



**SAVE YOUR WATER**

NASHVILLE'S WATER IS RUNNING LOW AND NEEDS YOUR HELP

**GOOD**

- BOTTLED WATER
- PAPER PLATES
- FEWER FLUSHES

**BAD**

- LAUNDRY
- CAR WASH
- LAWN WATERING

LIKE WATER TO DRINK? MIGHT BE TIME TO STINK.  
MORE INFO: [TENNESSEAN.COM/WATER](http://TENNESSEAN.COM/WATER)



# Historic Flood Impact on the Nashville Drinking Water System

Scott Potter, Director  
Metro Water Services, Nashville, TN

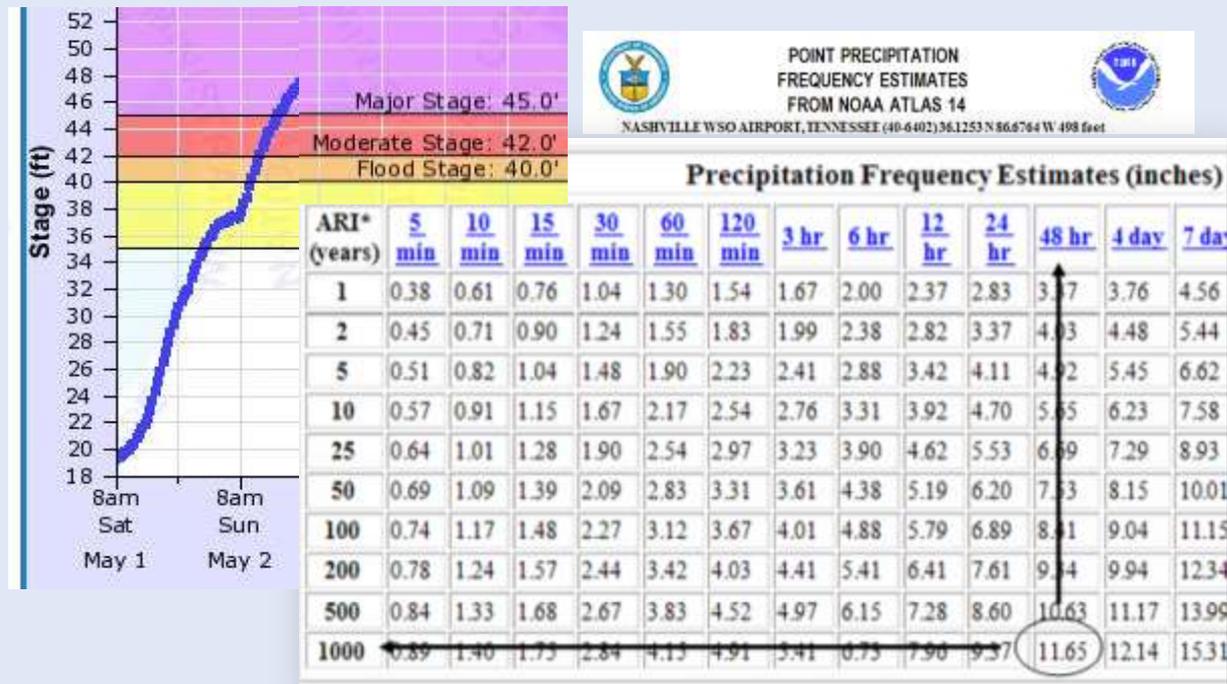


# Historic Event = 13.53"/48 Hours

**May 1** – 6.32" of Rain = 3rd greatest one-day rainfall total in Nashville's history

**May 2** – The wettest day ever in Nashville:

- Greatest rainfall in a 6 hour period = 5.57"
- Most rainfall in 12 hours = 7.20"

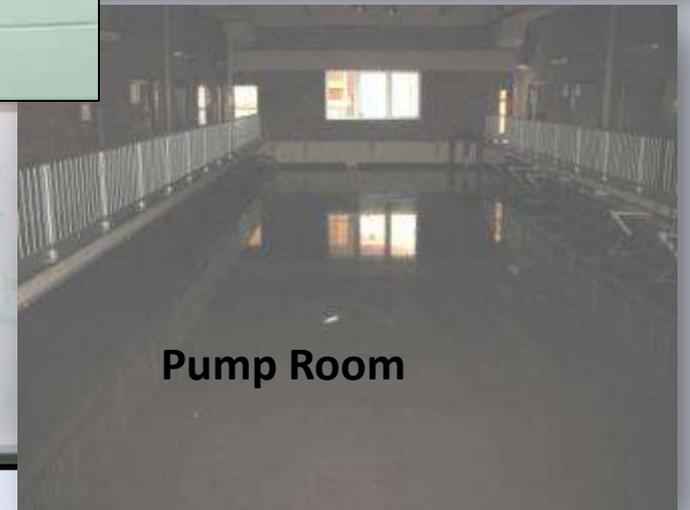




# May 2 - K.R. Harrington WTP Floods



Lee Luton,  
Plant Manager



Pump Room

# May 2 – Dry Creek WWTP Floods



# May 3 – Protect Omohundro WTP

3pm - Latest Crest Projection: 52.5' at 8 p.m. Flood stage: 40.0'



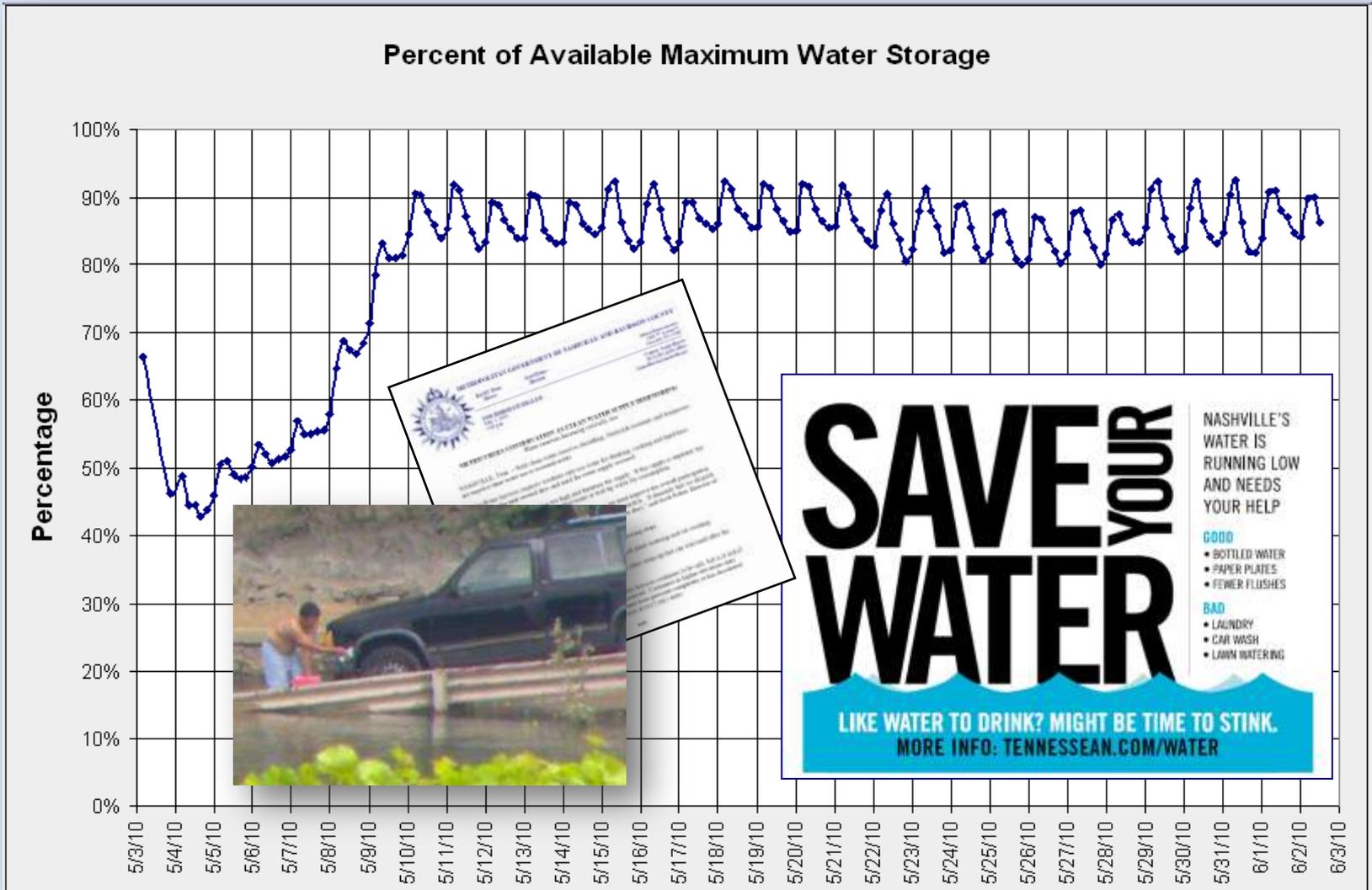
# Reservoir & Pump Station Damage



**28 Pump Stations Damaged**



# Water Reserves & Conservation



# May 4 – Recovery Begins

- Emergency procurement procedures allow on the spot bids & awards
- 270 flood-related purchase orders issued in May
- \$13 million in flood-related procurement in May



# System Services Priority: Locate/Repair Leaks

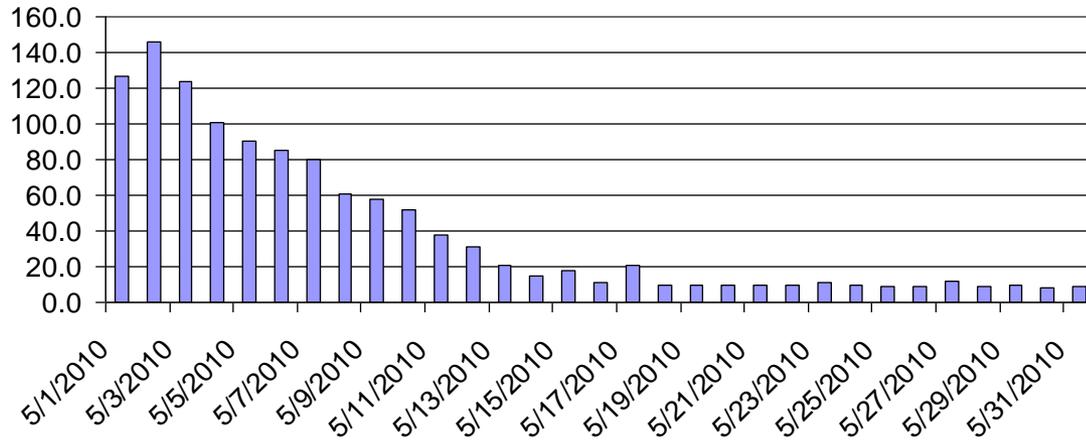
39 Water-related emergency repairs in May

- 22 water mains
- 10 water service lines
- 7 fire hydrants



# May: Water Quality Threatened

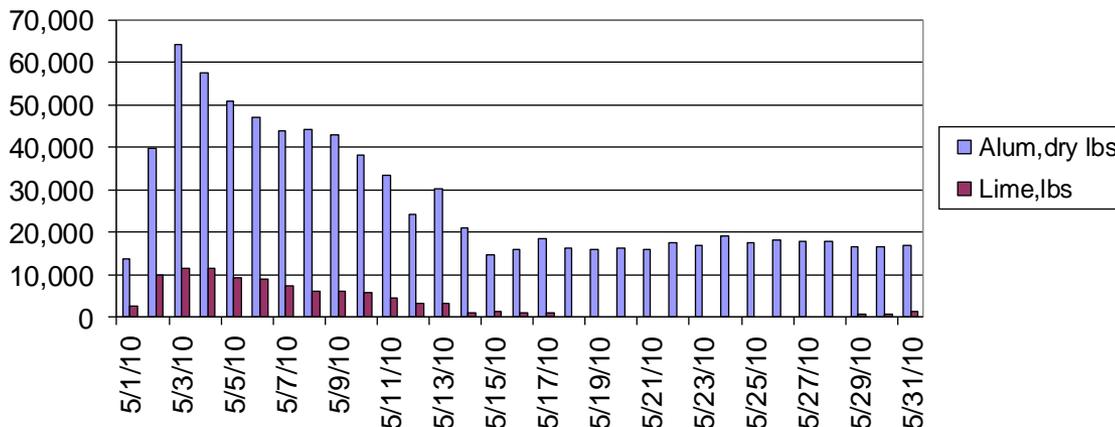
**Omohundro WTP Raw Turbidity**



## Turbidity

- May 3, 5am = 146 NTU
- Normal = 9 NTU or lower

**Omohundro WTP Coagulant & Hydrated Lime Use**



## May Chemical Costs

- \$212,473
- Normally \$50K - \$70K

## May Electrical Costs

- \$304,000
- 2X normal monthly cost

# One month later – June 1 – WTP Online Recovery: K.R. Harrington WTP

- Four 2500 hp pumps repaired
- Electrical circuits replaced
- Clear well structure assessed
- Disinfection & Water Quality Testing
- Repair of solids building walls
- Dry out records



# Mitigation: K.R. Harrington WTP

- Relocate generators, switch gear
- Add 5<sup>th</sup> generator = increase capacity to 90mgd
- Raise clear well vents
- Seal wall penetrations
- Elevate chemical feed system



# Dry Creek WWTP

## Recovery

- Last violation: July 2010
- Repair/replace electronics
- Timeline: Winter 2012

## Mitigation

- Wall around plant
- Storm drain closures



# Biosolids Facility

## Recovery

- Online: September 2010
- Work on critical process areas:
  - electrical system
  - thickening process
  - digester control system
  - heat drying process
- Additional repairs:
  - repair fixed digester cover
  - replace digester membrane covers
  - minor electrical work

## Mitigation

- Elevate electrical substations
- Wall options
- Storm drain closures



# Recovery: Sewer Line Cleaning

Inspection of pipes and removal of flood-related debris

- May 2012: 6,702,000 pounds of debris removed by contractors (ongoing)
- New initiative: all sewers of at least 8 inches diameter and larger will be inspected and cleaned every 5 years



# Recovery: Reservoirs



- Warner Park
  - 250' access road
  - Completed Fall 2010
- West Meade Hills
  - Access road, water line
  - Completed Fall 2011
- Oak Hill
  - Earthen slope
  - Drain lines and piers
  - Completed Fall 2011

# Pump Stations

## Recovery

- Online May 12, 2010



## Mitigation

- May 2012: ~50% complete
- Elevate generators
- Relocate electrical panels
- Relocate conductor cable
- Dry pit submersibles



# Recovery: Stormwater/Watershed Group

- Water quality reconnaissance: walked/canoed streams
- 105 Geo-Mean bacteriological samples taken for TDEC
- 34 Hazardous waste locations reported for EPA remediation
- 20 Large debris fields located & mapped
- Identify sites for volunteer cleanups
- 2011: work with Mayor's Office to match private property damage needs to non-profit resources



# Recovery: Stormwater Infrastructure

- 698 Project Locations
  - Replace damaged roadway culverts
  - Remove debris from culverts, inlets channels
  - Redefine eroded channels



# Mitigation: Metro Center

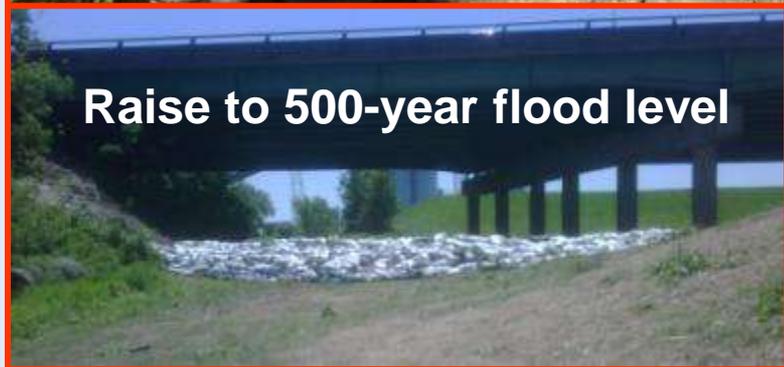
## Stormwater pump station

- New power distribution
- System
- Additional electrical/pump building



## Levee

Remove vegetation and plant grass on both sides



# Mitigation: River Bank Stabilization

- Completed April 2012
- Collaboration with NRCS





# Recovery: Engineering

- 2,800+ flood related purchase orders
- FEMA Reimbursements:
  - 234 Project Worksheets Approved
  - 57 on Appeal
  - **MWS accounts for 35% of all Metro project worksheets, 40% of the dollar value**
- Project management, procurement, documentation, record keeping, regulatory accounting



# Recovery: Costs

## Treatment Plants and Conveyance

- 2 Water plants  
3 Sewer plants  
= **\$22 million**
- 28 Sewer pump stations  
3 Water pump stations  
3 Reservoirs  
= **\$7.5 million**

## Distribution and Collection System

- Richland Creek Sewer  
= **\$2.5 million**
- Water and sewer line repairs = **\$3.0 million**
- Over 100 stormwater sites  
= **\$9.6 million**
- Metro Center Stormwater Pump Station replacement  
= **\$4.9 million**

# Recovery: Permits/Stormwater Review

- With Metro Codes & Planning Departments
- 8,033 Residential Flood Repair Permit Customers Assisted May 2010 – June 2011



# Flood Hazard Mitigation Home Buyouts



## May 2010

S	M	T	W	T	F	S
						1
				6	7	8
			13	14	15	
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

**May 1 & 2  
Flooding**

## June 2010

S	M	T	W	T	F	S
						1
				6	7	8
			13	14	15	16
20	21	22	23	24	25	26
27	28	29	30			

**June 22 Letters of  
Interest to Purchase**

## July 2010

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

## August 2010

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

**Aug. 1 Homeowners  
Return Letters**

## September 2010

S	M	T	W	T	F	S
						1
				6	7	8
			13	14	15	16
20	21	22	23	24	25	26
27	28	29	30			

**Sept. 21 Council  
Approves Application**

**Sept. 23 to TEMA**

## October 2010

S	M	T	W	T	F	S
						1
				6	7	8
			13	14	15	16
23	24	25	26	27	28	29
30	31					

**Oct. TEMA  
Application to  
FEMA**

## November 2010

S	M	T	W	T	F	S
						1
				6	7	8
			13	14	15	16
23	24	25	26	27	28	29
30						

**Nov. 29 Approval  
Received From FEMA  
First Package: 81 Homes**

## December 2010

S	M	T	W	T	F	S
						1
				6	7	8
			13	14	15	16
23	24	25	26	27	28	29
30	31					

**Dec. 15  
First 3 Closings**



# Home Buyout Costs

Total Project Cost = \$44,439,170

Total Funds Spent = \$28,813,951

Total Funds Reimbursed = \$6,623,145

Total Reimbursement Submitted = \$9,373,258

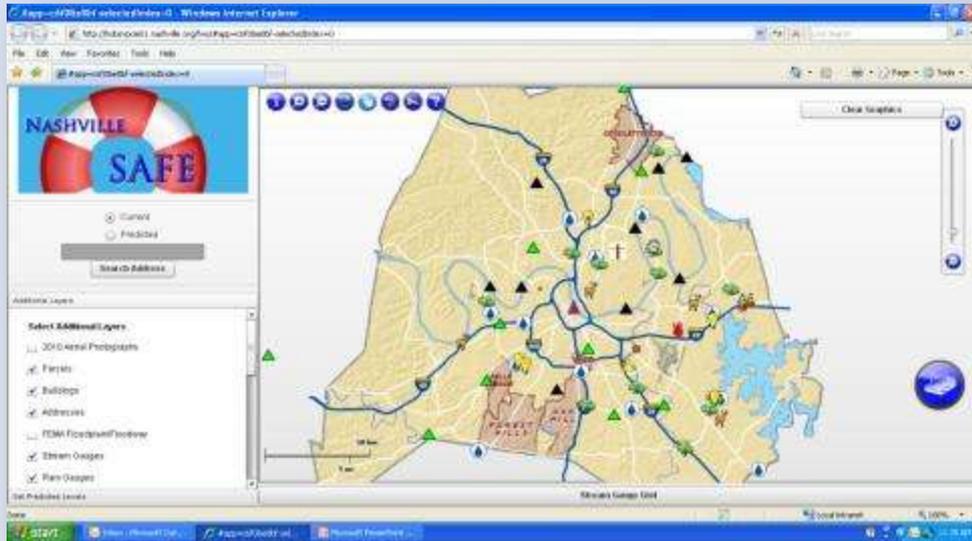




- Catalog of potential projects
- Evaluation process



# New Forecasting & Warning Systems

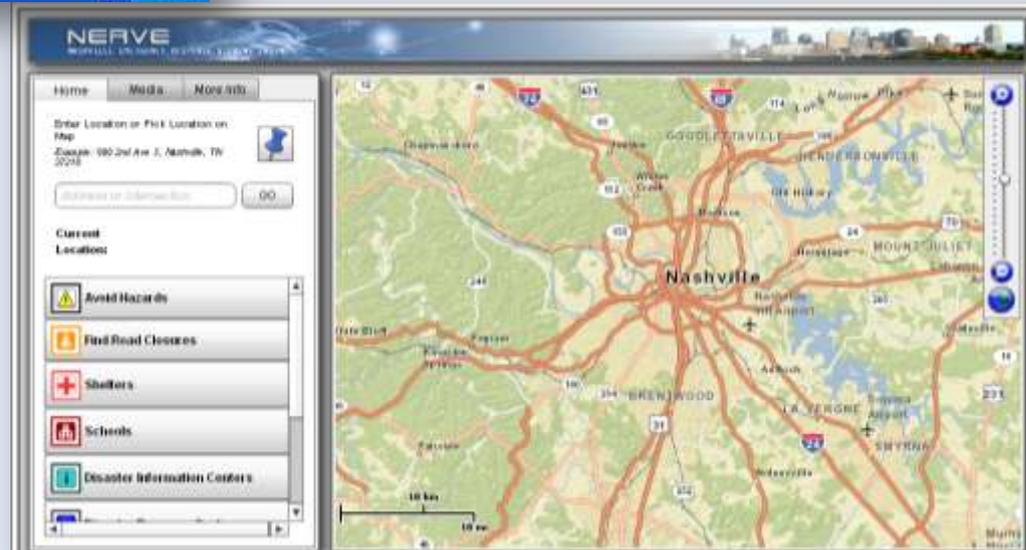


## Nashville SAFE: EOC

- Inundation mapping
- Timing charts
- Predictive action level maps

## NERVE: Public/Media

- real-time information
- road closures
- school closings
- Shelters, etc.





# QUESTIONS?

Scott Potter, PE

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