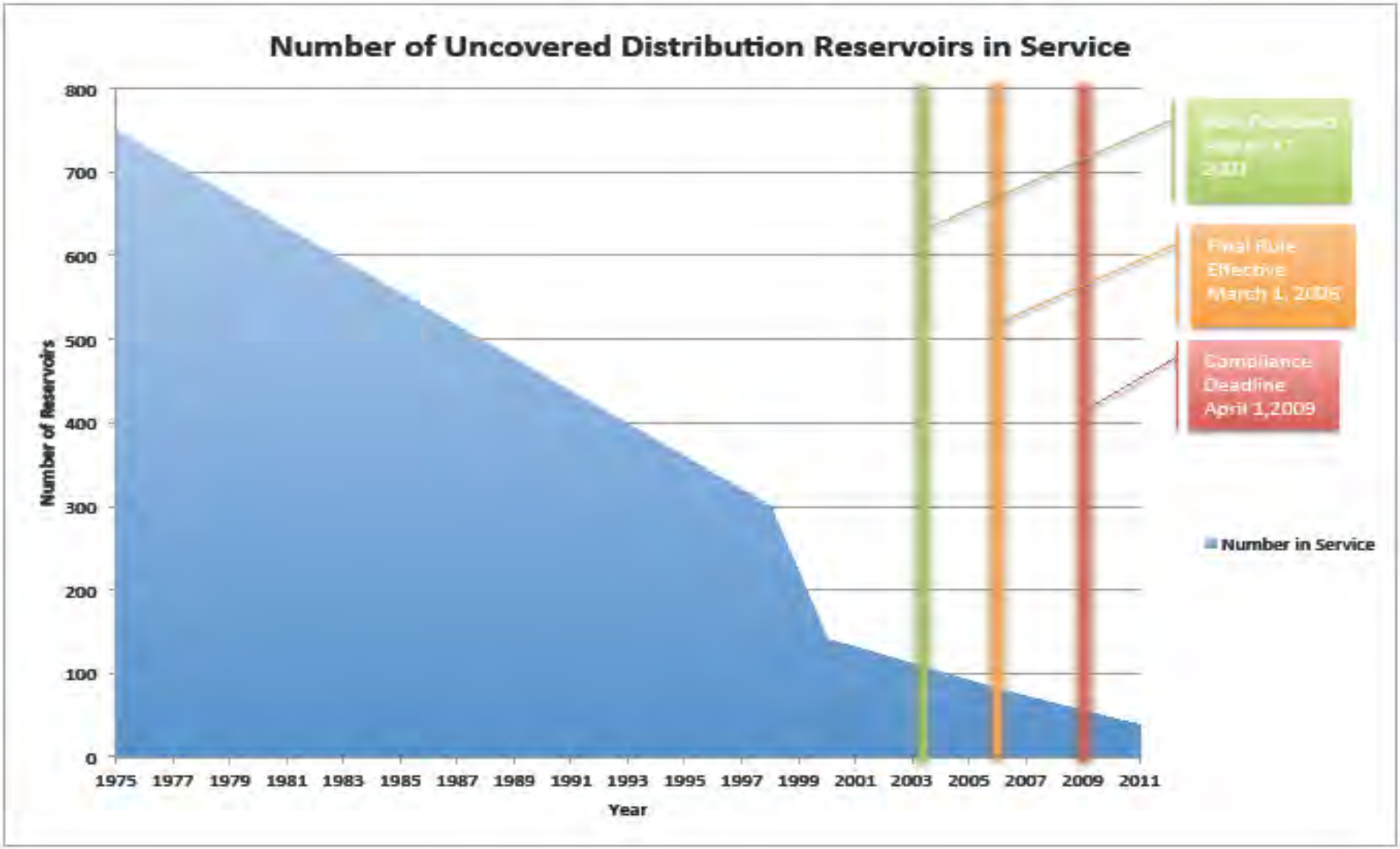
Passaic Valley Water Commission

Phase 1-Storage Improvement Project

Why is the Storage Improvement Project necessary?

- EPA's Safe Drinking Water Requirement (LT2ESWTR)
  - Systems that store treated water in uncovered open reservoirs must either cover the reservoir or treat the reservoir discharge to inactivate pathogens. These requirements are necessary to protect against the contamination of water that occurs in open reservoirs.
- To Protect Public Health



Note: In 1975, there were 750 uncovered distribution reservoirs in service in the United States. Due to public health concerns, water utilities began covering or abandoning them. By the time the USEPA proposed a rule mandating their elimination in 2003, there were only 110 reservoirs remaining. Today there are less than 40 nationwide and all of these are mandated to be eliminated.

Closed Water System

River Supply

Water Treatment Plant
"water is purified"

Storage Tanks

Closed Pipe System to Customer

Uncovered storage essentially negates purpose of water treatment

Open Finished Water System

River Supply

Water Treatment Plant
"water is purified"

Uncovered Reservoir Water Storage

Closed Pipe System to Customer

Open Finished Water System

Vandalism

Run-off

Airborne contamination

River Supply

Water Treatment Plant
"water is purified"

Uncovered Reservoir
Water Storage

Closed Pipe System
to Customer

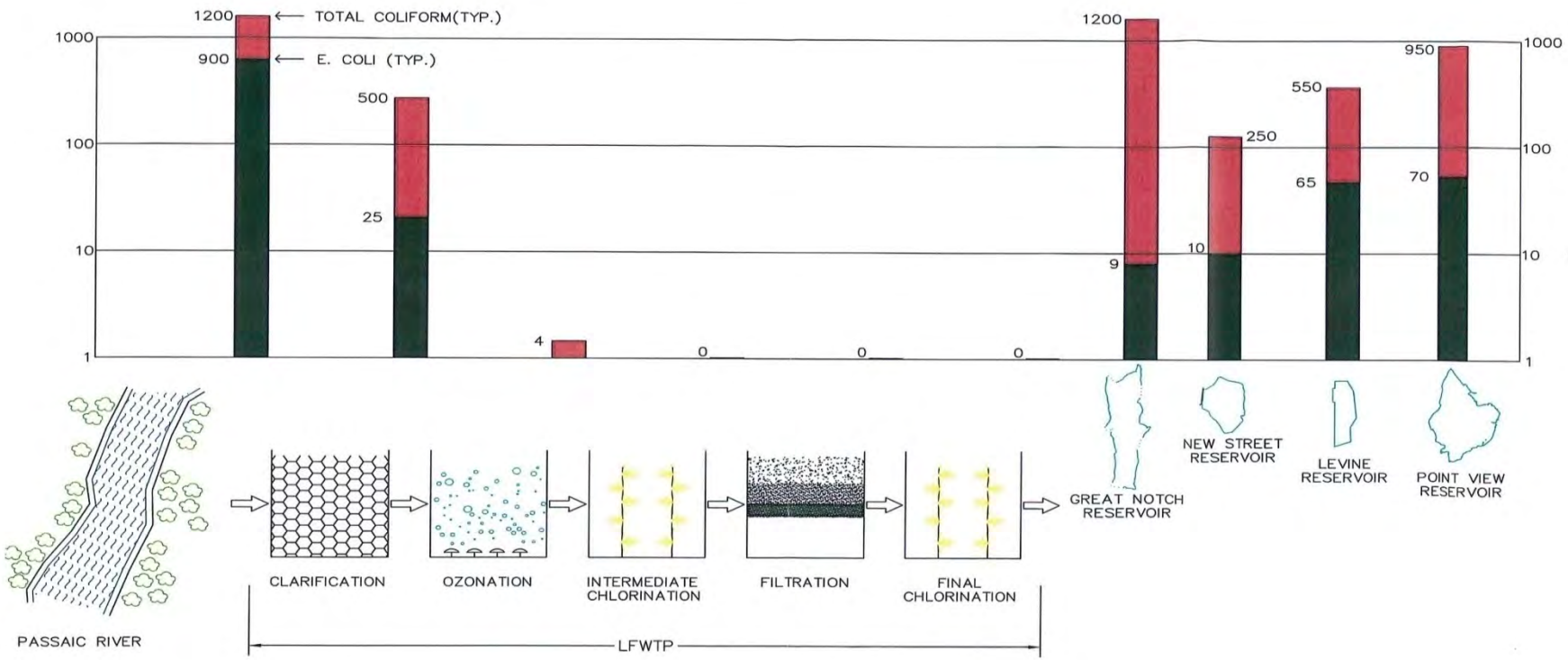
Uncovered reservoirs expose the treated water supply to a host of potential contamination risks

Security Threats

Birds

Mammals

Multi-Barrier Approach



Explanation: Modern water treatment technology uses many barriers, such as sedimentation, ozonation, filtration, etc. to remove pathogens. By storing this treated water in open reservoirs, we are relying solely on a single barrier, that is chlorination, to protect the water supply.

Pathogens - include various types of bacteria, viruses, protozoan parasites and other organisms

- Cryptosporidium
- Giardia lamblia
- Legionella
- Viruses (enteric)
  - Enteroviruses
    - polioviruses
      coxsackieviruses,echoviruses
    - 62 non-polio enteroviruses

- Bacteria
  - Fecal coliform and *Escherichia coli (E. coli)*
  - Other Fecal indicators *Enterobacter cloacae* *Enterococci*

COLIFORM SPECIATION

COLIFORM CONFIRMATION/ BACTERIOLOGICAL SPECIATION for DISTRIBUTION SYSTEM POSITIVE TOTAL COLIFORM SITES

LOCATION ID:	DATE COLLECTED:	SAMPLE ID:	SAMPLE:	TYPICAL SOURCE / PRESSURE GRADIENT:	ORIGINAL SAMPLE RESULTS (COLIFORM and *E. coli*):	NUMBER OF IDENTIFICATIONS:	IDENTIFICATION:	FAMILY:	ORIGIN:	CONFIRMED AS COLIFORM (YES or NO):
D-72	7/24/2013	AB39007	Valley Deli & Grocery, 117 Valley Rd, Clifton	425	Coliform P / *E. coli* A	1 of 1	*Enterobacter cloacae*	*Enterobacteriaceae*	Facultative anerobe and can flourish in oxygen absent environments. Found in human and animal feces, water and	YES
D-28	7/24/2013	AB38994	PVWC, 1525 Main Avenue, Clifton	300	Coliform P / *E.coli* A	1 of 2	*Plesiomonas shigelloides*	*Enterobacteriaceae*	Gram negative, rod shaped bacterium that is a freshwater aquatic organism. Pathogenic organism that cause diarrheal	NO
D-28	7/24/2013	AB38994	PVWC, 1525 Main Avenue, Clifton	300	Coliform P / *E.coli* A	2 of 2	*Enterobacter sakazakii*	*Enterobacteriaceae*	Present in the gut of humans and animals. Associated with outbreaks of meningitis and enteritis. Reported cases	YES
D-103	7/23/2013	AB38929	The Clifton Little School, 391 Broad Street, Clifton	425	Coliform P / *E.coli* A	1 of 1	*Plesiomonas shigelloides*	*Enterobacteriaceae*	Gram negative, rod shaped bacterium that is a freshwater aquatic organism. Pathogenic organism that cause diarrheal	NO
D-99	7/22/2013	AB38841	Daughter's of Miriam, 155 Hazel Street, Clifton	425	Coliform P / *E.coli* A	1 of 2	*Enterobacter cloacae*	*Enterobacteriaceae*	Facultative anerobe and can flourish in oxygen absent environments. Found in human and animal feces, water and	YES
D-99	7/22/2013	AB38841	Daughter's of Miriam, 155 Hazel Street, Clifton	425	Coliform P / *E.coli* A	2 of 2	*Enterobacter sakazakii*	*Enterobacteriaceae*	Present in the gut of humans and animals. Associated with outbreaks of meningitis and enteritis. Reported cases	YES
D-100A	7/22/2013	AB38859	Rutt's Hut 417 River Road, Clifton Women's Room	*Normal Hydraulic Conditions*: 51" High Pressure	Coliform P / *E.coli* A	1 of 1	*Enterobacter cloacae*	*Enterobacteriaceae*	Facultative anerobe and can flourish in oxygen absent environments. Found in human and animal feces, water and	YES
D-107	7/22/2013	AB38857	Family Cleaners, 12 Market Street, Clifton	51" High Pressure Mix Supply / 330 Gradient	Coliform P / *E.coli* A	1 of 2	*Enterobacter asburiae*	*Enterobacteriaceae*	Associated with urinary tract, respiratory, wound and other infections.	YES
D-107	7/22/2013	AB38857	Family Cleaners, 12 Market Street, Clifton	51" High Pressure Mix Supply / 330 Gradient	Coliform P / *E.coli* A	2 of 2	*Enterobacter cloacae*	*Enterobacteriaceae*	Facultative anerobe and can flourish in oxygen absent environments. Found in human and animal feces, water and	YES
D-100	7/22/2013	AB38855	Rutt's Hut 417 River Road, Clifton	*Normal Hydraulic Conditions*: 51" High Pressure	Coliform P / *E.coli* A	1 of 2	*Enterobacter asburiae*	*Enterobacteriaceae*	Associated with urinary tract, respiratory, wound and other infections.	YES
D-100	7/22/2013	AB38855	Rutt's Hut 417 River Road, Clifton	*Normal Hydraulic Conditions*: 51" High Pressure	Coliform P / *E.coli* A	2 of 2	*Enterobacter sp.*	*Enterobacteriaceae*	NA	YES

COLIFORM SPECIATION

COLIFORM CONFIRMATION/ BACTERIOLOGICAL SPECIATION for DISTRIBUTION SYSTEM POSITIVE TOTAL COLIFORM SITES

LOCATION ID:	DATE COLLECTED:	SAMPLE ID:	SAMPLE:	TYPICAL SOURCE / PRESSURE GRADIENT:	ORIGINAL SAMPLE RESULTS (COLIFORM and *E. coli*):	NUMBER OF IDENTIFICATIONS:	IDENTIFICATION:	FAMILY:	ORIGIN:	CONFIRMED AS COLIFORM (YES or NO):
D-66	7/22/2013	AB38851	The Hearth, 1116 Rt 46 West, Clifton	425	Coliform P / E.coli A	1 of 2	*Plesiomonas shigelloides*	*Enterobacteriaceae*	Gram negative, rod shaped bacterium that is a freshwater aquatic organism. Pathogenic organism that cause diarrheal	NO
D-66	7/22/2013	AB38851	The Hearth, 1116 Rt 46 West, Clifton	425	Coliform P / E.coli A	2 of 2	*Enterobacter asburiae*	*Enterobacteriaceae*	Associated with urinary tract, respiratory, wound and other infections.	YES
D-24	7/22/2013	AB38848	Clifton FS #4, 144 Main Avenue, Clifton	330	Coliform P / E.coli A	1 of 2	*Enterobacter sp.*	*Enterobacteriaceae*	NA	YES
D-24	7/22/2013	AB38848	Clifton FS #4, 144 Main Avenue, Clifton	330	Coliform P / E.coli A	2 of 2	*Enterobacter cloacae*	*Enterobacteriaceae*	Facultative anerobe and can flourish in oxygen absent environments. Found in human and animal feces, water and	YES
D-63	7/16/2013	AB38612	D-63- Lorenzo's Pizza, 208 New Street, West Paterson	New Street Reservoir/ 300 Gradient	Coliform P / E.coli A	1 of 1	*Plesiomonas shigelloides*	*Enterobacteriaceae*	Gram negative, rod shaped bacterium that is a freshwater aquatic organism. Pathogenic organism that cause diarrheal	NO
D-56	8/13/2012	AB23117	D-56- Melquitax 469-21st Avenue, Paterson	New Street Reservoir/ 300 Gradient	Coliform P / E.coli A	1 of 1	*Plesiomonas shigelloides*	*Enterobacteriaceae*	Gram negative, rod shaped bacterium that is a freshwater aquatic organism. Pathogenic organism that cause diarrheal	NO
D-86	8/13/2012	AB23100	D-86- Totowa Bait and Tackle 10 Albion Avenue, Paterson	New Street Reservoir/ 300 Gradient	Coliform P / E.coli A	1 of 1	*Plesiomonas shigelloides*	*Enterobacteriaceae*	Gram negative, rod shaped bacterium that is a freshwater aquatic organism. Pathogenic organism that cause diarrheal	NO
D-77 Field Duplicate	8/7/2012	AB22831	D-77 A&S Luncheonette, 41 Clark Street, Paterson	New Street Reservoir/ 300 Gradient	Coliform P / *E.coli* A	1 of 1	*Pasteurella sp.*	*Pasteurellaceae*	Associated with animals and infections in human. This is a pathogenic organism that is oxidase positive.	NO
Wanaque North	7/26/2012	AB22266	Wanaque North	North Jersey District Water Supply	Coliform P / *E.coli* A	1 of 1	*Klebsiella pneumoniae spp. pneumoniae*	*Enterobacteriaceae*	Human feces and soil.	YES
D-100	7/2/2012	AB20937	Rutt's Hut 417 River Road, Clifton	*Normal Hydraulic Conditions*: 51" High Pressure	Coliform P / *E.coli* A	1 of 1	*Serratia marcescens*	*Enterobacteriaceae*	Common on damp surfaces, feeds on phosphorous containing materials.	YES
NA-18	6/11/2012	AB19750	Arlington Laundromat 493 Ridge Road, North Arlington	51" High Pressure Mix Supply / 330 Gradient	Coliform P / *E.coli* A	1 of 1	*Citrobacter freundii*	*Enterobacteriaceae*	Common in soil, water, and wastewater. Can be found in almost everywhere. Organism uses citrate as a carbon source	YES

COLIFORM SPECIATION

COLIFORM CONFIRMATION/ BACTERIOLOGICAL SPECIATION for DISTRIBUTION SYSTEM POSITIVE TOTAL COLIFORM SITES

LOCATION ID:	DATE COLLECTED:	SAMPLE ID:	SAMPLE:	TYPICAL SOURCE / PRESSURE GRADIENT:	ORIGINAL SAMPLE RESULTS (COLIFORM and *E. coli*):	NUMBER OF IDENTIFICATIONS:	IDENTIFICATION:	FAMILY:	ORIGIN:	CONFIRMED AS COLIFORM (YES or NO):
D-51	12/14/2011	AB11776	Northside FS# 4 48 Temple Street, Paterson	New Street Reservoir/ 300 Gradient	Coliform P / *E.coli* A	1 of 1	*Enterobacter cloacae*	*Enterobacteriaceae*	Facultative anerobe and can flourish in oxygen absent environments. Found in human and animal feces, water and	YES
D-107	11/14/2011	AB10455	Family Cleaners, 12 Market Street, Clifton	51" High Pressure Mix Supply / 330 Gradient	Coliform P / *E.coli* A	1 of 4	*Serratia liquefaciens*	*Enterobacteriaceae*	Is a pathogen which is capable of colonizing a wide variety of surfaces in water, soil, and humans.	YES
D-107	11/14/2011	AB10455	Family Cleaners, 12 Market Street, Clifton	51" High Pressure Mix Supply / 330 Gradient	Coliform P / *E.coli* A	2 of 4	*Citrobacter freundii*	*Enterobacteriaceae*	Common in soil, water, and wastewater. Can be found in almost everywhere. Organism uses citrate as a carbon source	YES
D-107	11/14/2011	AB10455	Family Cleaners, 12 Market Street, Clifton	51" High Pressure Mix Supply / 330 Gradient	Coliform P / *E.coli* A	3 of 4	*Klebsiella oxytoca*	*Enterobacteriaceae*	Found in the intestinal tract of a healthy colon. However can spread to other parts of the body and cause life-threatening	YES
D-107	11/14/2011	AB10455	Family Cleaners, 12 Market Street, Clifton	51" High Pressure Mix Supply / 330 Gradient	Coliform P / *E.coli* A	4 of 4	*Citrobacter amalonaticus*	*Enterobacteriaceae*	Found in human digestive tract and can be the cause of digestive issues, like diarrhea. Capable of causing UTI's in humans with	YES
D-24	11/14/2011	AB10446	Clifton FS #4 144 Main Avenue, Clifton	*Normal Hydraulic Conditions* : 51" High Pressure	Coliform P / *E.coli* A	1 of 2	*Serratia liquefaciens*	*Enterobacteriaceae*	Is a pathogen which is capable of colonizing a wide variety of surfaces in water, soil, and humans.	YES
D-24	11/14/2011	AB10446	Clifton FS #4 144 Main Avenue, Clifton	*Normal Hydraulic Conditions* : 51" High Pressure	Coliform P / *E.coli* A	2 of 2	*Klebsiella oxytoca*	*Enterobacteriaceae*	Found in the intestinal tract of a healthy colon. However can spread to other parts of the body and cause life-threatening	YES
NA-5	11/1/2011	AB09769	Borough Hall 214 Ridge Road North Arlington	51" High Pressure Mix Supply / 330 Gradient	Coliform P / *E.coli* A	1 of 1	*Enterobacter cloacae*	*Enterobacteriaceae*	Facultative anerobe and can flourish in oxygen absent environments. Found in human and animal feces, water and	YES
D-51	9/27/2011	AB08246	Northside FS #4 48 Temple Street, Paterson	New Street Reservoir/ 300 Gradient	Coliform P / *E.coli* A	1 of 4	*Klebsiella pneumoniae ss. pneumoniae*	*Enterobacteriaceae*	Human feces and soil.	YES
D-51	9/27/2011	AB08246	Northside FS #4 48 Temple Street, Paterson	New Street Reservoir/ 300 Gradient	Coliform P / *E.coli* A	2 of 4	*Enterobacter cloacae*	*Enterobacteriaceae*	Facultative anerobe and can flourish in oxygen absent environments. Found in human and animal feces, water and	YES
D-51	9/27/2011	AB08246	Northside FS #4 48 Temple Street, Paterson	New Street Reservoir/ 300 Gradient	Coliform P / *E.coli* A	3 of 4	*Enterobacter cloacae*	*Enterobacteriaceae*	Facultative anerobe and can flourish in oxygen absent environments. Found in human and animal feces, water and	YES

COLIFORM SPECIATION

COLIFORM CONFIRMATION/ BACTERIOLOGICAL SPECIATION for DISTRIBUTION SYSTEM POSITIVE TOTAL COLIFORM SITES

LOCATION ID:	DATE COLLECTED:	SAMPLE ID:	SAMPLE:	TYPICAL SOURCE / PRESSURE GRADIENT:	ORIGINAL SAMPLE RESULTS (COLIFORM and *E. coli*):	NUMBER OF IDENTIFICATIONS:	IDENTIFICATION:	FAMILY:	ORIGIN:	CONFIRMED AS COLIFORM (YES or NO):
D-51	9/27/2011	AB08246	Northside FS #4 48 Temple Street, Paterson	New Street Reservoir/ 300 Gradient	Coliform P / *E.coli* A	4 of 4	*Klebsiella pneumoniae ss. pneumoniae*	*Enterobacteriaceae*	Human feces and soil.	YES
L-22	9/14/2011	AB07463	Stone Center, Inc. 251 Garbaldi Avenue, Lodi	Botany Pump Station / 180 Gradient	Coliform P / *E.coli* A	1 of 3	*Enterobacter cloacae*	*Enterobacteriaceae*	Facultative anerobe and can flourish in oxygen absent environments. Found in human and animal feces, water and	YES
L-22	9/14/2011	AB07463	Stone Center, Inc. 251 Garbaldi Avenue, Lodi	Botany Pump Station / 180 Gradient	Coliform P / *E.coli* A	2 of 3	*Enterobacter cloacae*	*Enterobacteriaceae*	Facultative anerobe and can flourish in oxygen absent environments. Found in human and animal feces, water and	YES
L-22	9/14/2011	AB07463	Stone Center, Inc. 251 Garbaldi Avenue, Lodi	Botany Pump Station / 180 Gradient	Coliform P / *E.coli* A	3 of 3	*Enterobacter sp.*	*Enterobacteriaceae*	NA	YES
NA-5	9/12/2011	AB07297	Borough Hall 214 Ridge Road North Arlington	51" High Pressure Main / 330 Gradient	Coliform P / *E.coli* A	1 of 1	*Pseudomonas putida*	*Pseudomonadacea e*	Found in most soil and water habitats where there is oxygen present.	NO
LFWTP	8/16/2011	AB06090	800 Union Blvd, Totowa, NJ	LFWTP Effluent	Coliform P / *E.coli* A	1 of 1	*Klebsiella oxytoca*	*Enterobacteriaceae*	Found in the intestinal tract of a healthy colon. However can spread to other parts of the body and cause life-threatening	YES
D-80	8/9/2011	AB05664	Bartlet Greenhouse & Florist 814 Grove Street, Clifton	Great Notch Reservoir / 425 Gradient	Coliform P / *E.coli* A	1 of 1	*Serratia marcescens*	*Enterobacteriaceae*	Common on damp surfaces, feeds on phosphorous containing materials.	YES
D-22	8/9/2011	AB05655	Autocare Station 120 Broad Street, Clifton	Great Notch Reservoir / 425 Gradient	Coliform P / *E.coli* A	1 of 1	*Enterobacter osburiae*	*Enterobacteriaceae*	Associated with urinary tract, respiratory, wound and other infections.	YES
D-100	8/1/2011	AB05173	Rutt's Hut 417 River Road, Clifton	*Normal Hydraulic Conditions*: 51" High Pressure Mix Supply / 330 Gradient *GN Regulators are Open*: Great Notch Reservoir /425 Gradient	Coliform P / *E.coli* A	1 of 1	*Enterobacter cloacae*	*Enterobacteriaceae*	Facultative anerobe and can flourish in oxygen absent environments. Found in human and animal feces, water and soil. Has been detected in distribution system and/or biofilms.	YES

COLIFORM SPECIATION

COLIFORM CONFIRMATION/ BACTERIOLOGICAL SPECIATION for DISTRIBUTION SYSTEM POSITIVE TOTAL COLIFORM SITES

LOCATION ID:	DATE COLLECTED:	SAMPLE ID:	SAMPLE:	TYPICAL SOURCE / PRESSURE GRADIENT:	ORIGINAL SAMPLE RESULTS (COLIFORM and *E. coli*):	NUMBER OF IDENTIFICATIONS:	IDENTIFICATION:	FAMILY:	ORIGIN:	CONFIRMED AS COLIFORM (YES or NO):
Field Duplicate D-25	7/20/2011	AB04666	La Quinta 265 Route 3 East, Clifton	*Normal Hydraulic Conditions*: 51" High Pressure Mix Supply / 330 Gradient *GN Regulators are Open*: Great Notch Reservoir /425 Gradient	Coliform P / *E.coli* A	1 of 1	*Klebsiella oxytoca*	*Enterobacteriaceae*	Found in the intestinal tract of a healthy colon. However can spread to other parts of the body and cause life-threatening diseases. It is closely related to *Klebsiella pneumonia*.	YES
D-25	7/20/2011	AB04656	La Quinta 265 Route 3 East, Clifton	*Normal Hydraulic Conditions*: 51" High Pressure Mix Supply / 330 Gradient *GN Regulators are Open*: Great Notch Reservoir /425 Gradient	Coliform P / *E.coli* A	1 of 1	*Enterobacter cloacae*	*Enterobacteriaceae*	Facultative anerobe and can flourish in oxygen absent environments. Found in human and animal feces, water and soil. Has been detected in distribution system and/or biofilms.	YES
D-78	7/12/2011	AB04175	D-78 Hair Designers, 143 Livingston Street, Clifton	Great Notch Reservoir / 425 Gradient	Coliform P / *E.coli* A	1 of 1	*Serratia* sp.	*Enterobacteriaceae*	NA	YES
D-72	7/12/2011	AB04174	D-72 Valley Deli & Grocery,117 Valley Road, Clifton	Great Notch Reservoir / 425 Gradient	Coliform P / *E.coli* A	1 of 1	*Serratia marcescens*	*Enterobacteriaceae*	Common on damp surfaces, feeds on phosphorous containing materials.	YES
D-77 Field Duplicate	7/5/2011	AB03746	D-77 A&S Luncheonette, 41 Clark Street, Paterson	New Street Reservoir/ 300 Gradient	Coliform P / *E.coli* A	1 of 1	*Serratia marcescens*	*Enterobacteriaceae*	Common on damp surfaces, feeds on phosphorous containing materials.	YES
D-77	7/5/2011	AB03744	D-77 A&S Luncheonette, 41 Clark Street, Paterson	New Street Reservoir/ 300 Gradient	Coliform P / *E.coli* A	1 of 1	*Serratia marcescens*	*Enterobacteriaceae*	Common on damp surfaces, feeds on phosphorous containing materials.	YES
D-63	7/5/2011	AB03710	D-63 Lorenzo's Pizza, 223 New Street, Woodland Park	New Street Reservoir/ 300 Gradient	Coliform P / *E.coli* A	1 of 1	*Serratia marcescens*	*Enterobacteriaceae*	Common on damp surfaces, feeds on phosphorous containing materials.	YES
D-106	6/13/2011	AB02710	D-106 Red, White & Blue Thrift Store, 765 River Street, Paterson	Levine Reservoir /180 Gradient	Coliform P / *E.coli* A	1 of 1	*Serratia marcescens*	*Enterobacteriaceae*	Common on damp surfaces, feeds on phosphorous containing materials.	YES

COLIFORM SPECIATION

COLIFORM CONFIRMATION/ BACTERIOLOGICAL SPECIATION for DISTRIBUTION SYSTEM POSITIVE TOTAL COLIFORM SITES

LOCATION ID:	DATE COLLECTED:	SAMPLE ID:	SAMPLE:	TYPICAL SOURCE / PRESSURE GRADIENT:	ORIGINAL SAMPLE RESULTS (COLIFORM and *E. coli*):	NUMBER OF IDENTIFICATIONS:	IDENTIFICATION:	FAMILY:	ORIGIN:	CONFIRMED AS COLIFORM (YES or NO):
D-3	6/13/2011	A802701	D-3- Blue Cross Animal Hospital Rt 20 & Rt 80, Paterson	New Street Reservoir/ 300 Gradient	Coliform P / *E.coli* A	1 of 1	*Klebsiella pneumoniae*	*Enterobacteriaceae*	Found in the normal flora of the mouth, skin, and intestines.	YES
D-46	2/16/2011	AA96136	D-46 Riverside/ E. Side Fire Station #3 236 Lafayette Street, Paterson	New Street Reservoir/ 300 Gradient	Coliform P / E.coli A	1 of 2	*Enterobacter cloacae*	*Enterobacteriaceae*	Facultative anerobe and can flourish in oxygen absent environments. Found in human and animal feces, water and	YES
D-46	2/16/2011	AA96136	D-46 Riverside/ E. Side Fire Station #3 236 Lafayette Street, Paterson	New Street Reservoir / 300 Gradient	Coliform P / E.coli A	2 of 2	*Enterobacter cloacae*	*Enterobacteriaceae*	Flourish in oxygen absent environments. Found in human and animal feces, water and soil.	YES
D-52	10/5/2010	AA90148	D-52 Fire Station #13, 127 Trenton Avenue, Paterson	New Street Reservoir / 300 Gradient	Coliform P / *E.coli* A	1 of 2	*Vibrio tubiashii*	*Vibrionaceae*	A halophilic organism not normally found in fresh water.	NO
D-52	10/5/2010	AA90148	D-52 Fire Station #13, 127 Trenton Avenue, Paterson	New Street Reservoir / 300 Gradient	Coliform P / *E.coli* A	2 of 2	*Sphingobacterium sp.*	*Sphingobacterium*	A saprophytic organism commonly found in soil and water. The organism is unique because it is able to use organic matter as an energy source.	NO
D-47	10/4/2010	AA90044	D-47- Fire Station #6, 850 Madison Avenue, Paterson	New Street Reservoir / 300 Gradient	Coliform P / *E.coli* A	1 of 1	*Enterobacter cloacae*	*Enterobacterioceae*	Facultative anerobe and can flourish in oxygen absent environments. Found in human and animal feces, water and soil. Has been detected in distribution system and/or biofilms.	YES
W- 9	9/28/2010	AA89808	W9- Tommy's Diner, 235 Paterson Avenue, Wallington	Botany Pump Station / 180 Gradient	Coliform P / *E.coli* A	1 of 1	*Serratia marcescens*	*Enterobacteriaceae*	Common on damp surfaces, feeds on phosphorous containing materials.	YES
W- 9	9/21/2010	AA89483	W9- Tommy's Diner 235 Paterson Avenue, Wallington	Botany Pump Station / 180 Gradient	Coliform P / *E.coli* A	1 of 1	*Serratia marcescens*	*Enterobacteriaceae*	Common on damp surfaces, feeds on phosphorous containing materials.	YES
D-86	9/20/2010	AA89347	D86- Totowa Bait & Tackle, 10 Albion Avenue, Paterson	New Street Reservoir/ 300 Gradient	Coliform P / *E.coli* A	1 of 1	*Serratia marcescens*	*Enterobacteriaceae*	Common on damp surfaces, feeds on phosphorous containing materials.	YES
NA-16	9/20/2010	AA89337	NA16- Prospect Deli 203 Prospect Avenue, North Arlington	51" High Pressure Mix Suppy (330 Gradient)	Coliform P / *E.coli* A	1 of 1	*Enterobacter asburiae*	*Enterobacteriaceae*	Associated with urinary tract, respiratory, wound and other infections.	YES

COLIFORM SPECIATION

COLIFORM CONFIRMATION/ BACTERIOLOGICAL SPECIATION for DISTRIBUTION SYSTEM POSITIVE TOTAL COLIFORM SITES

LOCATION ID:	DATE COLLECTED:	SAMPLE ID:	SAMPLE:	TYPICAL SOURCE / PRESSURE GRADIENT:	ORIGINAL SAMPLE RESULTS (COLIFORM and *E. coli*):	NUMBER OF IDENTIFICATIONS:	IDENTIFICATION:	FAMILY:	ORIGIN:	CONFIRMED AS COLIFORM (YES or NO):
Wanaque North	9/8/2010	AA88763	Wanaque North	North Jersey District Water Supply	Coliform P / *E.coli* A	1 of 2	*Raoultella terrigena (another name: Klebsiella terrigena)*	*Enterobacteriaceae*	Human feces, soil, water, grains, fruits and vegetables.	YES
Wanaque North	9/8/2010	AA88763	Wanaque North	North Jersey District Water Supply	Coliform P / *E.coli* A	2 of 2	*Klebsiella pneumoniae ss. pneumoniae*	*Enterobacteriaceae*	Human feces and soil.	YES
D-67	9/8/2010	AA88729	D-67- Capello & Son, 236 Grand Street, Paterson	New Street Reservoir/ 300 Gradient	Coliform P / *E.coli* A	1 of 1	*Raoultella terrigena (another name: Klebsiella terrigena)*	*Enterobacteriaceae*	Human feces, soil, water, grains, fruits and vegetables.	YES
D-63	9/2/2010	AA88419	D-63- Lorenzo's Pizza, 208 New Street, West	New Street Reservoir/ 300 Gradient	Coliform P / E.coli A	1 of 1	*Plesiomonas shigelloides*	*Enterobacteriaceae*	Gram negative, rod shaped bacterium that is a freshwater aquatic organism. Pathogenic	NO
D-28	8/25/2010	AA87969	D-28- PVWC 1525 Main Avenue, Clifton	New Street Reservoir/ 300 Gradient	Coliform P / *E.coli* A	1 of 1	*Serratia marcescens*	*Enterobacteriaceae*	Common on damp surfaces, feeds on phosphorous containing materials. Has been detected in distribution system and/or biofilms.	YES
D-77	8/24/2010	AA87853	D77- A&S Luncheonette, 41 Clark Street, Paterson	New Street Reservoir/ 300 Gradient	Coliform P / *E.coli* A	1 of 1	*Enterobacter asburiae*	*Enterobacteriaceae*	Associated with urinary tract, respiratory, wound and other infections.	YES
D-29	8/23/2010	AA87774	D29- PassMemSch 39 Myrtle & Monroe St. Passaic	New Street Reservoir/ 300 Gradient	Coliform P / *E.coli* A	1 of 1	*Leclercia adecurboxylata*	*Enterobacteriaceae*	Found in the gut of animals, present in human stool and in a variety of environmental sources.	YES
D-108	8/18/2010	AA87595	D-108- Lakeview Deli, 313 Lakeview Avenue, Clifton	New Street Reservoir/ 300 Gradient	Coliform P / *E.coli* A	1 of 1	*Serratia marcescens*	*Enterobacteriaceae*	Common on damp surfaces, feeds on phosphorous containing materials.	YES
D-67	8/18/2010	AA87593	D67-Capello & Son, 236 Grand Street, Paterson	New Street Reservoir/ 300 Gradient	Coliform P / *E.coli* A	1 of 1	No Identification- (Examination of the biochemical profile given by the Crystal™ test suggests that this organism is	NA	NA	NA
D-90	8/10/2010	AA87134	D90-Home Depot, 10-179 Dayton Avenue, Passaic	New Street Reservoir/ 300 Gradient	Coliform P / *E.coli* A	1 of 1	*Raoultella terrigena (another name: Klebsiella terrigena)*	*Enterobacteriaceae*	Human feces, soil, water, grains, fruits and vegetables.	YES

DEFINITION OF COLIFORM: Rod-shaped, Gram-negative, non-spore forming organisms, that are part of the Enterobacteriaceae family and do not produce cytochrome oxidase

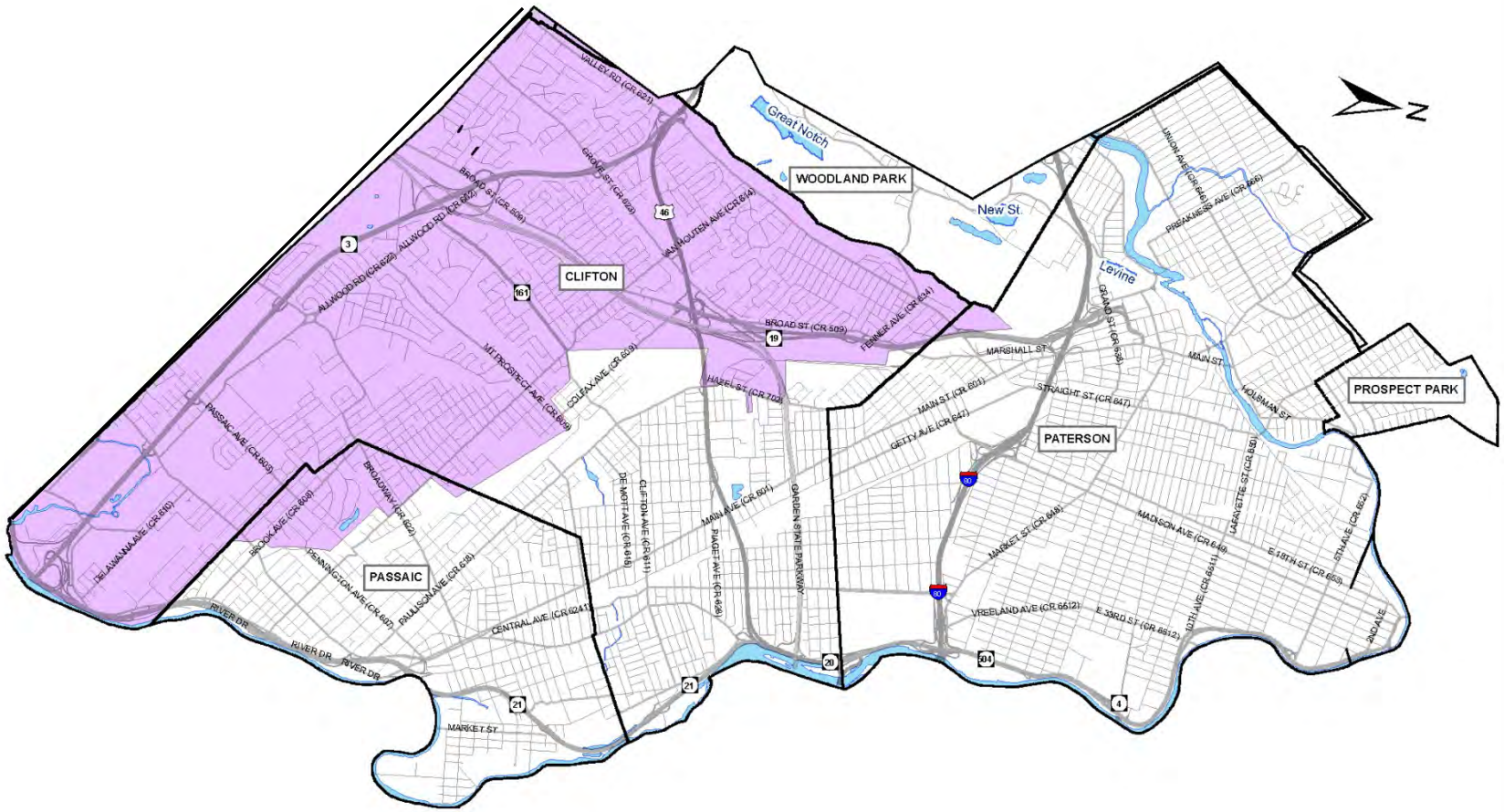
What are other benefits of converting our reservoirs to a Closed Water System?

- Addition of Corrosion Inhibitor to Water Supply
  - Minimize public exposure to lead and copper in drinking water caused by the corrosion of service lines, interior plumbing and plumbing fixtures.
  - Reduce corrosion of transmission mains which will improve water quality, fire flow protection and extend life of water mains.
- Currently, corrosion inhibitors are unable to be used because it promotes algae blooms in the open reservoir system.

Phasing in Corrosion Inhibitor

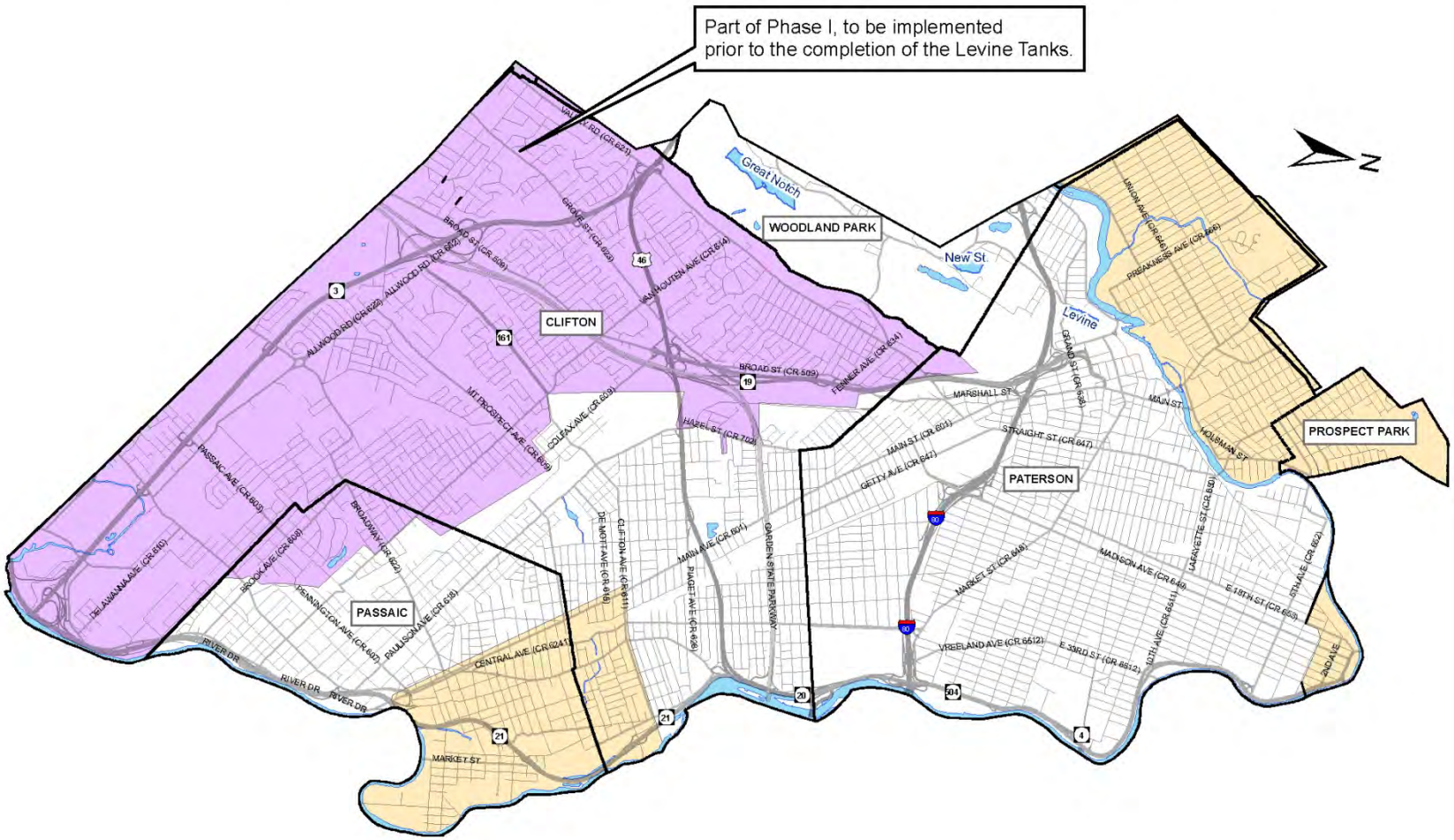
- Phase IA: Corrosion Inhibitor Pre-Levine Tanks
- Phase IB: Corrosion Inhibitor Addition at the Proposed Levine Tanks.
- Phase II: Corrosion Inhibitor Addition at the Proposed New Street Tanks.
- Phase III: Corrosion Inhibitor Addition at the Proposed Great Notch Tanks.

CORROSION INHIBITOR PRE-LEVINE TANKS BY END OF YEAR 2014



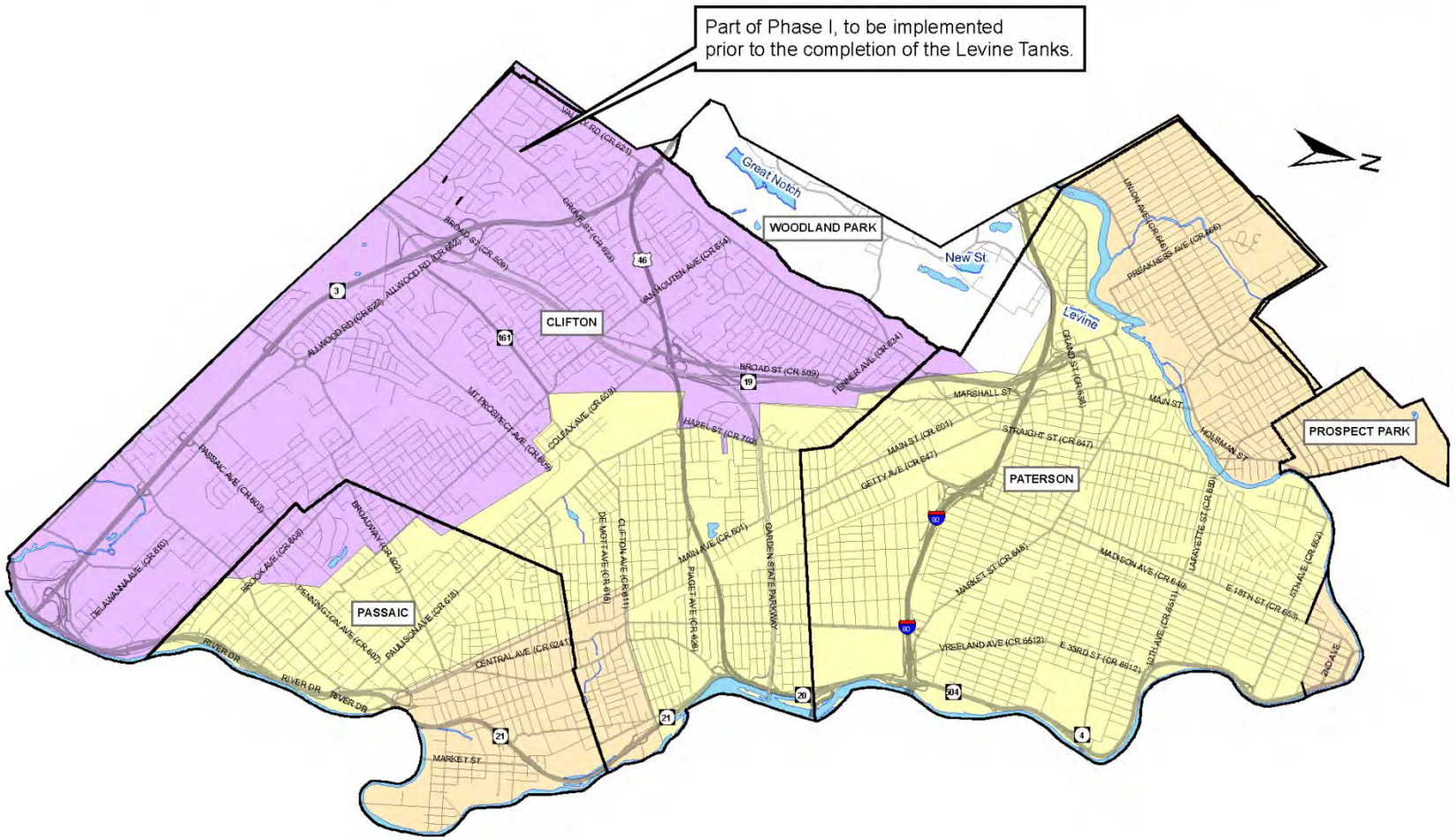
A PORTION OF THE DISTRIBUTION SYSTEM WILL RECEIVE CORROSION INHIBITOR PRIOR TO THE COMPLETION OF THE LEVINE TANKS. CORROSION INHIBITOR WILL BE INJECTED IN THE PROXIMITY OF THE GREAT NOTCH RESERVOIR.

PHASE I: CONVERSION OF THE LEVINE RESERVOIR TO WATER STORAGE TANKS



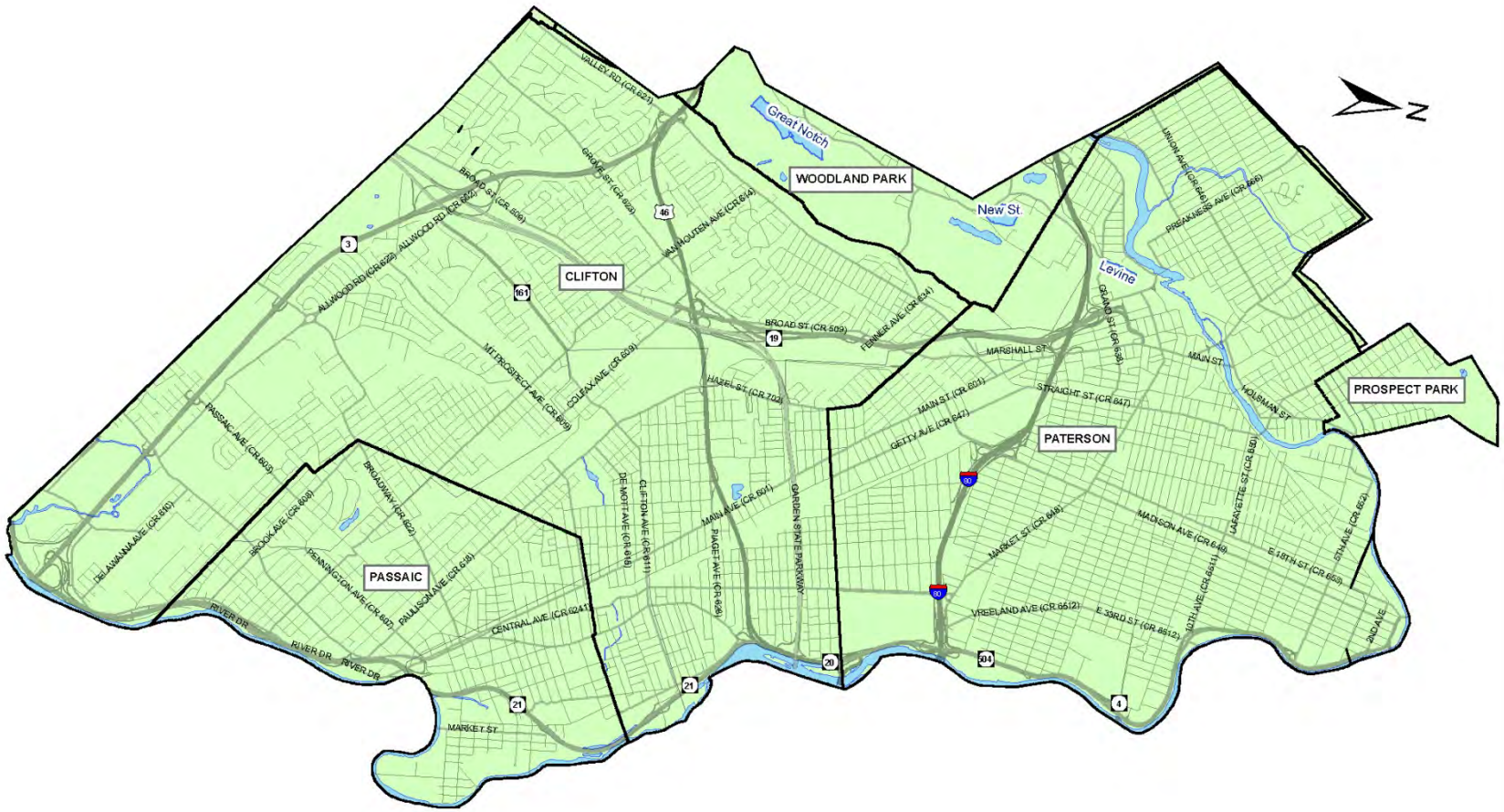
50% OF THE DISTRIBUTION SYSTEM WILL RECEIVE CORROSION INHIBITOR AFTER THE COMPLETION OF THE LEVINE TANKS. CORROSION INHIBITOR WILL BE INJECTED IN THE PROXIMITY OF THE LEVINE TANKS AND GREAT NOTCH RESERVOIR.

PHASE II: CONVERSION OF THE NEW STREET RESERVOIR TO WATER STORAGE TANKS



100% OF THE DISTRIBUTION SYSTEM WILL BE TREATED WITH A CORROSION INHIBITOR AFTER THE COMPLETION OF THE NEW ST TANKS. CORROSION INHIBITOR WILL BE INJECTED IN THE PROXIMITY OF THE LEVINE AND NEW ST TANKS AND AT THE GREAT NOTCH RESERVOIR.

PHASE III: CONVERSION OF THE GREAT NOTCH RESERVOIR TO WATER STORAGE TANKS



100% OF THE DISTRIBUTION SYSTEM WILL BE TREATED WITH A CORROSION INHIBITOR AFTER THE COMPLETION OF THE GREAT NOTCH TANKS. CORROSION INHIBITOR WILL BE MOVED TO THE LITTLE FALLS WATER TREATMENT PLANT UPON COMPLETION OF THE LEVINE, NEW ST AND GREAT NOTCH TANKS.

Compliance Timeline Driven By NJDEP Administrative Consent Order(ACO)

- PVWC could not meet the April 1, 2009 deadline to comply with the Federal Requirement (LT2ESWTR)
- PVWC entered into an ACO which required that a feasibility study be conducted to evaluate the alternatives for compliance
- September 10, 2009 PVWC submitted it's findings in a report to DEP
- DEP provided comments, PVWC made revisions and on August 24, 2012 the report was approved as final
- The major components of the project and schedule were delineated in the ACO

What are the Phase 1 Project Components?

Levine Reservoir

- Two 2.5-million gallon ground storage tanks
- New access road
- New piping to connect the tanks to existing reservoir inlet and outlet piping
- Water Quality Monitoring and Utility Building
- Stormwater improvements.

PVWC WTP

- Four 3-Megawatt Emergency Power Generators

Verona

- An additional 2 million gallon ground storage tank

Comparison of Alternatives at Levine Reservoir

Water Storage Tanks

- Simple and reliable operations
- Improved water system security
- Lower energy requirements
- Lower cost to customers

Off site Elevated Storage

- No suitable land available (New Street property at wrong elevation, remote from piping network, and privately owned)
- Would have to abandon Levine reservoir anyway

Treatment

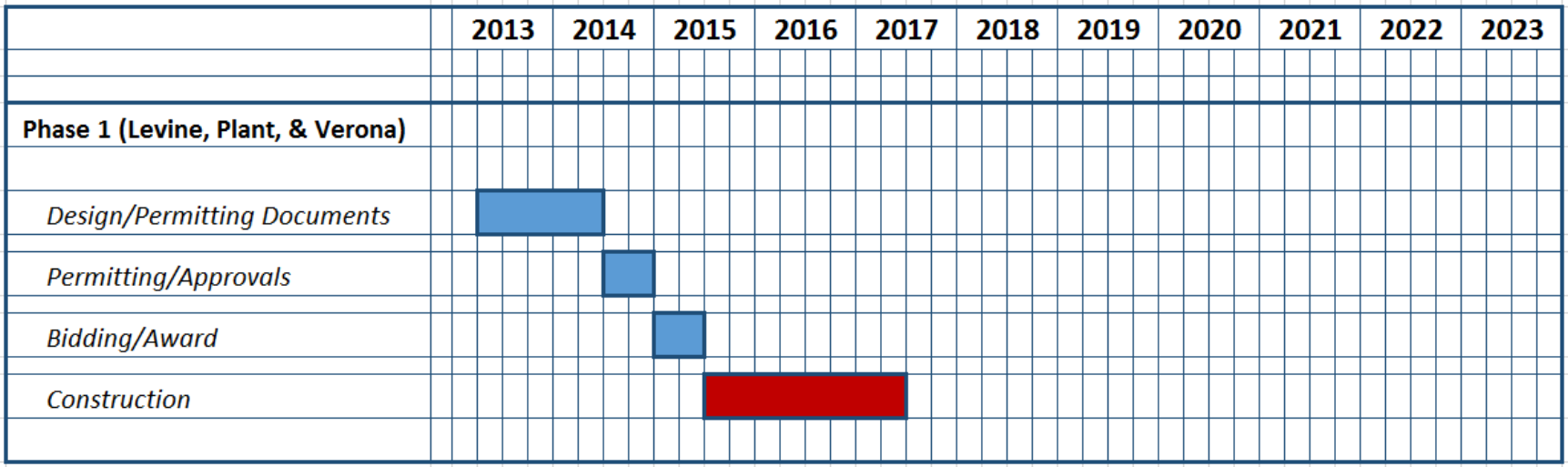
- Treatment facilities will also disrupt site
- Lower reliability
- Very High Construction Costs ~$45 million
- Higher Labor, Power, and Chemical Costs

Floating Cover

- Difficult and costly to maintain; unsightly

……When?

ACO Compliance Schedule for Phase 1



Levine Reservoir - Before

Levine Reservoir - After

Levine Reservoir - Before

Levine Reservoir - After

Levine Reservoir From Grand Street - Before

Levine Reservoir From Grand Street - After

Levine Reservoir From Reservoir Road - Before

Levine Reservoir From Reservoir Rd - After

View From Pool Entrance on Grand Street

View Of Levine in Vicinity of Great Falls Park with Tanks

Please visit PVWC's website on a regular basis to see all project updates. Please contact customer service at customerservice@pvwc.com for any comments or questions.