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

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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

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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

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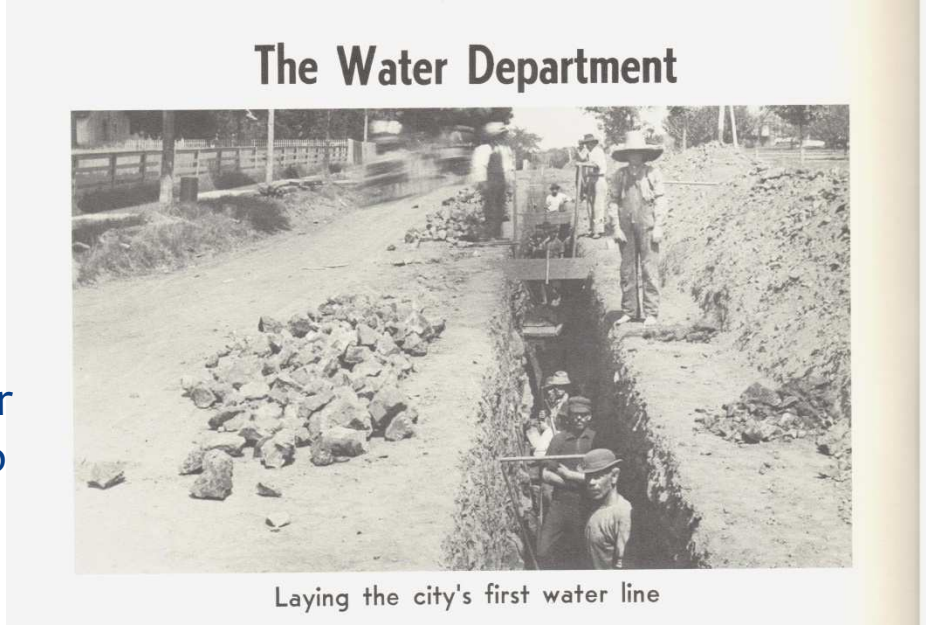
HISTORY OF THE WATER DEPARTMENT

* 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 6th, 1857**

* The original bond issued for this construction was for $50,000



Laying the city's first water line

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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

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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 14th
* 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

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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

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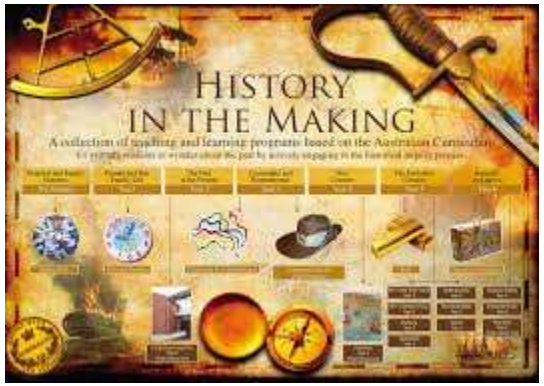
Status of Operations



History of New Britain Water continued….

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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…

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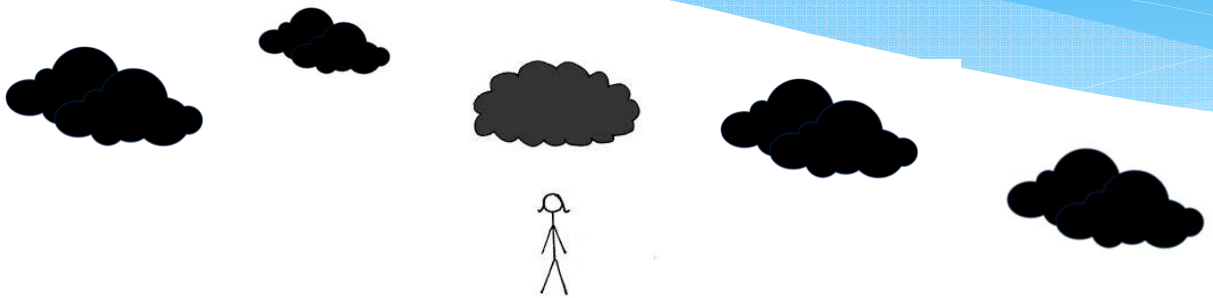
Status of Operations



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

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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

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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!

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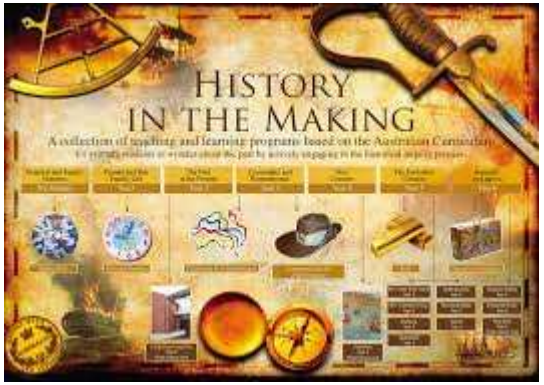
Status of Operations

History of New Britain Water continued….



2016!

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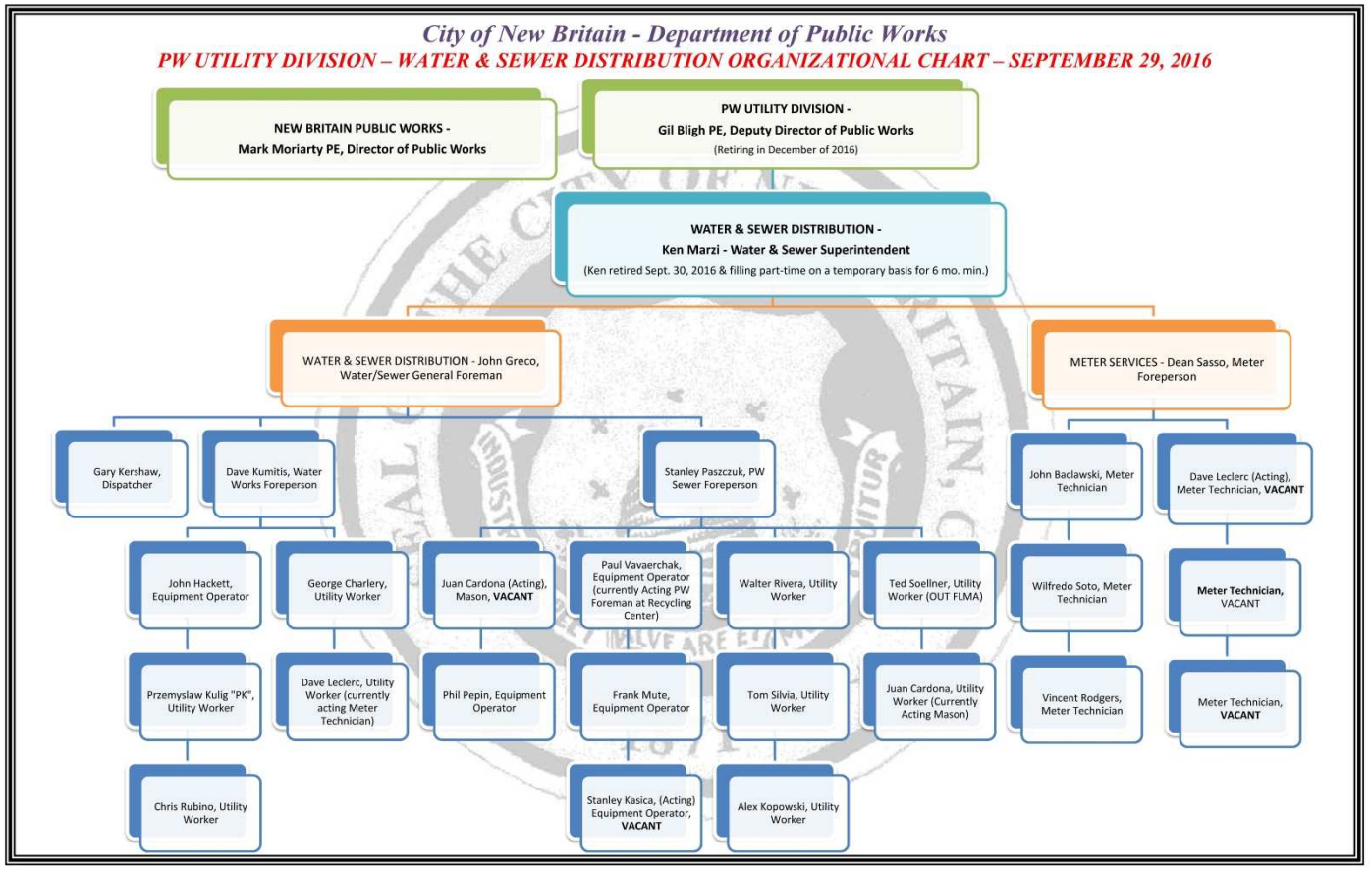
Status of Operations



PUBLIC WORKS UTILITY DIVISION – DISTRIBUTION SYSTEM ORG. CHART 2016

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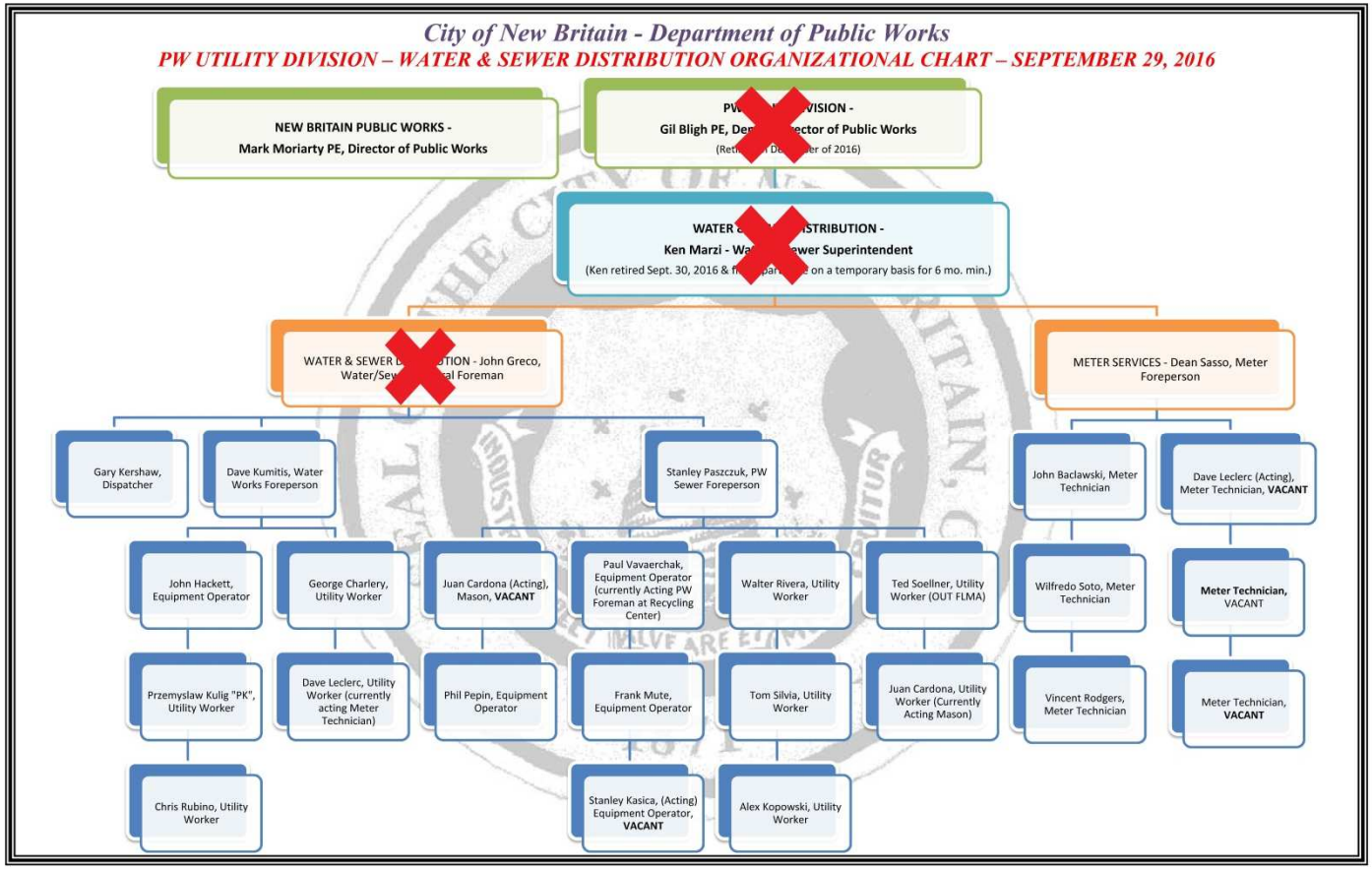
Status of Operations



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

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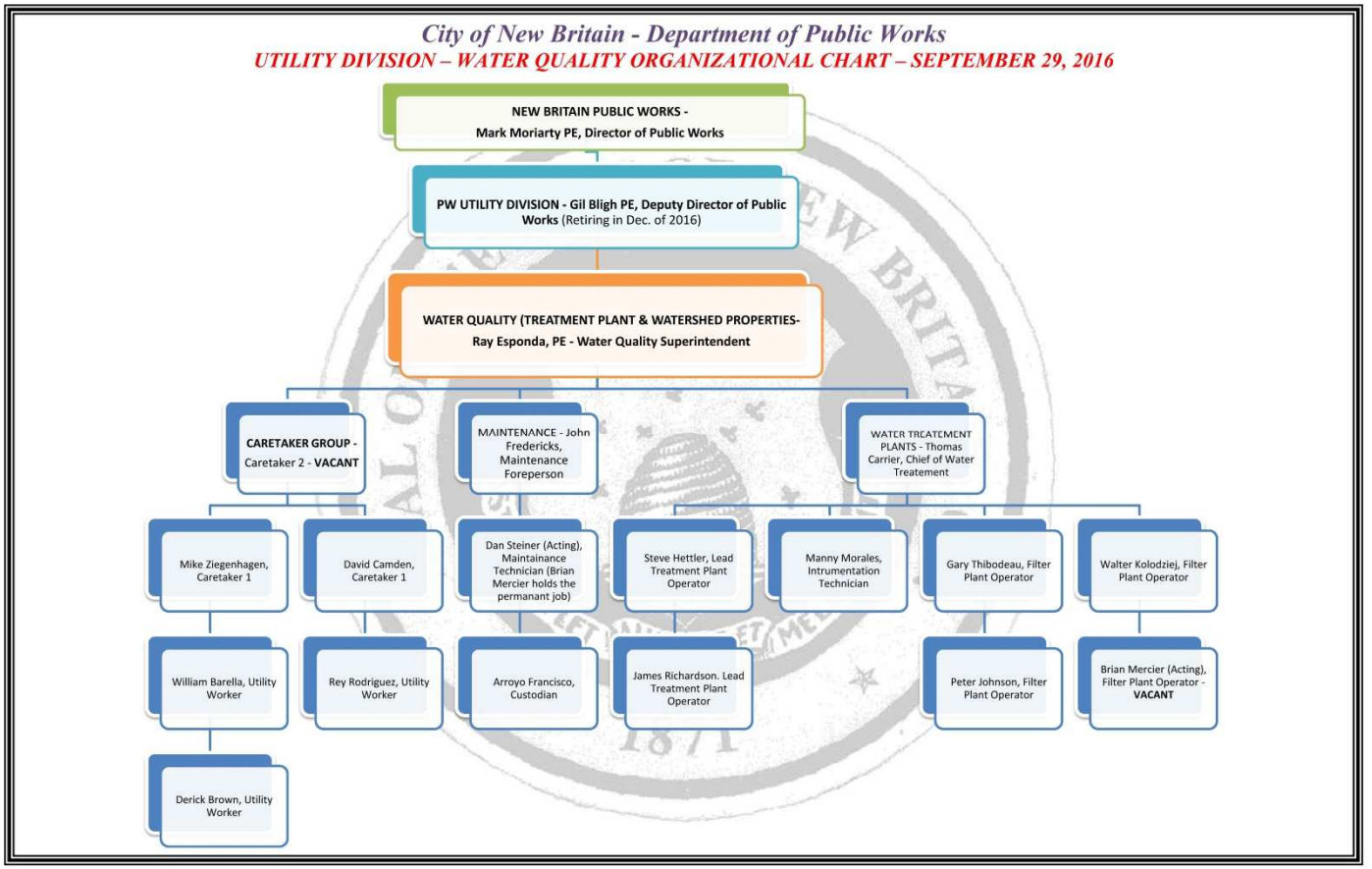
Status of Operations



PUBLIC WORKS UTILITY DIVISION – WATER QUALITY ORG. CHART 2016

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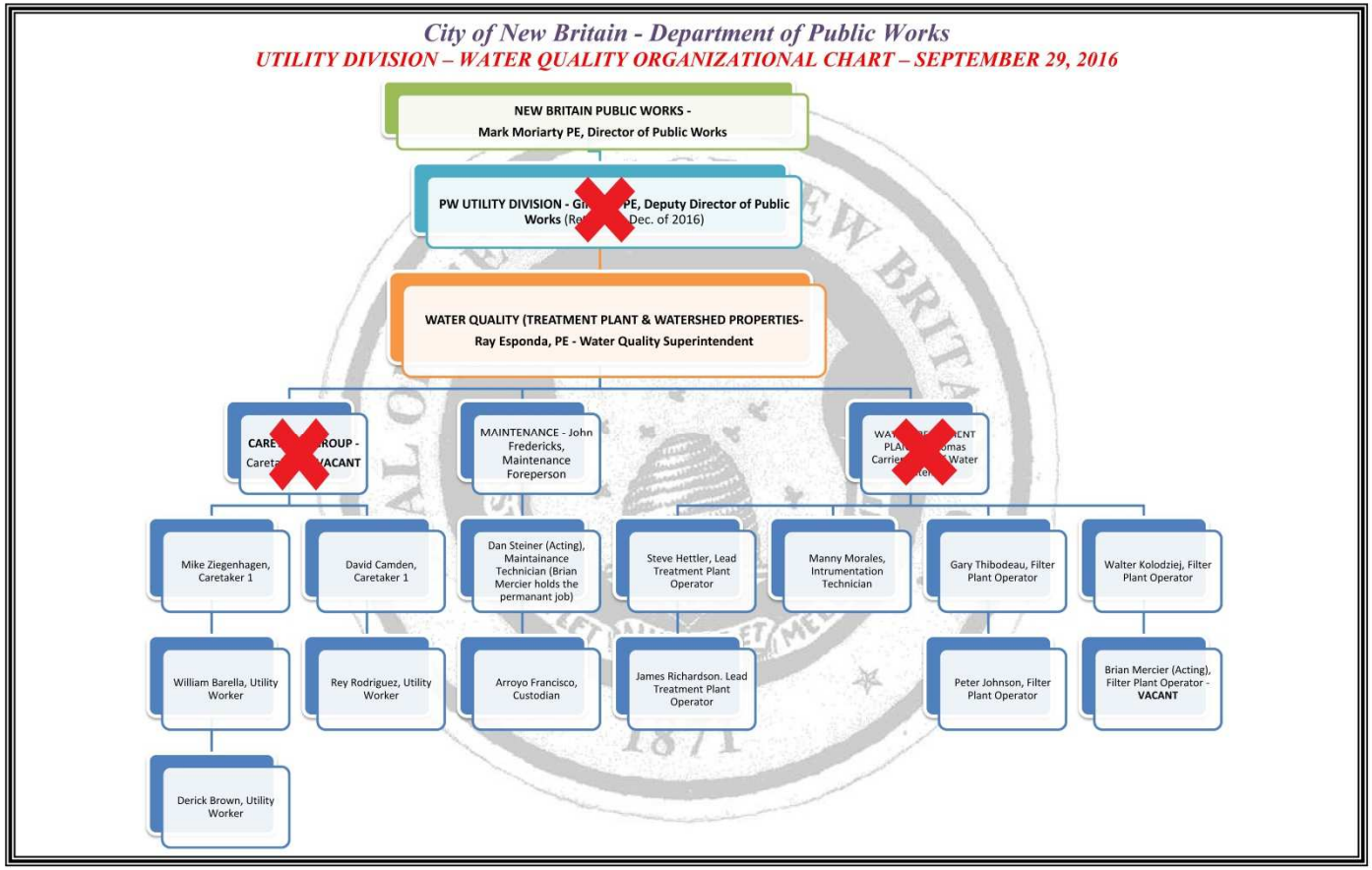
Status of Operations



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

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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

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Status of Operations

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

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Status of Operations

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

Shuttle Meadow Reservoir at 20%

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Status of Operations

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

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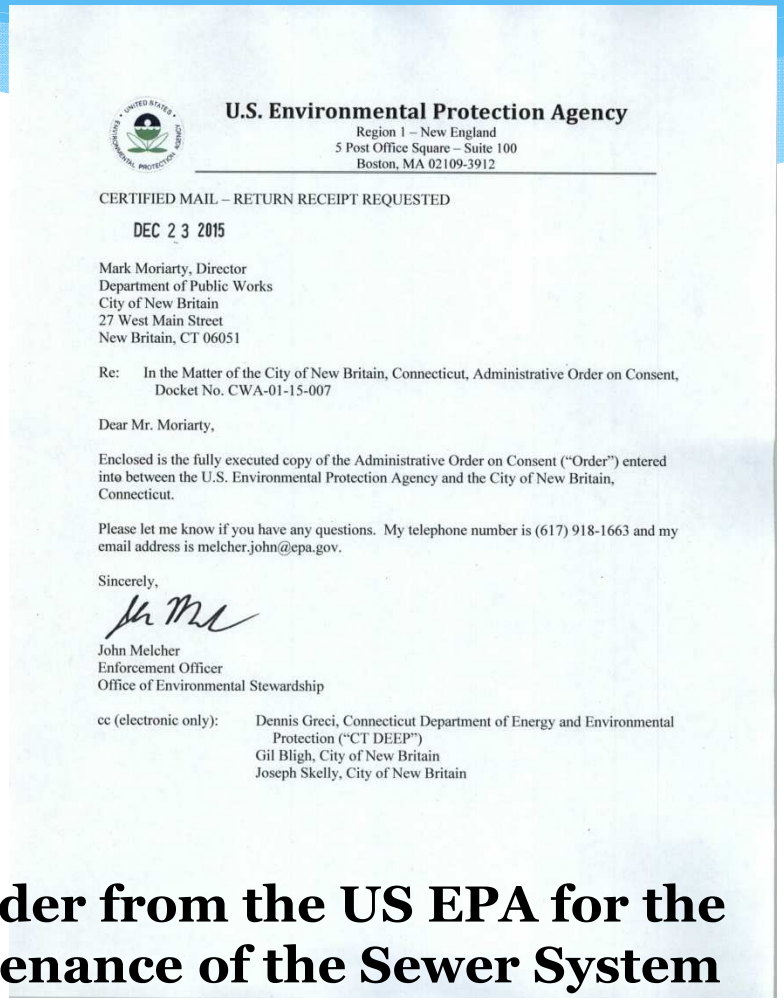
Status of Operations

EPA
United States
Environmental Protection
Agency



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.

Sincerely,

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

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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 Kumitis

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Status of Operations

& They're Battle Tested

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

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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

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Status of Operations

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

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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

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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

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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

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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

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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

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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)

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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

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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

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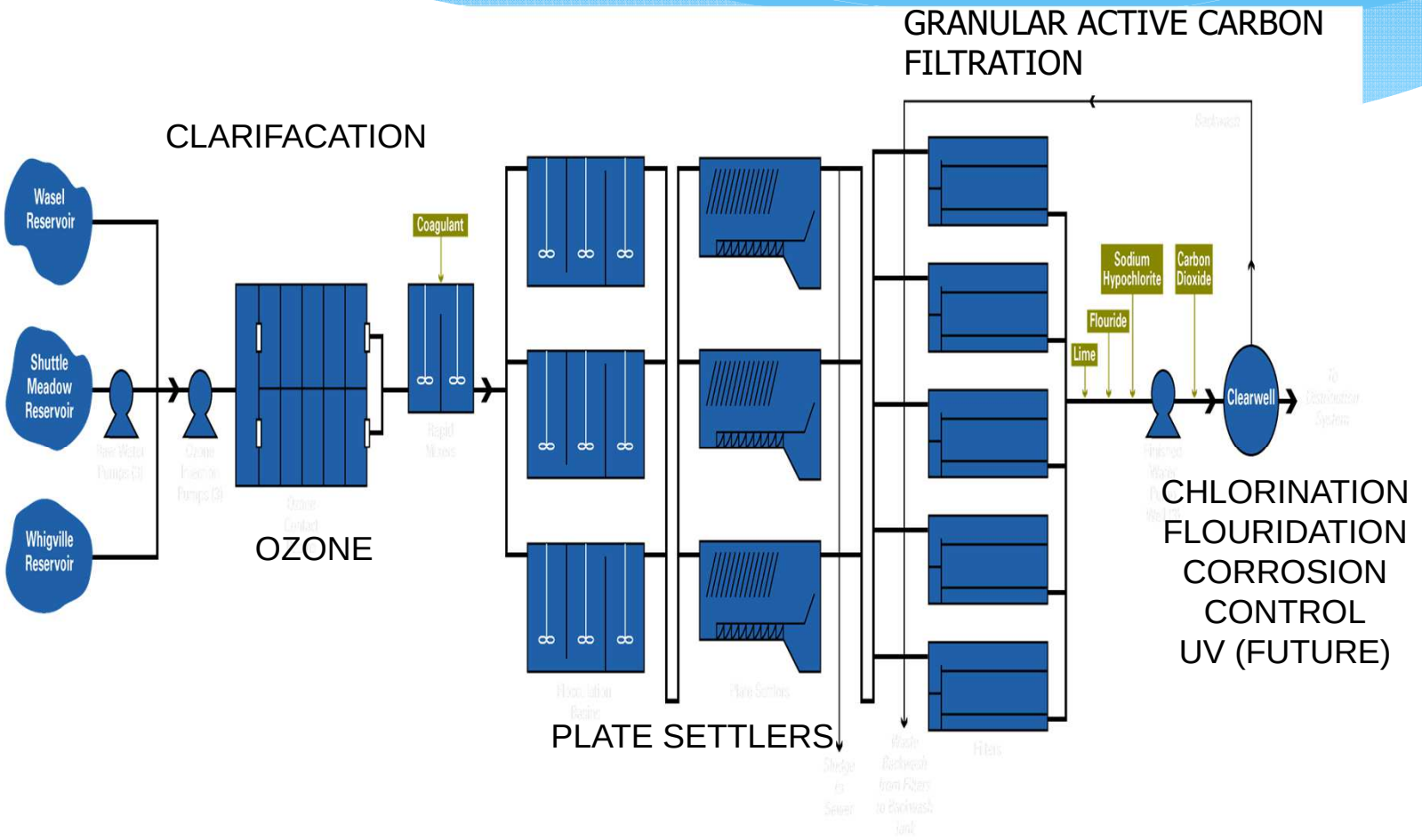
Water Quality and Treatment



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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

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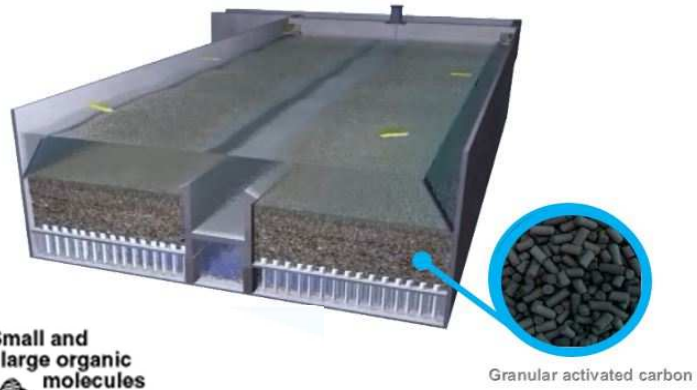
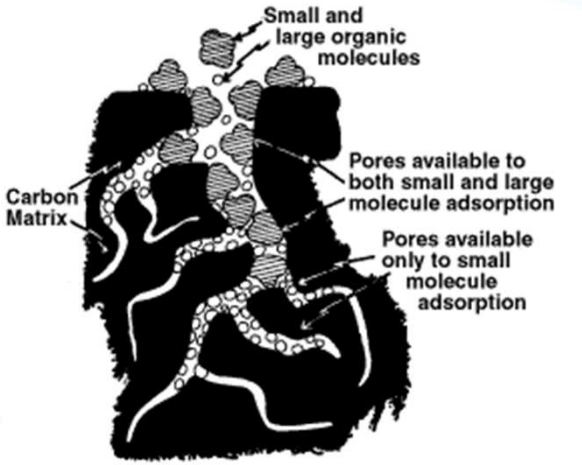
Water Quality and Treatment

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 ft2.

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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

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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

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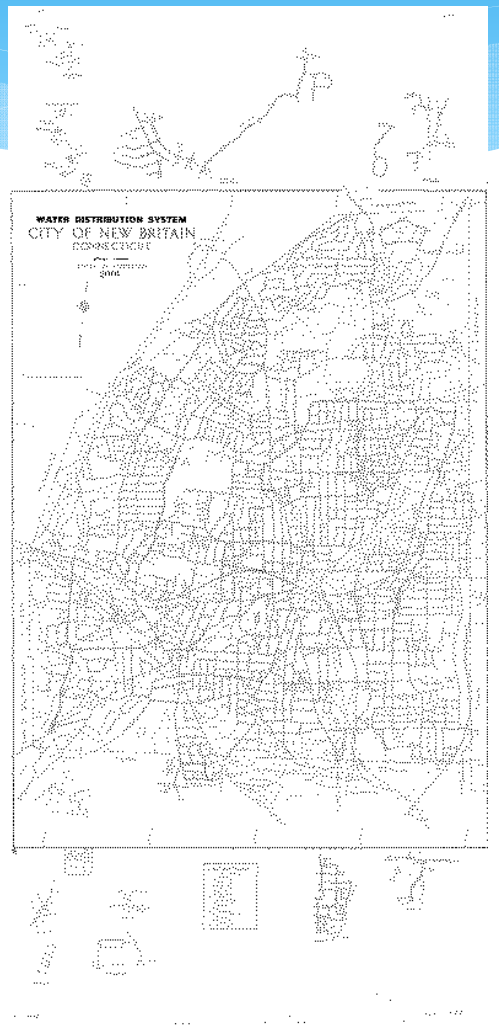
Water Distribution System

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



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Water Distribution System

City's Service Areas

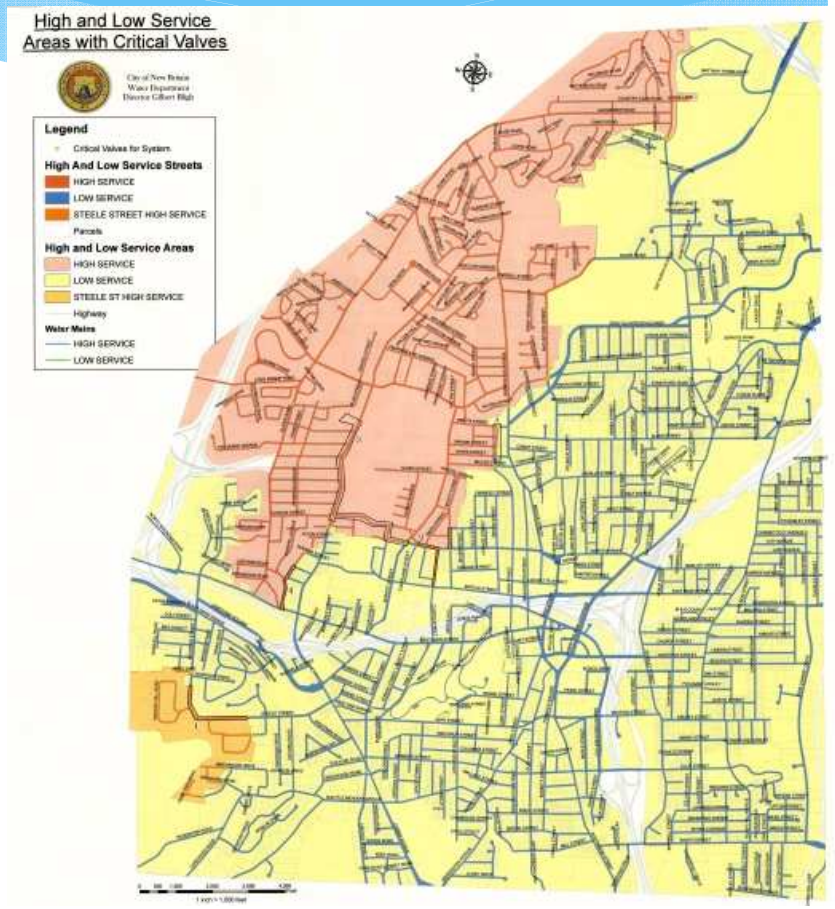
- Low Service Area Gravity Fed from 2 storage tanks
- High Service fed by Elam Street Elevated Storage Tank and 3 Pump stations
- Steele St High Service fed by 1 Pump Station

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

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Water Storage tanks

Elam Street Elevated Tank

* Capacity I million gallons
* Provides pressure and water for areas of city at high elevations
* Used as an antenna to improve radio communications through out 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.

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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

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Water Distribution System

Water Distribution System

Annual Maintenance Programs

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

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Water Distribution System

Chestnut Street Water Main Break (Dec. 19th, 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

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Water Distribution System

Chestnut Street Water Main Break
(Dec. 19th, 2018)

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

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Aging Water Utility System - Projects

* December 6th, 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

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Water Distribution System

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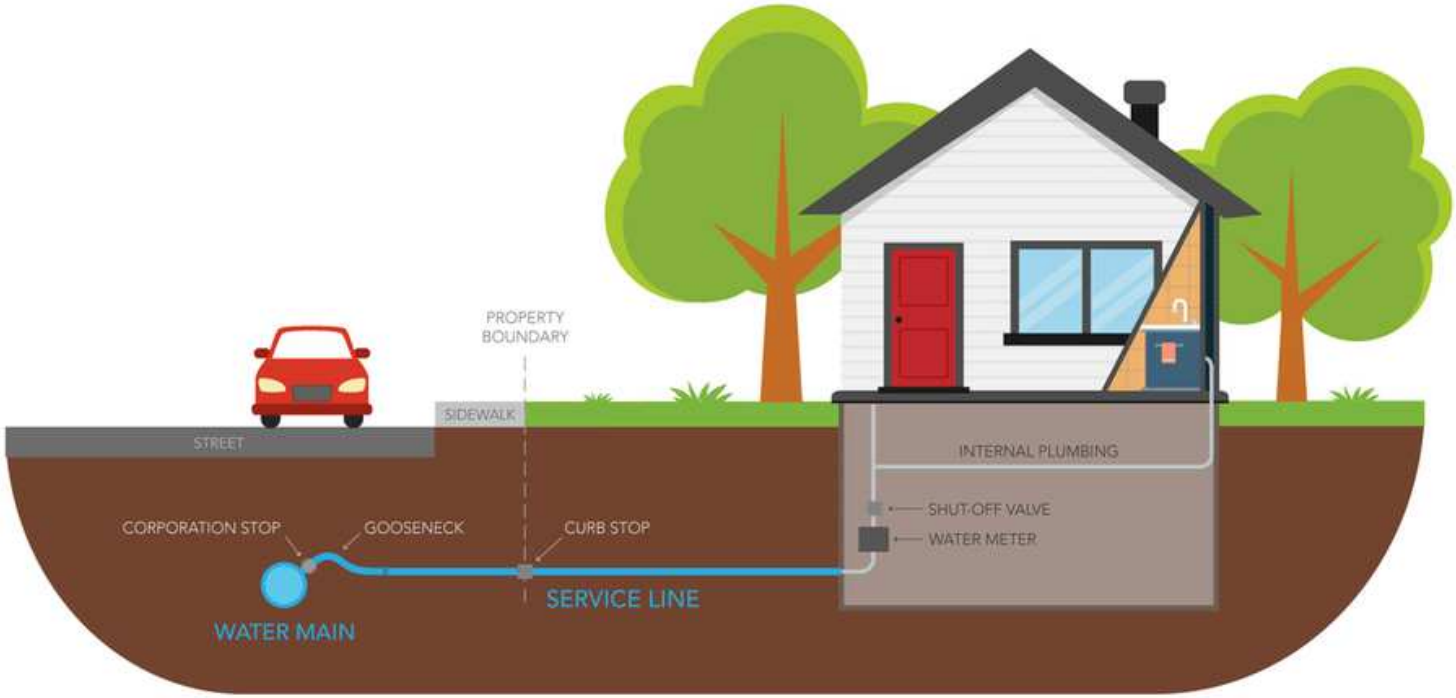
Water Distribution System



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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

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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

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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

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Current Project and Initiatives

Dam Rehabilitation and Repairs

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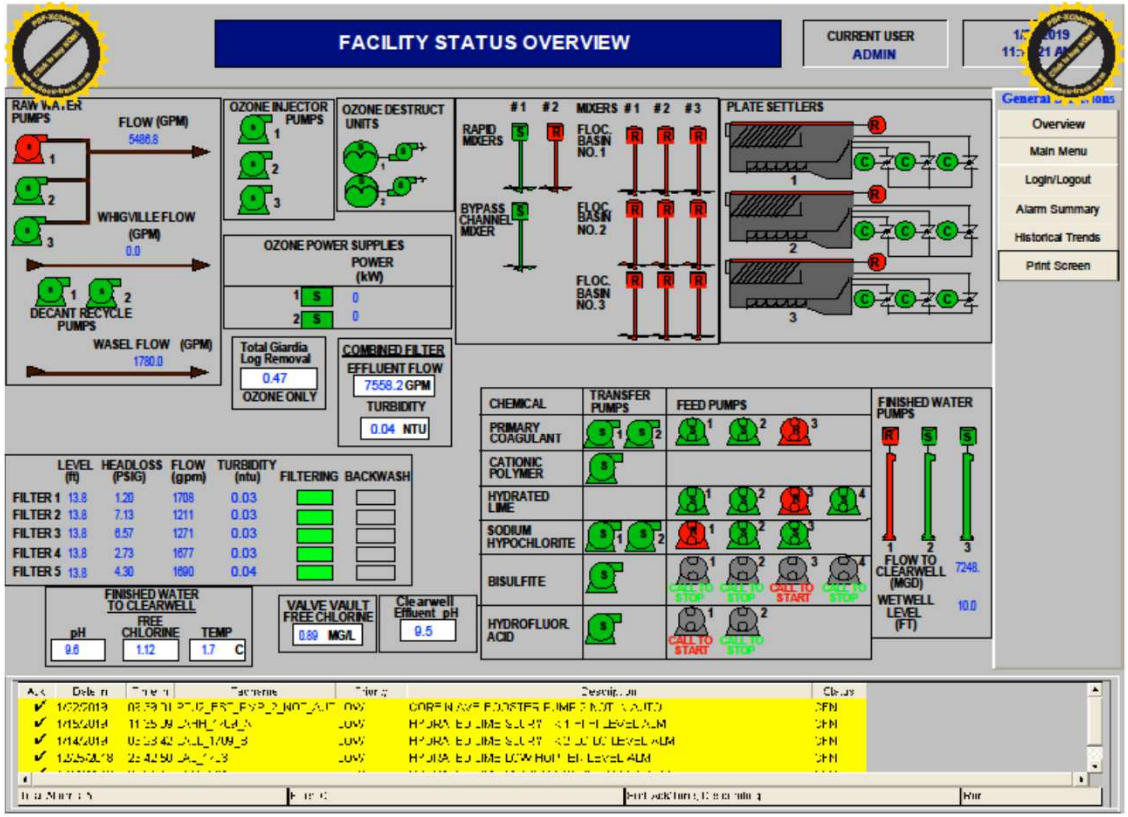
Operation Upgrades



Supervisory Control and Data Acquisition

(SCADA)

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

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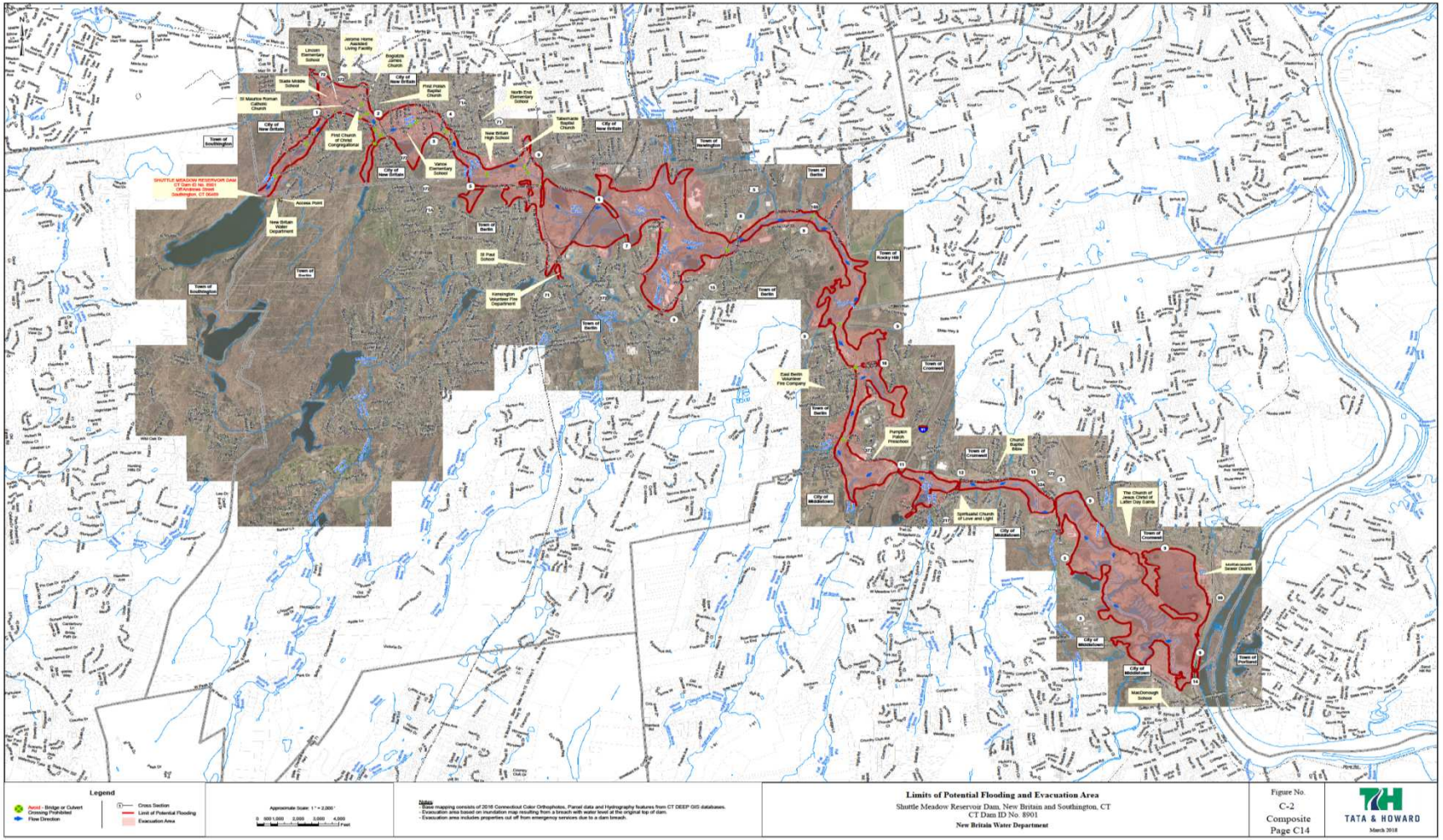
Dam Inundation Studies



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Bristol wellfield future Water potable water supply

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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

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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
New Britain	**$2.921**	**$58.42**	**$ 82.42**