MATTABASSETT DISTRICT**

*PROVIDING  
CLEAN WATER  
AND FOR OVER  
50 YEARS*



**THE MATTABASSETT DISTRICT**