



The History of Water and Sewer Service in Charleston

Andy Fairey, Chief Operating Officer
Charleston Water System



**Charleston
Water System**

Agenda

- Overview of Charleston Water System
- History of water and sewer service in Charleston
- Challenges for the Water Industry in the U.S.
- Current World Water Crisis

Our Mission

is to protect public health and enhance the environment of our service community by providing clean water services of exceptional quality and value.

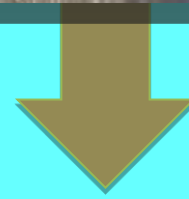


Water Service



Public health
Fire protection

Wastewater Service



Public health
Environmental protection



Water Service

1 water treatment plant

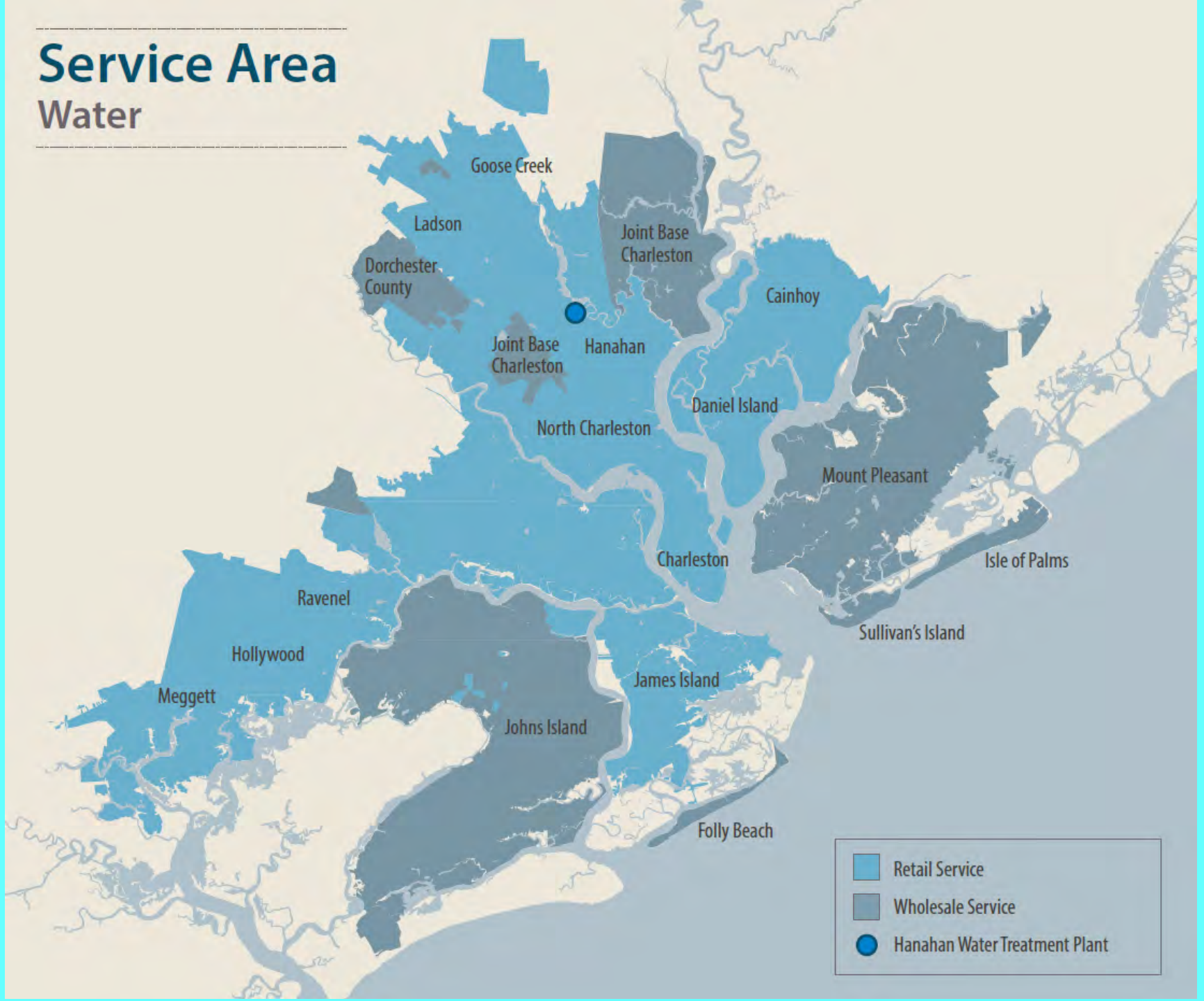
1,700 miles of water mains

8,700 fire hydrants

111,000 homes and businesses served

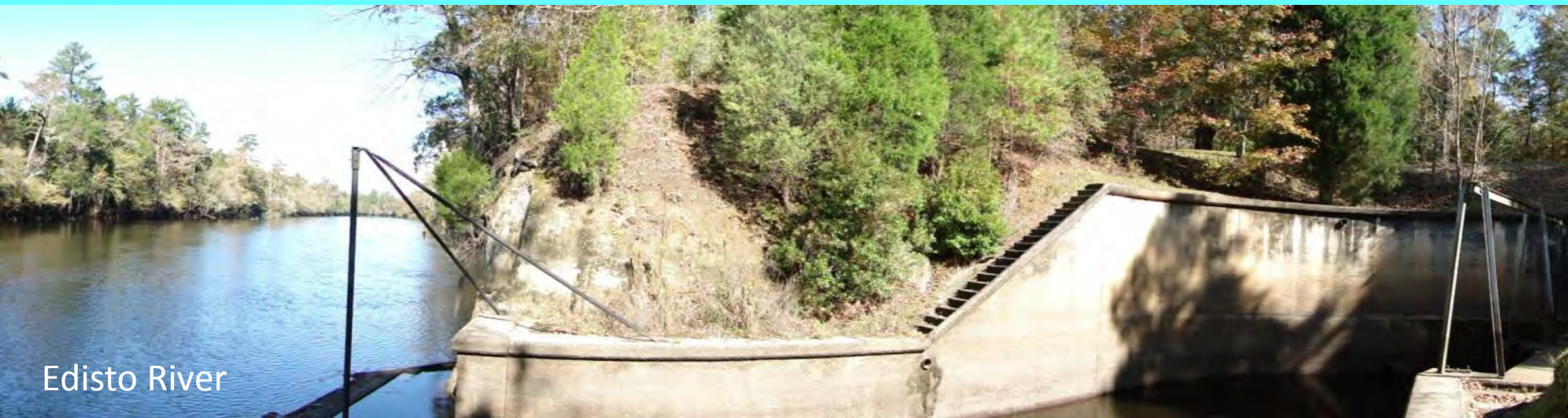
Service Area

Water





Bushy Park Reservoir

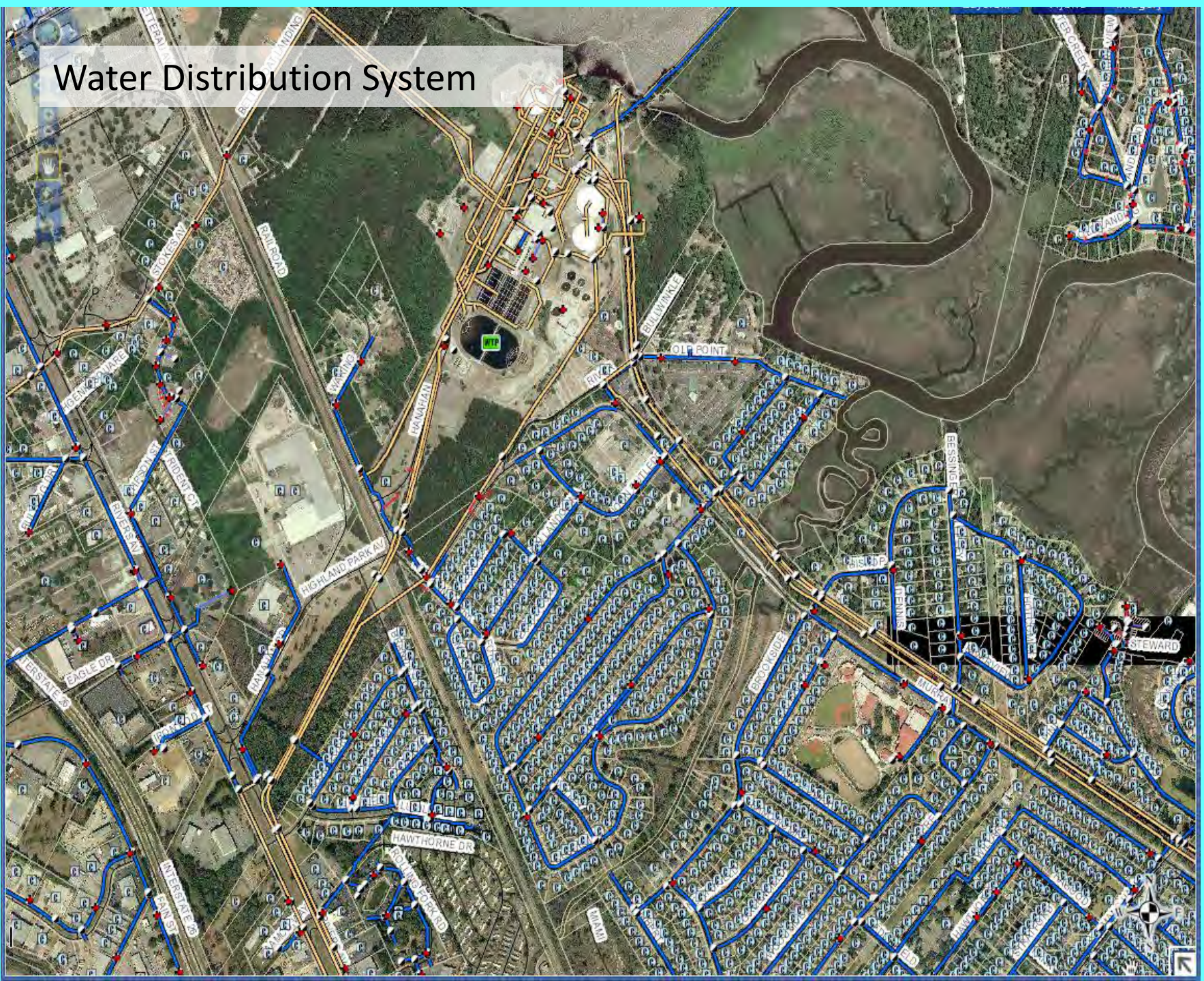


Edisto River

Hanahan Water Treatment Plant



Water Distribution System





Sewer Service

1 wastewater treatment plant

700 miles of gravity sewer and force mains

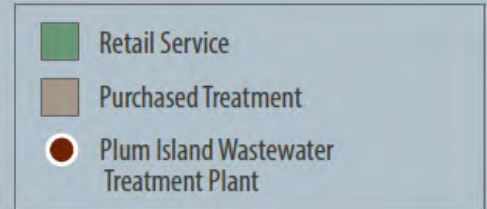
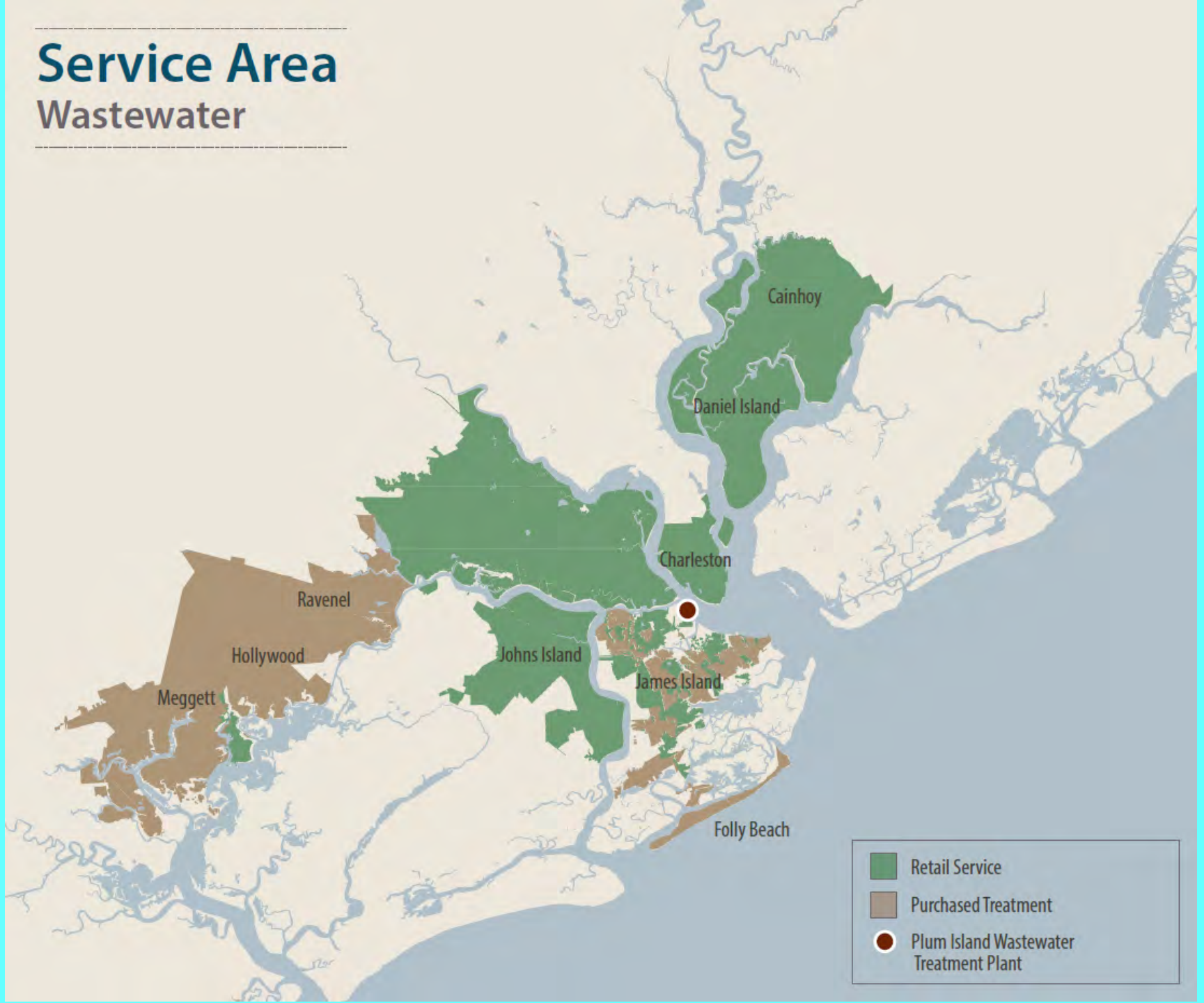
11.5 miles of deep sewer tunnel

185 pump stations

53,000 homes and businesses served

Service Area

Wastewater



Wastewater Collection System

Scale 1:28,000

2,327,802.44
355,613.52

- Pumpstation
- Manhole
- SValve
- Vent
- Cleanout
- SPipe Fitting
- Schamber
- Sewer
 - 0 - 4
 - 4 - 10
 - 10 - 15
 - 15 - 21
 - 21 - 30
- Liftstation
- Stundoor
- Treatment Plant
- Sservic
- Sstinlet
- Soutfall
- Snode





Plum Island Wastewater Treatment Plant
Charleston Harbor



Charleston Harbor

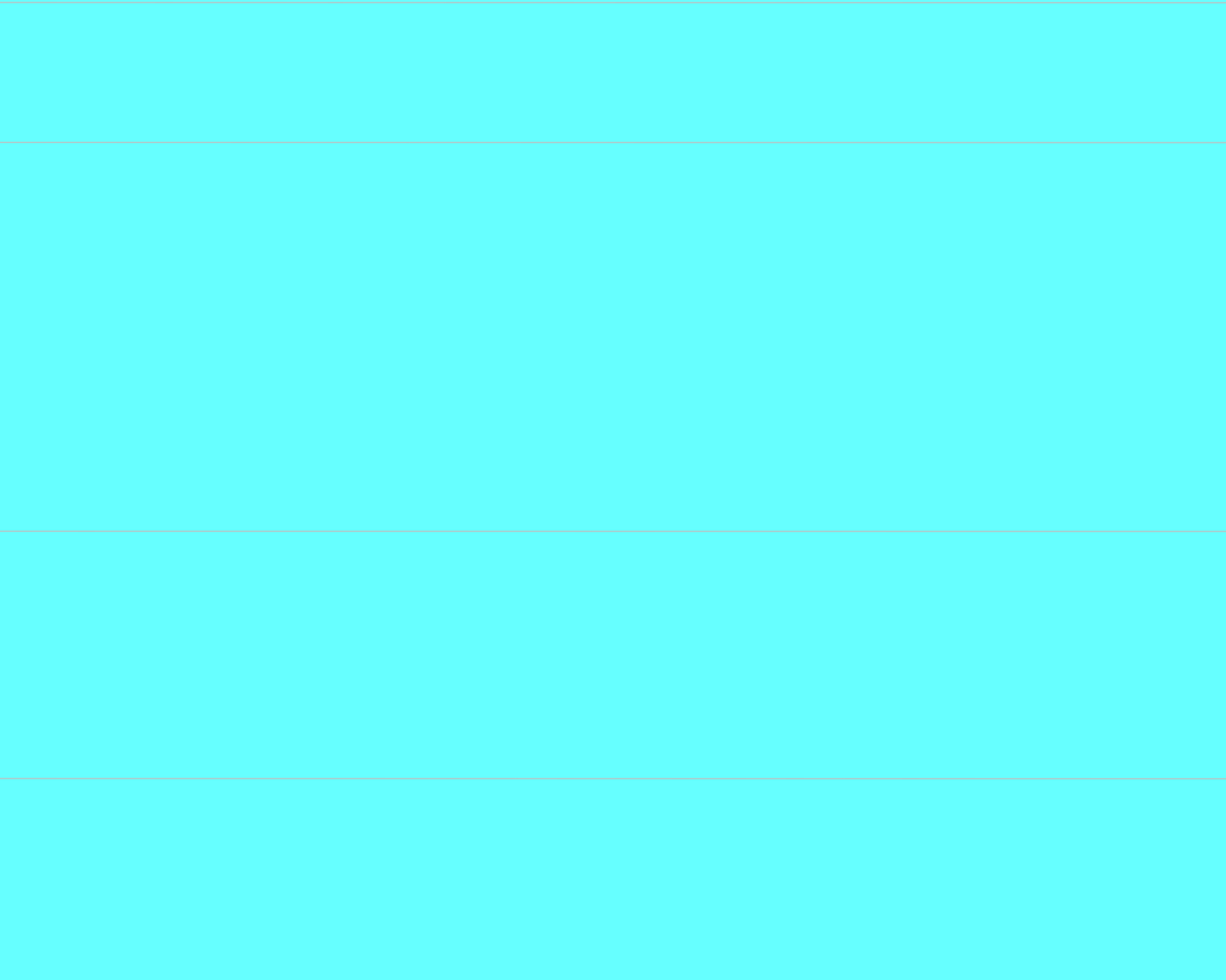
Water

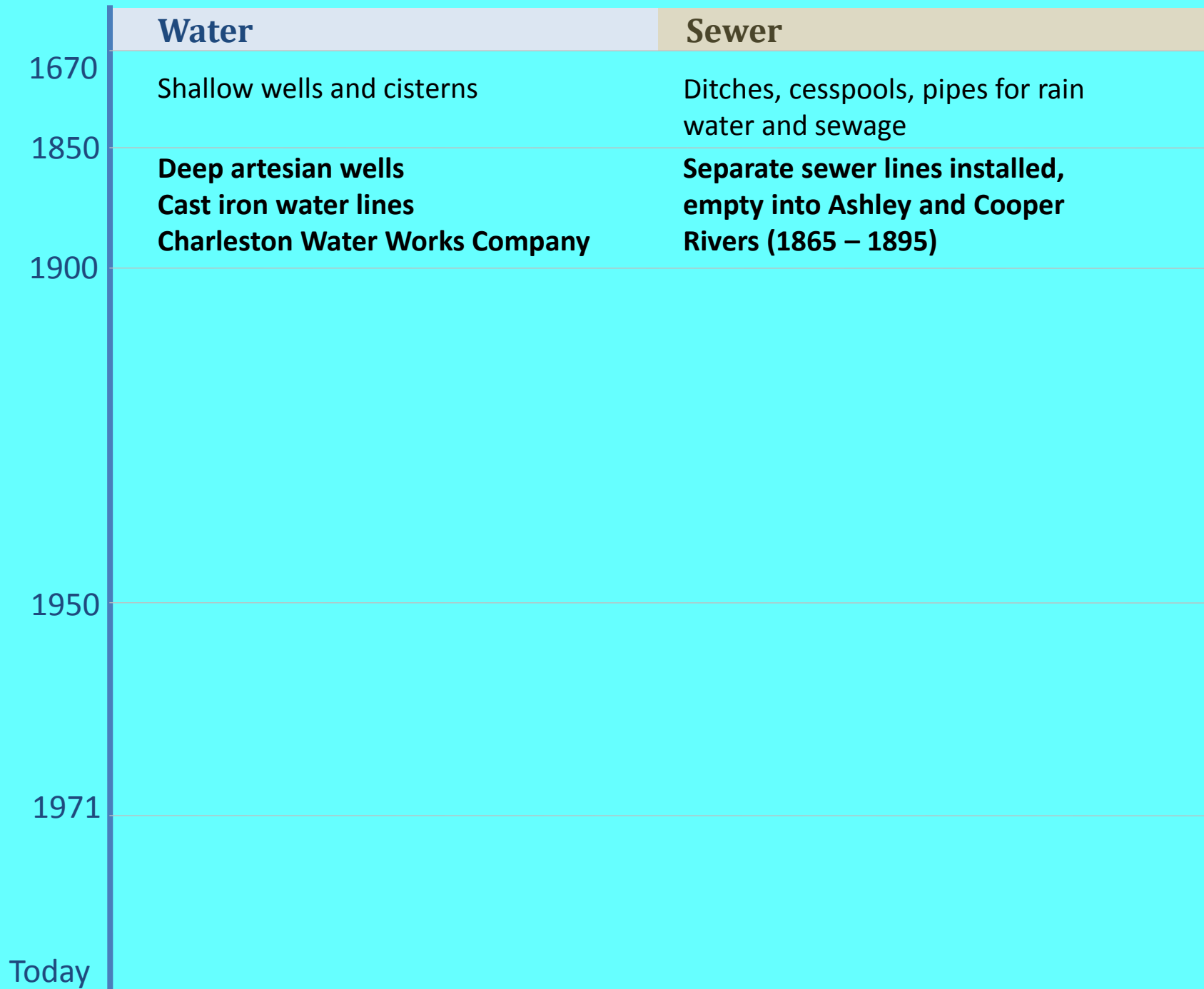
Sewer

1670
1850
1900
1950
1971
Today

Shallow wells and cisterns

Ditches, cesspools, pipes for rain water and sewage





Water

Sewer

Shallow wells and cisterns

Ditches, cesspools, pipes for rain water and sewage

Deep artesian wells
Cast iron water lines
Charleston Water Works Company

Separate sewer lines installed, empty into Ashley and Cooper Rivers (1865 – 1895)

Today



Meeting St @ Wentworth artesian well



Calhoun @ Rutledge (Cannon Park) artesian well

**These wells are now connected to water mains and do not provide artesian water*

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1670	Shallow wells and cisterns	Ditches, cesspools, pipes for rain water and sewage
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1900	Charleston Light & Water Co. builds Goose Creek Reservoir and Hanahan Steam Pumping Station (1904) Charleston Water System formed (1917) Use of cement-lined water mains (1921) Cease use of lead service lines (1931) Edisto River water supplies plant thru 23-mile tunnel completed in 1937	
1950		
1971		
Today		



Pumping Sta. - April 1905

Charleston Light & Water Co.



Hanahan Water Treatment Plant, c. 1939



Engineers Cottages. - April 1905

Charleston Light & Water Co

Goose Creek Reservoir dam, c. 1905





Filter building, 1920

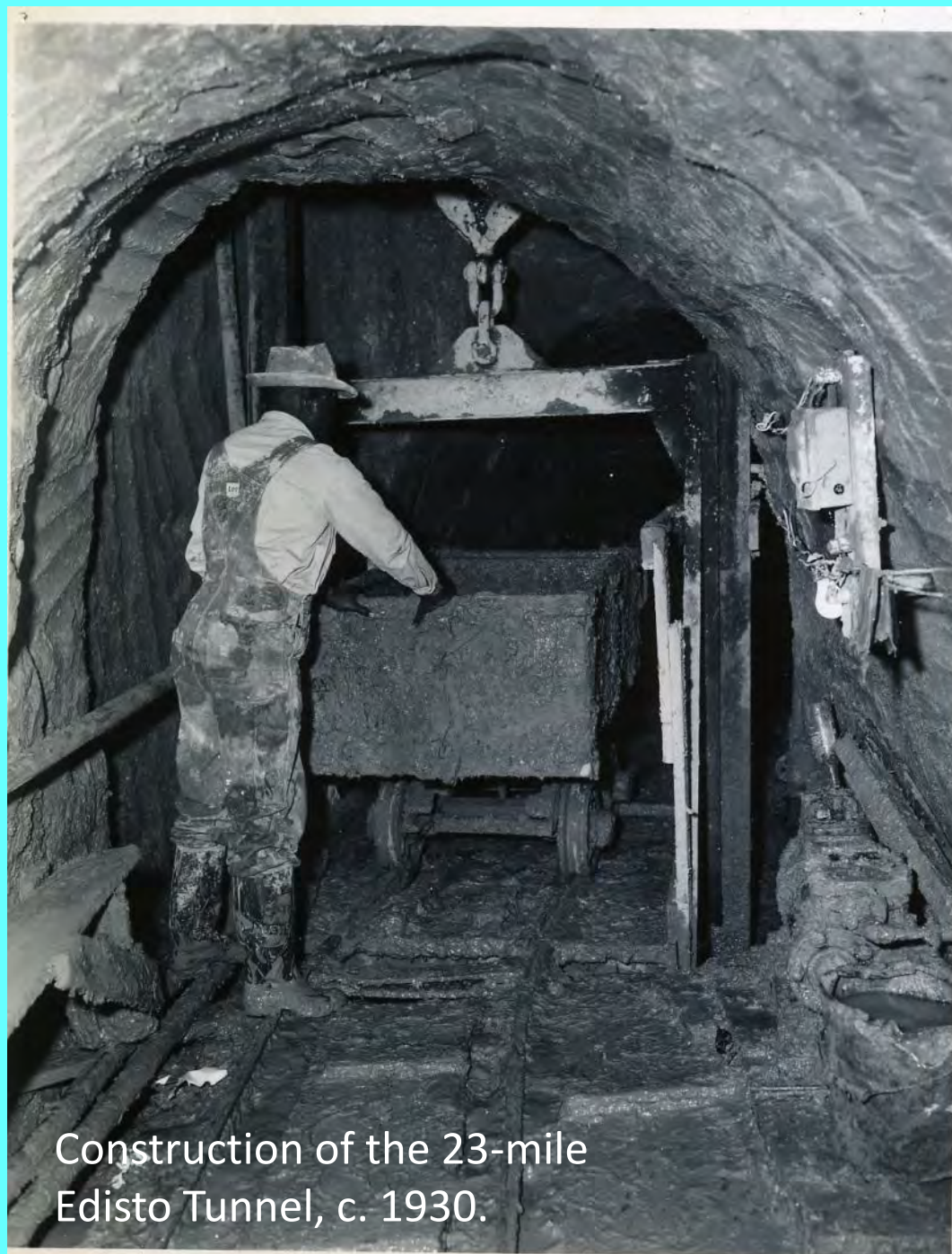


Goose Creek Reservoir intake, 1924



COMMISSIONERS, BIDDERS AND OTHER INTERESTED PARTIES
ATTENDING OPENING OF BIDS ON
EDISTO-ASHLEY RIVER TUNNEL
ADDITIONAL WATER SUPPLY FOR CHARLESTON, S. C.
DEC. 5, 1927.

MELCHERS
27 AS 24



Construction of the 23-mile
Edisto Tunnel, c. 1930.



EDISTO-ASHLEY RIVER TUNNEL - INLET FOREBAY & SHAFT - DEC. 5, 1928.



Progress Photos: Low Service Pump Room. 10/17/46.

Gibson
pump
station
construction
, 1946.



TRESTLE & PIPE COMPLETED.
TAKING UP TRACK, WEST TRESTLE,
NOISETTE CR. AT RHETT & HELM AVE'S.
AUG. 13. 1941.



Hanahan Plant, 1954.
Sedimentation basins (still in service)



McDowell Tunnel grand opening, 1955. Supplemented the Goose Creek Reservoir with water from Foster Creek.

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1950	McDowell Tunnel (1955) supplies water from Foster Creek Cement-lined ductile iron pipes	Pollution in Charleston Harbor worsens, gains attention CWS assumes operation of sewer system (1965), builds Plum Island WWTP and deep tunnels (1971)
1971		
Today		

Health Service Uncovers Suspect In Fish Deaths

By BELVIN HORRES
Evening Post Staff Writer

A suspect in the death of millions of fish in waters about Charleston has been uncovered.

T. Allen Wastler, head of a U.S. Public Health Service harbor pollution study here, said it has been found that the concentration of carbon dioxide in waters of the Ashley River has been found to be 88 milligrams per liter.

Biologists say that this is more than four times the amount of free carbon dioxide in sea water needed to kill certain species of fish.

Dr. Robert G. Lutz, head of Bears Bluff Laboratories on Wadmalaw Island, said he has not made a study of the effect of CO-2 on fish in salt water but that the concentration seems "extremely high" and that he would look into the matter.

Carbon dioxide content is no doubt caused by industrial waste and sewage dumped into the harbor waters.

"We are taking steps to obtain additional equipment to pursue the study further," Wastler said.

He pointed out that it would take additional research to determine if the CO-2 content of the harbor was the main culprit. "It could be that it (the CO-2 content) is among other reasons for the fish deaths," he said.

The study of carbon dioxide began early this week after it was noted that numerous small bubbles were appearing on the waters, especially in the Ashley River.

"Carbon dioxide surplus would cause fish to act as though they were drunk or suffering brain damage," Wastler said. These symptoms have been noted in fish dying in the harbor.

A THREE-PRONGED investigation into the fish deaths has

been in progress by the USPHS. The South Carolina Pollution Control Authority is making its own investigation.

Wastler, making no claim an authority on fish and cause of the deaths, said a league had informed him that 20 milligram per liter of carbon dioxide content in sea water "could make a fish awfully and possibly cause death."

The PHS Southeastern Laboratory at Athens, Ga. earlier this week, that of water samples taken from the harbor had shown a high degree of pollution.

However, the laboratorians could not pinpoint the cause of pollution. The laboratorians report on its findings was forwarded to Wastler.

The Robert A. Tamm Sanitation Center in Columbia also is studying the cause of the fish deaths. The center is cooperating with the South Carolina Pollution Control Authority in studying the matter. Carbon filters are being used.

Water Pollution Law Is Signed

Communities and individuals now have seven years in which to prepare for the ultimate requirements of the Charleston harbor pollution law.

Passed by the General Assembly, the measure has been signed by the governor. It holds promise that fouling of local waters will eventually be just about ended.

The law prohibits any municipality or person from dumping untreated sewage into the county's tidal waters after July 1, 1970.

It stipulates also that municipalities engaging in this practice must, by July 15, 1964, submit plans for treatment plants. The plans must include anticipated methods of financing, engineering studies, possible plant sites and tentative dates for beginning construction of the plants.

A fine of \$1,000 a day may be levied on any municipality violating the law after the 1970 date, and a fine of \$20 a day for individuals who violate it. Where the latter can show that it is impracticable or unfeasible for them to treat the sewage, the law allows exceptions.

This is not hasty legislation. It is based on long studies, and is designed to end a bad situation. It gives those affected ample time in which to prepare. It is the culmination of a long period of concern over water pollution and

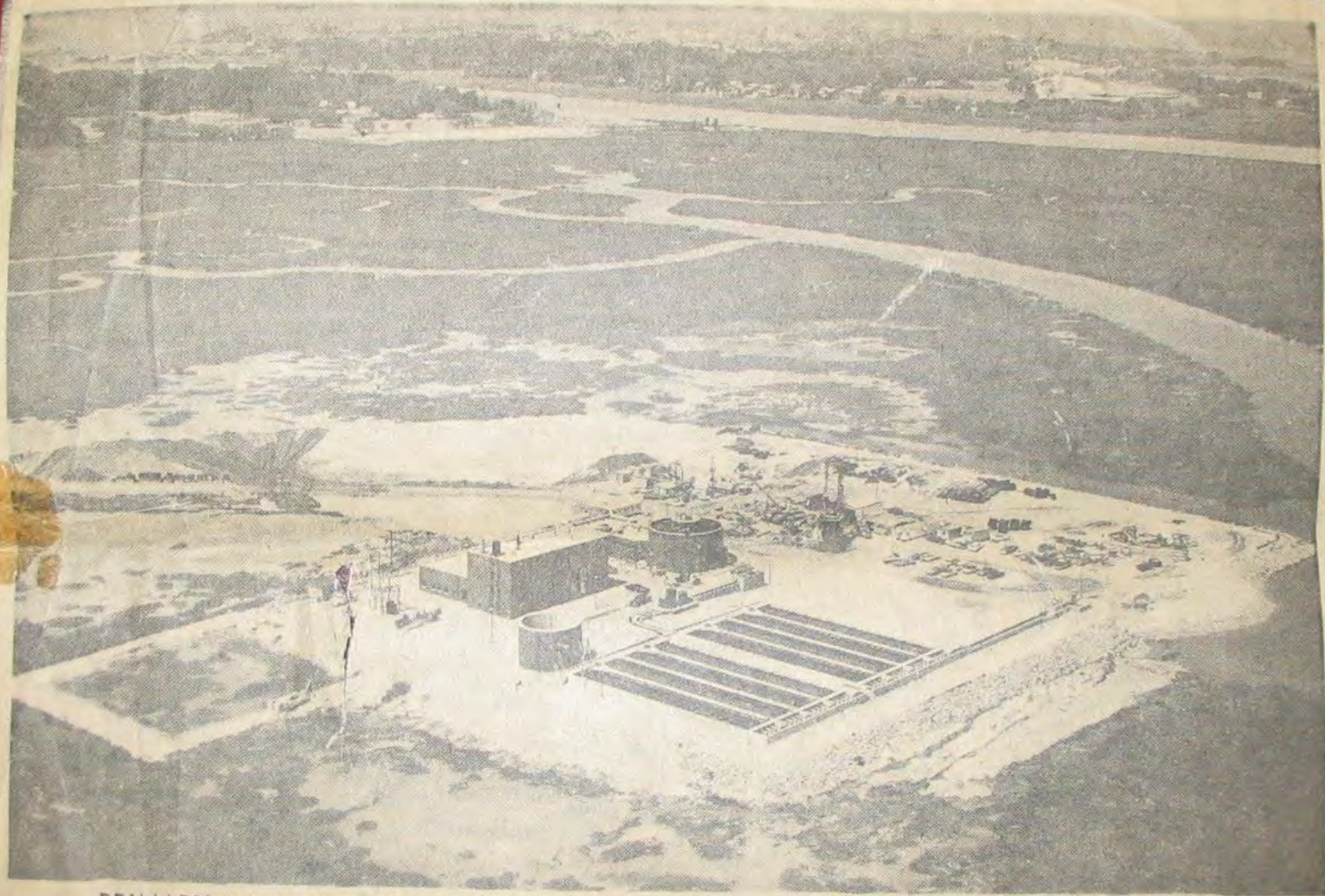
APR 2 1965



Plum Island Wastewater Treatment Plant construction, c. 1969.



Sewer tunnel system construction, c. 1969.



PRIMARY SEWAGE TREATMENT PLANT TAKING SHAPE IN ASHLEY RIVER MARSH

The city of Charleston's primary sewage treatment plant on Plum Island is scheduled to start operating in mid-June, according to Water Works director John R. Bettis. Raw sewage from throughout the city will be piped to the island where a pumping station, the larger of two circular structures, will pump the sewage to the long, rectangular settling and treatment basins. There the solids will be chemically treated and will settle to the bottom of the basins. The smaller circular structure is a holding tank for solids,

The large building between the pumping station and holding tank houses vacuum filters and an incinerator where the solid waste will be burned. The pumping station, which extends about 125 feet below the ground, will not be receiving sewage from the east side of the peninsula until about year end, Bettis said. This aerial photograph was taken from southeast of the plant with the Wappoo Creek and West Ashley suburbia in the distance. (Staff photo by Jordan)

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1971	Bushy Park Reservoir becomes primary water supply after extension of McDowell Tunnel from Foster Creek into reservoir (1998)	Plum Island Plant upgrades Replace deep sewer tunnel system
Today		

Investing in our Infrastructure



Cross section of cast iron water main, cir. 1941, replaced 1991.

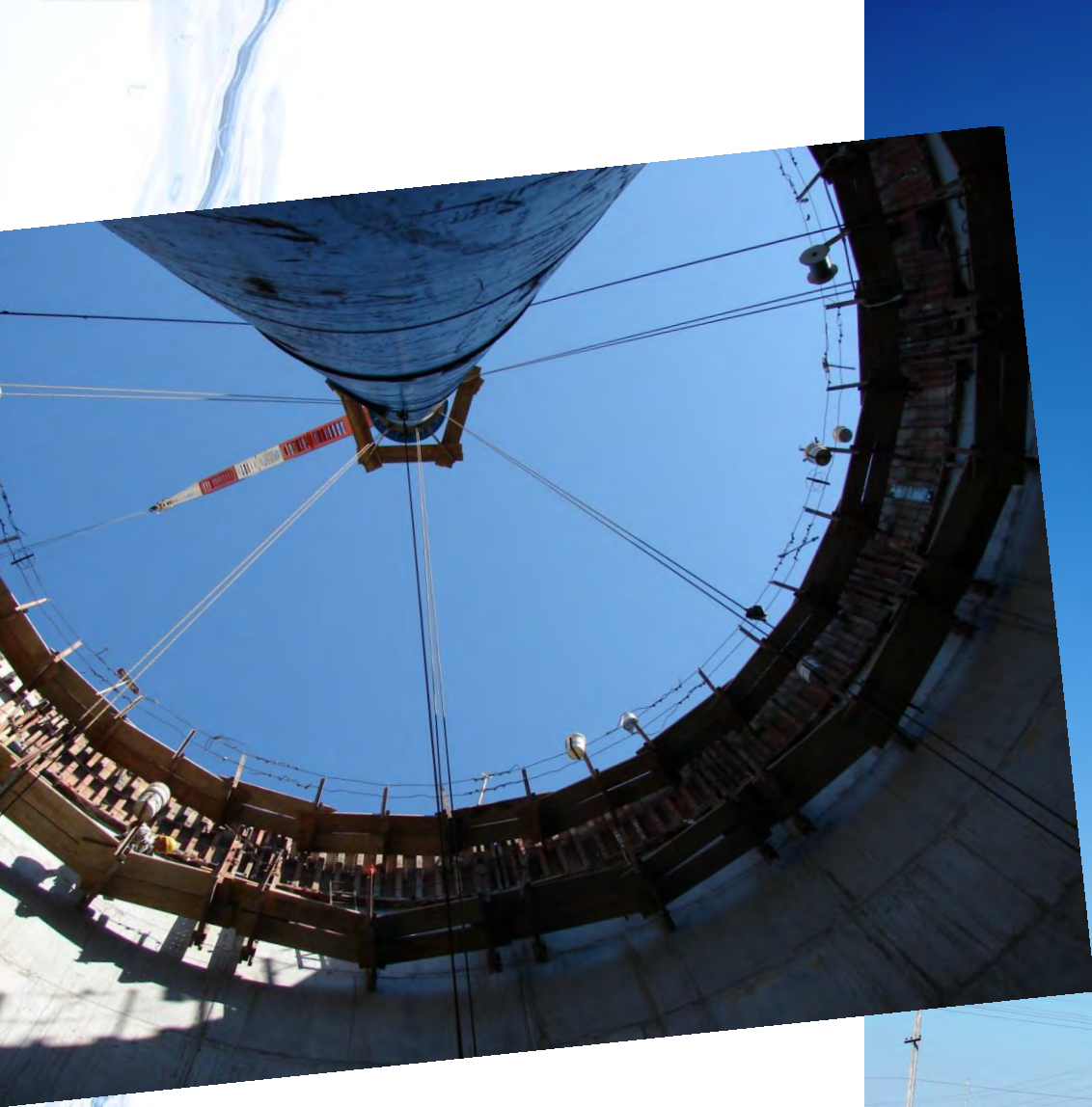
“The vast majority of the nation’s pipe network was installed after World War II and is now reaching the end of its useful life.”

— US Environmental Protection Agency, *Clean Water and Drinking Water Infrastructure GAP Analysis Report* (September 2002), p. 14.



New filter basins , piping, and chemical tanks. \$19 million.







30-inch water main, Grimball Road, James Island, Winter 2007.

Charleston Water System

Sewer Tunnel Replacement Project











Aeration and emergency generator project : \$ 18 M

Public water systems protect public health by preventing the spread of disease.



**Public health
Fire protection**



**Public health
Environmental protection**

Global Water Crisis

- Some one billion people—one-seventh of the world's population—do not have access to safe water. (WHO, 2010)
- Lack of safe water and adequate sanitation is the world's single biggest cause of illness. (U.N. Report, 2005)
- The impact of diarrheal disease on children is greater than the combined impact of human HIV/AIDS, tuberculosis and malaria. (WHO, 2010)



The average distance that women in developing countries walk to collect water per day is four miles and the average weight that women carry on their heads is approximately 44 pounds.
(Change.org, 2004)





Water that is already muddy is often further contaminated by livestock and other humans.

Access to water can often be dangerous, or extremely time consuming.



Living Water™ Treatment System

- 💧 Easily transportable
- 💧 Acts as a “Mini Municipal Water Treatment Plant”



How does it work?



- Can purify over 10,000 gallons of water per day
- Systems put together in Charleston by volunteers
- Powered by Solar Energy in most locations
- Less than one penny, per person, per day
- Microenterprise Program

Community Development

Three to five community members are trained to maintain and operate the system, and educate the community.



Sanitary Pit Latrine Development

Sanitation, which we take for granted, is non-existent for more than 2.5 billion people around the world – that's 38% of the world's population.



More often that not, their drinking water sources are contaminated as a result.

Education



Sanitation knowledge and resources that we take for granted are shared with communities receiving safe water solutions to ensure that the clean water stays clean. Simple practices such as washing hands before eating or preparing meals are often absent.

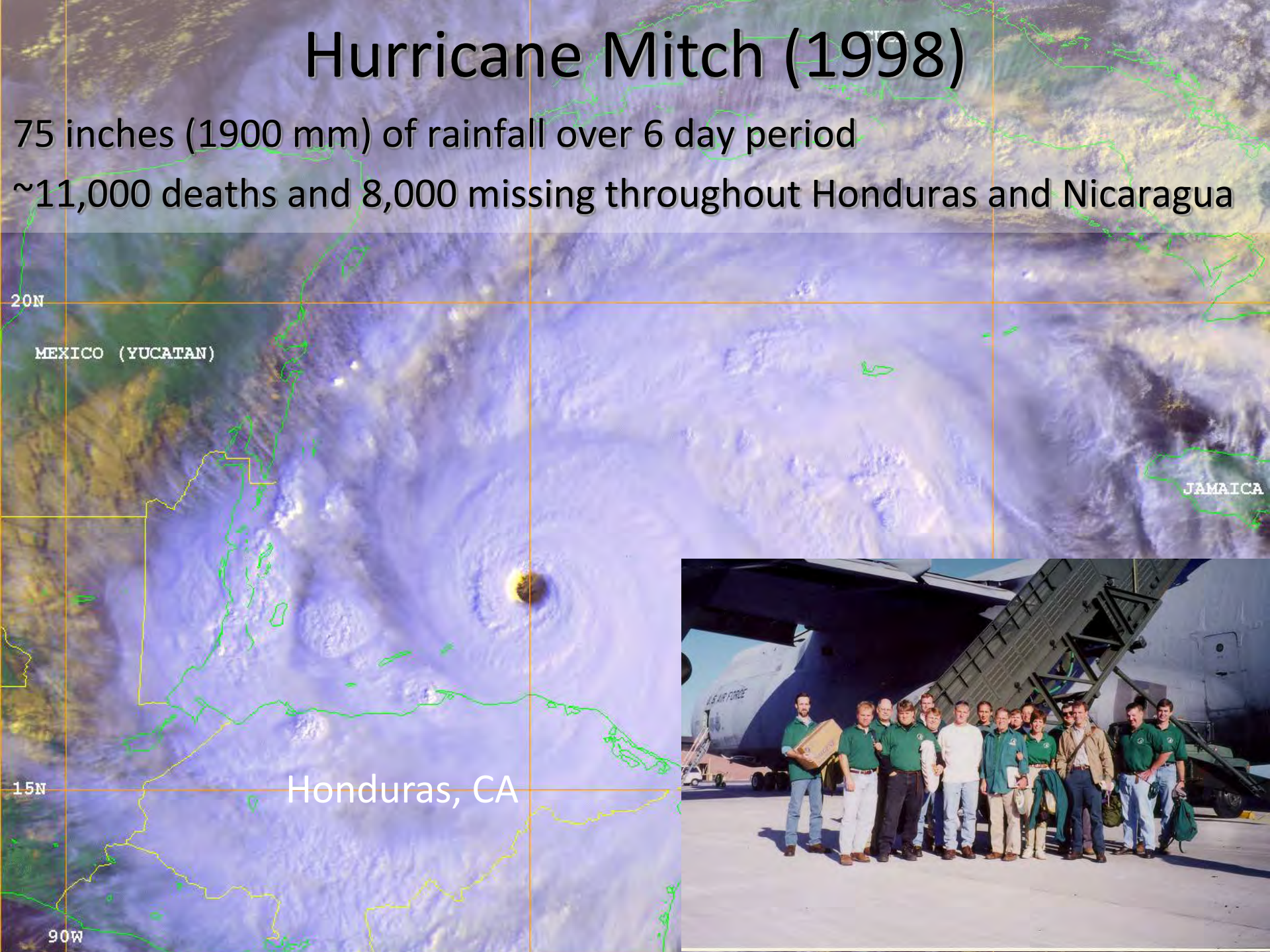


Disaster Response

Hurricane Mitch (1998)

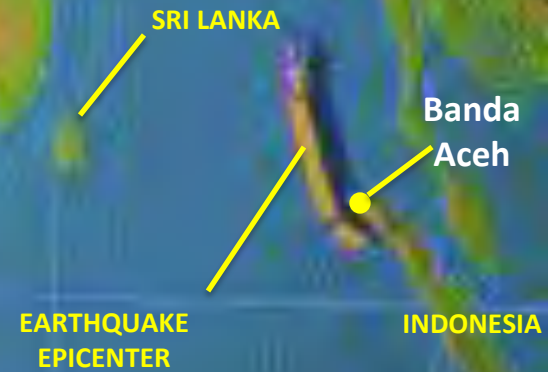
75 inches (1900 mm) of rainfall over 6 day period

~11,000 deaths and 8,000 missing throughout Honduras and Nicaragua



Tsunami (2004)

- Waves as high as 100 ft
- ~210,000 deaths throughout SE Asia



Hurricane Katrina (2005)



300 Purchased by WMI

+ 100 Donated by Pentair

400 Well Pumps to install

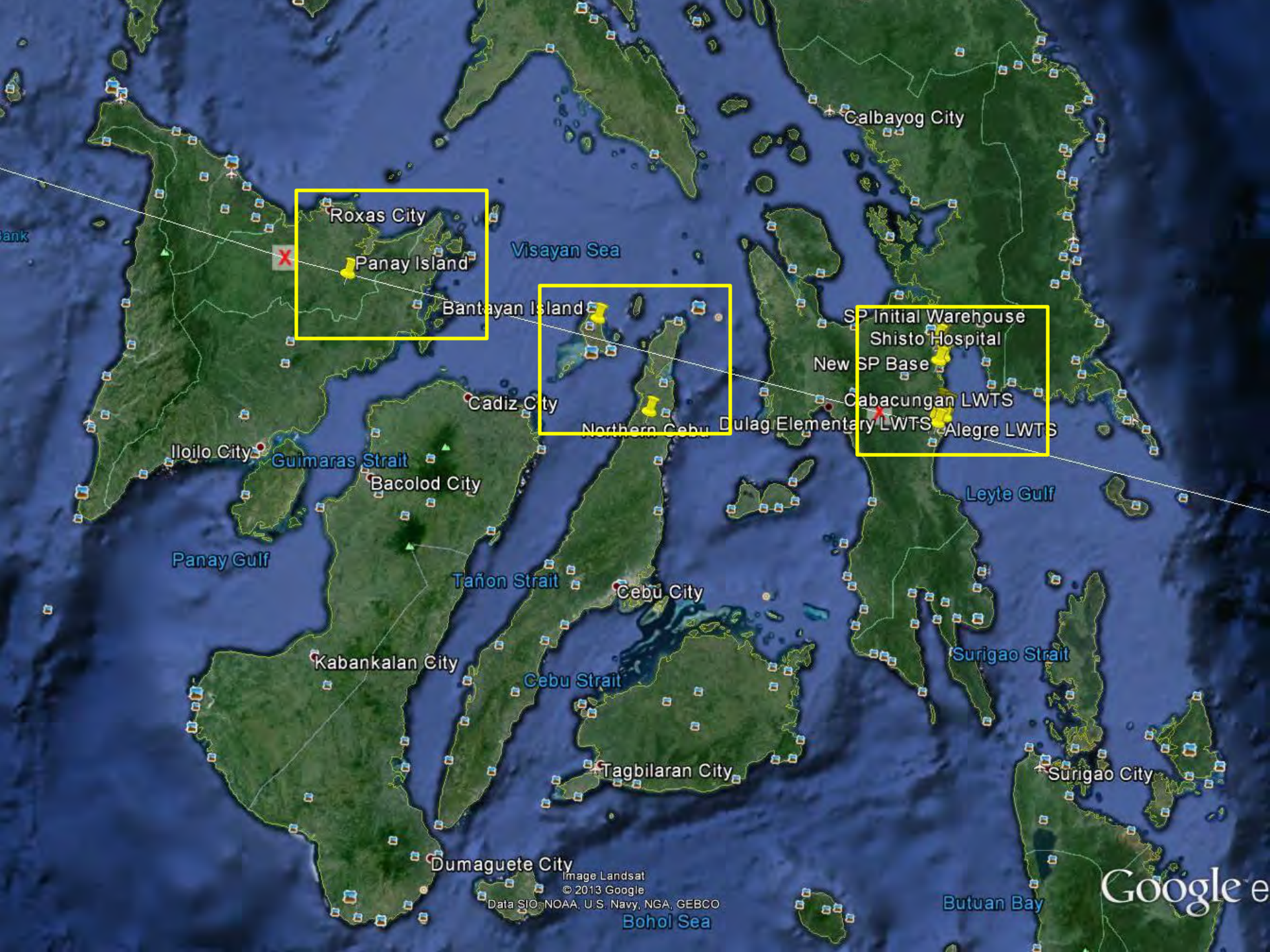
Haiti Earthquake (2010)





Typhoon Haiyan (2013)

- 195 mph sustained winds, 325 mph gusts (strongest ever at landfall)
- ~6,000 deaths in Philippines alone, ~4 million displaced



Roxas City
Panay Island

Bantayan Island
Northern Cebu

SP Initial Warehouse
Shisto Hospital
New SP Base
Cabacungan LWTS
Dulag Elementary LWTS
Alegre LWTS



Kikondo, Uganda

LEGEND

- Pump House
- ◇ LIFELINK Unit
- ⬡ Pump/Treat House
- ⊙ Reservoir Tank
- ⊙ Treatment House
- ▣ Underground Vault
- △ Business Centre
- ⊘ Lake Intake
- Supply Piping
- Distribution Piping
- ⋯ Power/Control Cable



There is an old African proverb that goes like this:
If you want to go fast, go alone. If you want to go far, go together.

GRUNDFOS 

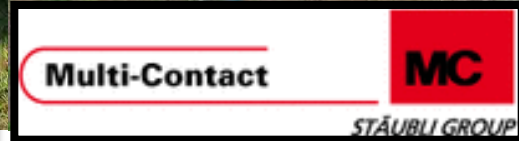


Water Missions 
Uganda

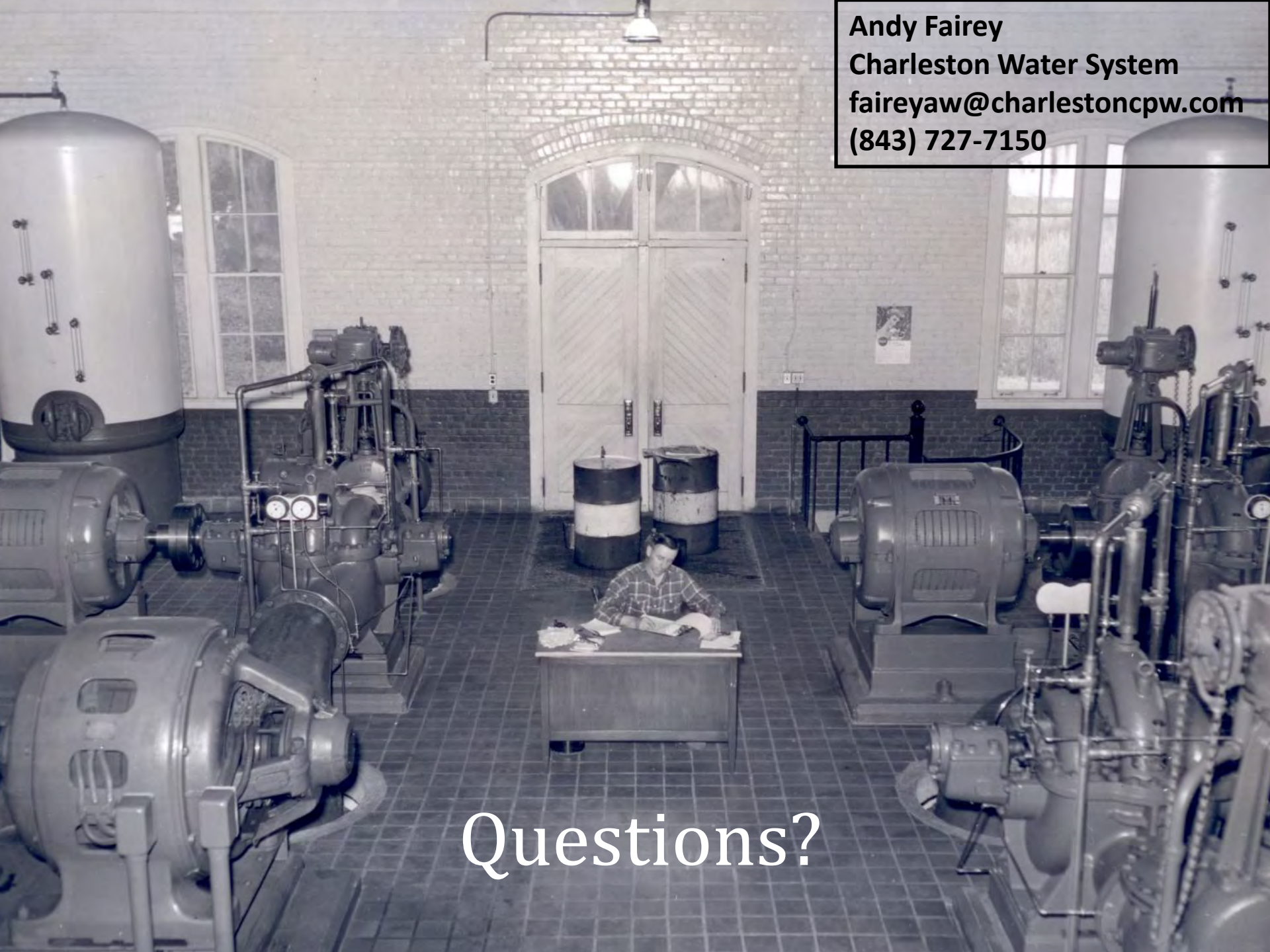
Kikondo TradeWater Project

Safe Water - Amaazi Amalungi
Public Bathing Shelter - Ebinabiiro Bya Bulikinomu
Phone Charging - OkuKyajjinga Amasiimu
Contact the WMU Water Agent on: 0701-178301

Contact our office on 0414 680 106, Plot49, Wilson Road, Jinja.
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Questions?