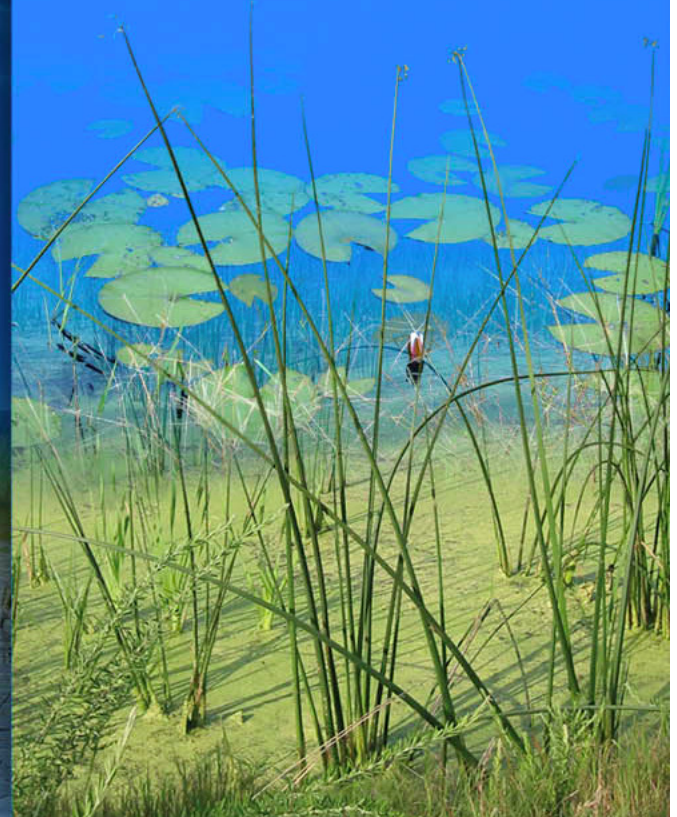


Sustainable Approaches for Total Water Management

The Clayton County Water
Authority Story

Jay Kirk

CH2M HILL



Discussion Outline

- Developing a total water management utility
- Stormwater management approach
- Water supply planning & treatment
- Water reclamation planning and how constructed wetlands fit into CCWA's business model for "Sustainability"



Total Water Management

- Integrated approach to water resource management
 - Needs
 - Sources
 - Management areas
 - Stormwater/Watershed Mgmt
 - Water Supplies
 - Wastewater
 - Sustainability



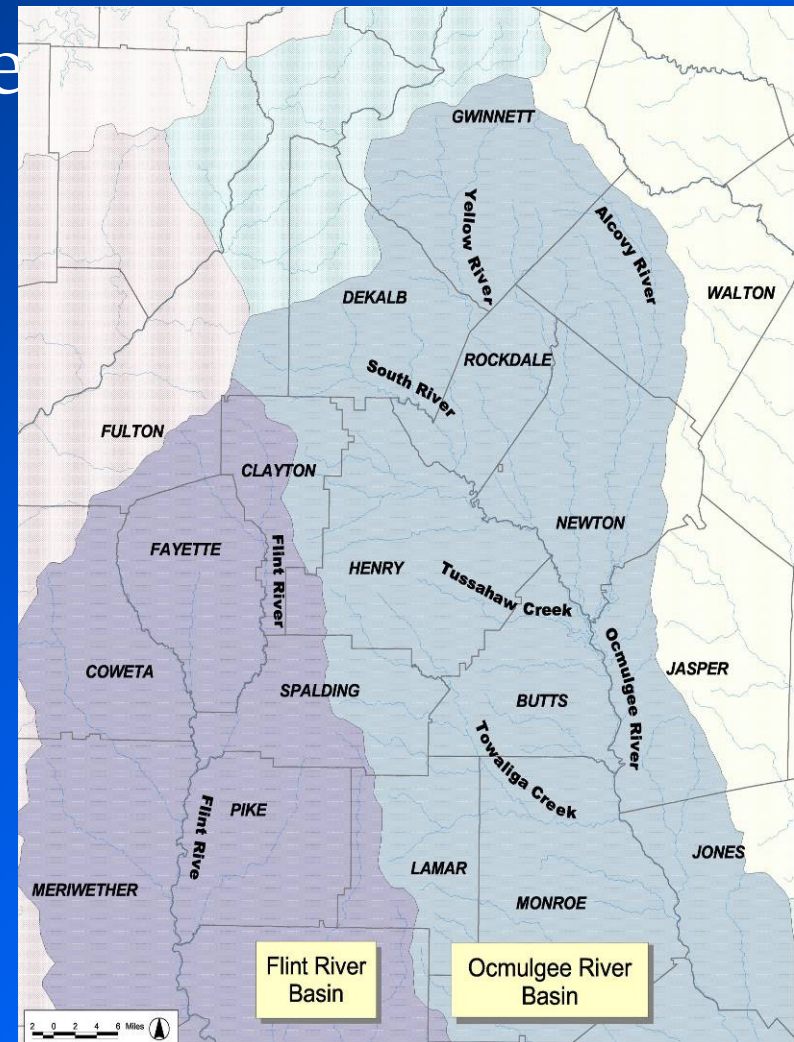
CCWA Background

- Provide drinking water, wastewater treatment, and stormwater management services for the County and 6 Cities
- Over 78,000 Accounts
- Serving over 270,000 people
- Created in 1955 to provide water and wastewater services to a rural, unincorporated area
- Capable management and planning resulted in Authority being preferred service provider



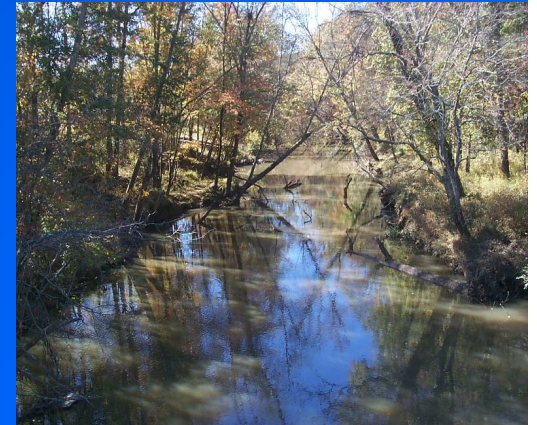
Clayton County Situation

- Surface water supplies are very limited
- Limited groundwater availability
- 2007 Drought
 - Within 1/2 inch of worst on record
 - Storage volume never fell below 77% of capacity
 - Storage is currently 100%



Watershed/Stormwater Management

- Watershed Management became a permit requirement in 1990's
 - CCWA developed comprehensive watershed management and protection plans
 - Comprehensive monitoring program
 - CCWA had limited influence over land use and stormwater management practices
- Developed County-wide watershed management and protection plans
 - Dependent on other agencies for much of implementation
 - Stream Improvement plan
 - Source Water Protection



Stormwater Utility

- Increasing Federal, State & Regional mandates increased need for cooperation with County agencies
 - Metropolitan North Georgia Water Planning District Plans
- Feasibility Study recommended County-wide stormwater utility managed by Water Authority
- New utility was implemented in 2007

Stormwater Utility

- Utility developed to:
 - Equitably fund mandates,
 - Protect water quality, water supplies,
 - Manage stormwater infrastructure
 - Proactively address flooding issues
- Utility fee included on water bill
 - Looks & feels more like utility
 - Monthly rather than annual bill
 - Water Authority better equipped to manage

Stormwater Utility Activities

- Asset Management
– maintenance and capital improvements

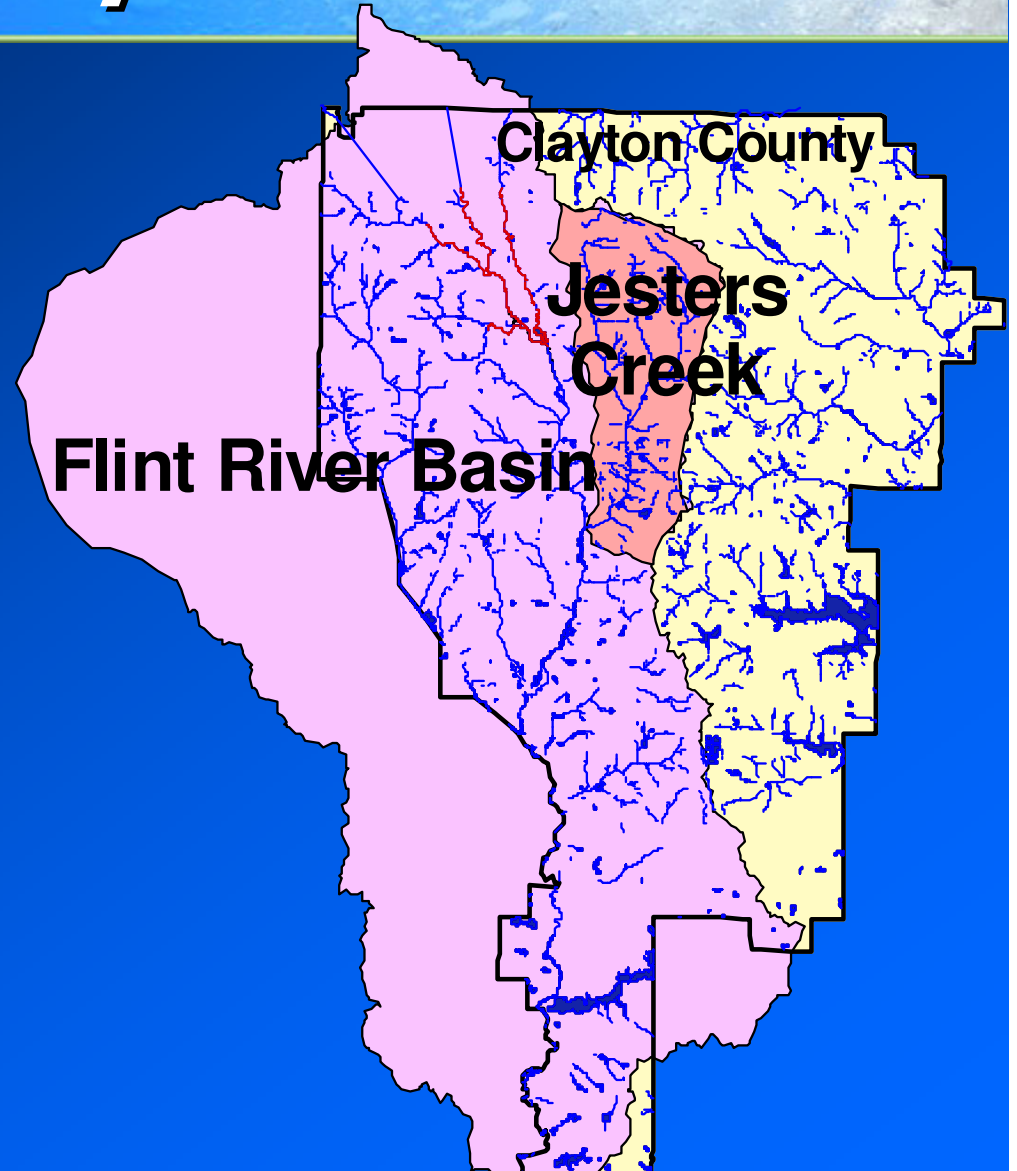


Stormwater Features for District 12 Land Lot 81

- Drainage Node
- Open Channel
- Storm Line
- Edge_Of_Pavement

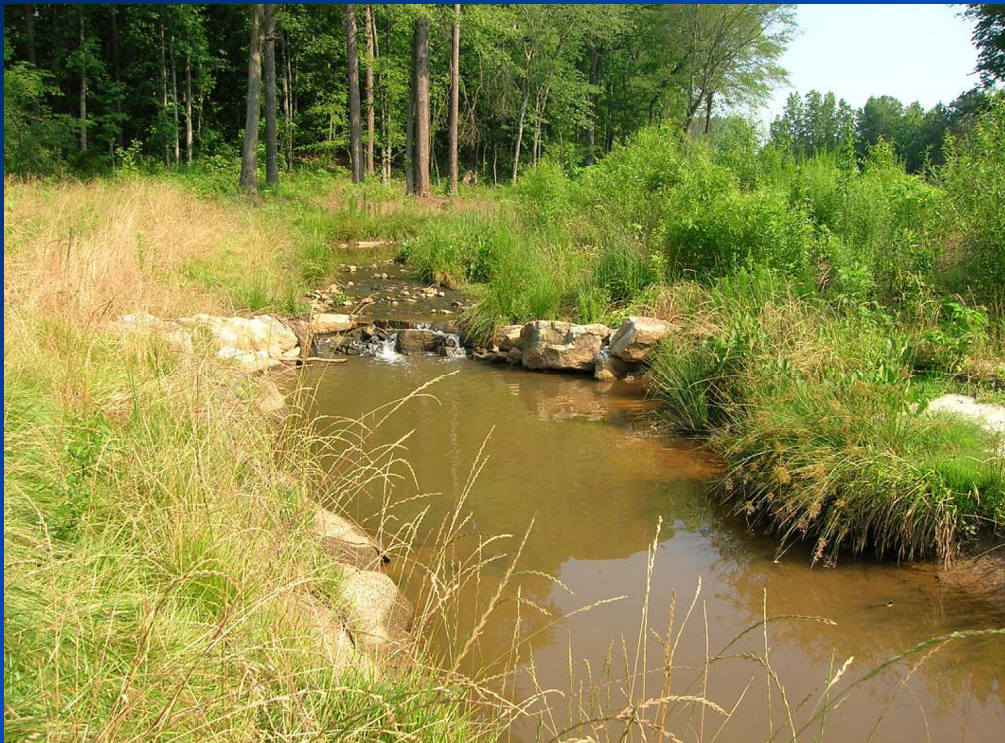
Stormwater Utility Activities

- Watershed management
 - Master Planning

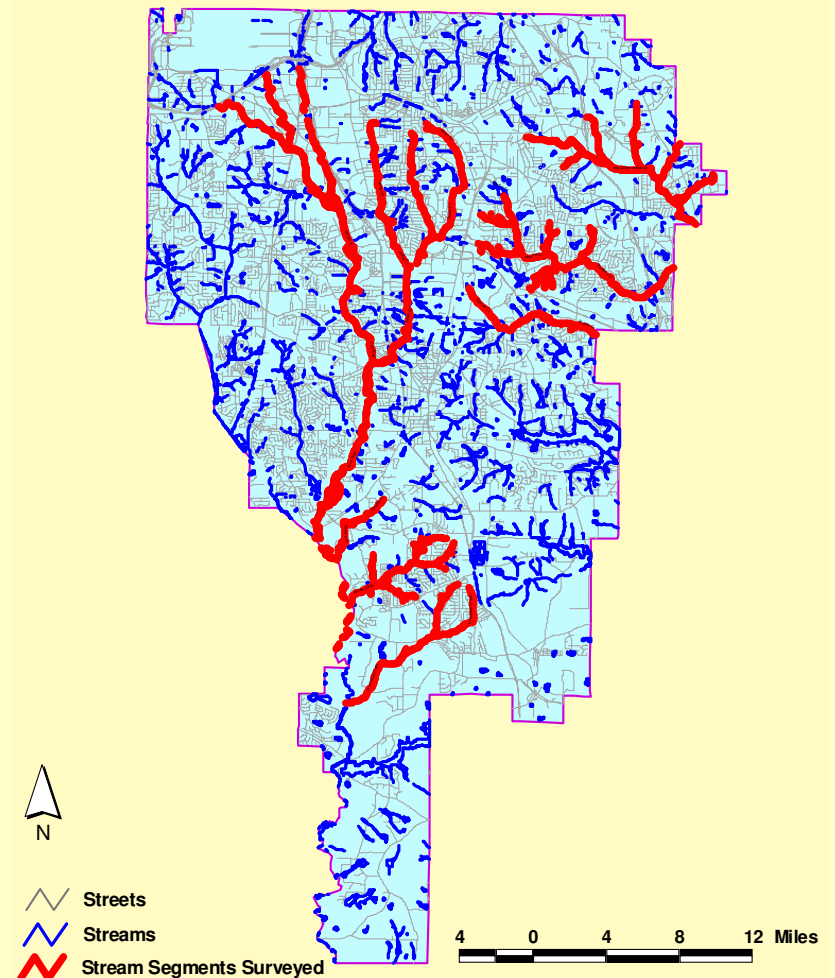


Stormwater Utility Activities

- Stream Improvement Plan
 - Stream Restoration



Clayton County Water Authority
Pedestrian Stream Surveys



Stormwater Utility Activities

- Floodplain Management
- Water quality monitoring
- Public Education



Water Supply / Drinking Water

- Limited, impacted supply
- Storage – reservoirs
- Water quality management
- Water conservation/leak detection
- Indirect potable reuse

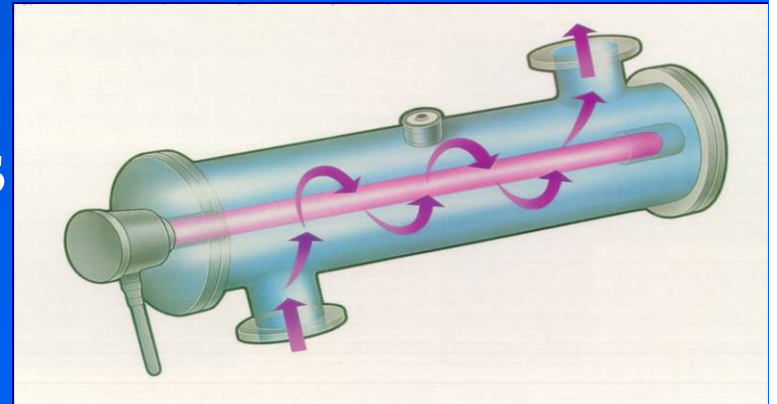
CCWA Reservoirs

- 4 major reservoirs
 - 4.2 billion gallons of storage
- “off-stream storage” for capturing wet weather flows
- Recharge from reclaimed water



Water Treatment

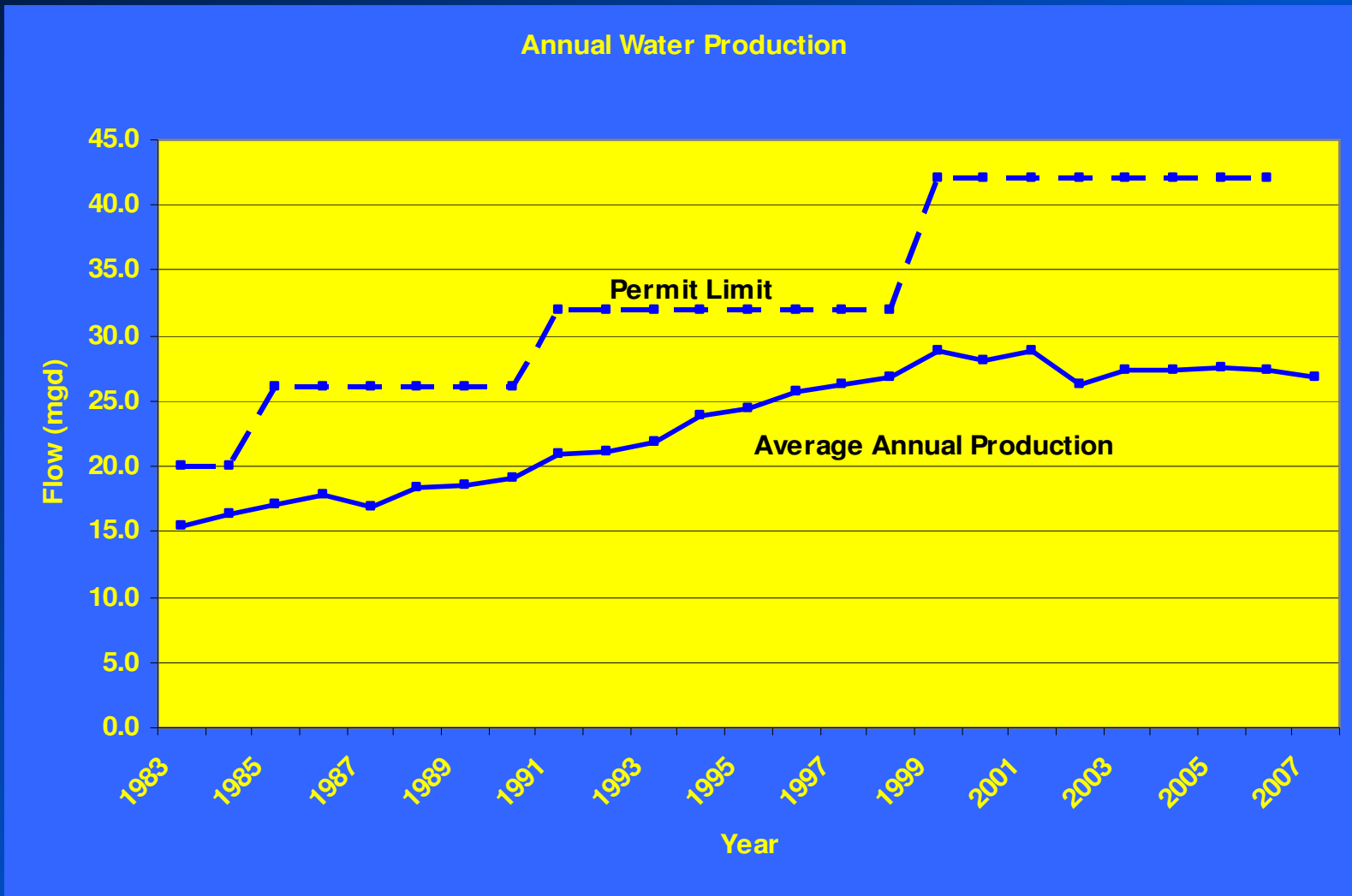
- Three coagulation/filtration plants – one utilizing the “claricone” upward flow process
- All plants meet enhanced coagulation criteria based on TOC removal
- Added Ultraviolet Light advanced disinfection units at each plant to provide an additional barrier



Water Quality

- Extensive source water sampling
 - Atlanta International Airport in watershed
- Sampling for microconstituents
 - CCWA water looks similar to other urban water supplies

Water Conservation



Water Conservation

- Water conservation insures capacity for the future
- Water conservation based rates
 - No increase for those who use 3,000 gallons or less
 - Only 5% increase for average use (6,000 gallons)
- Participation in Regional Toilet Rebate Program
 - \$100 rebate for 1.3 gallon per flush toilet
 - \$50 rebate for 1.6 gallon per flush toilet
 - Home must be 1993 or older

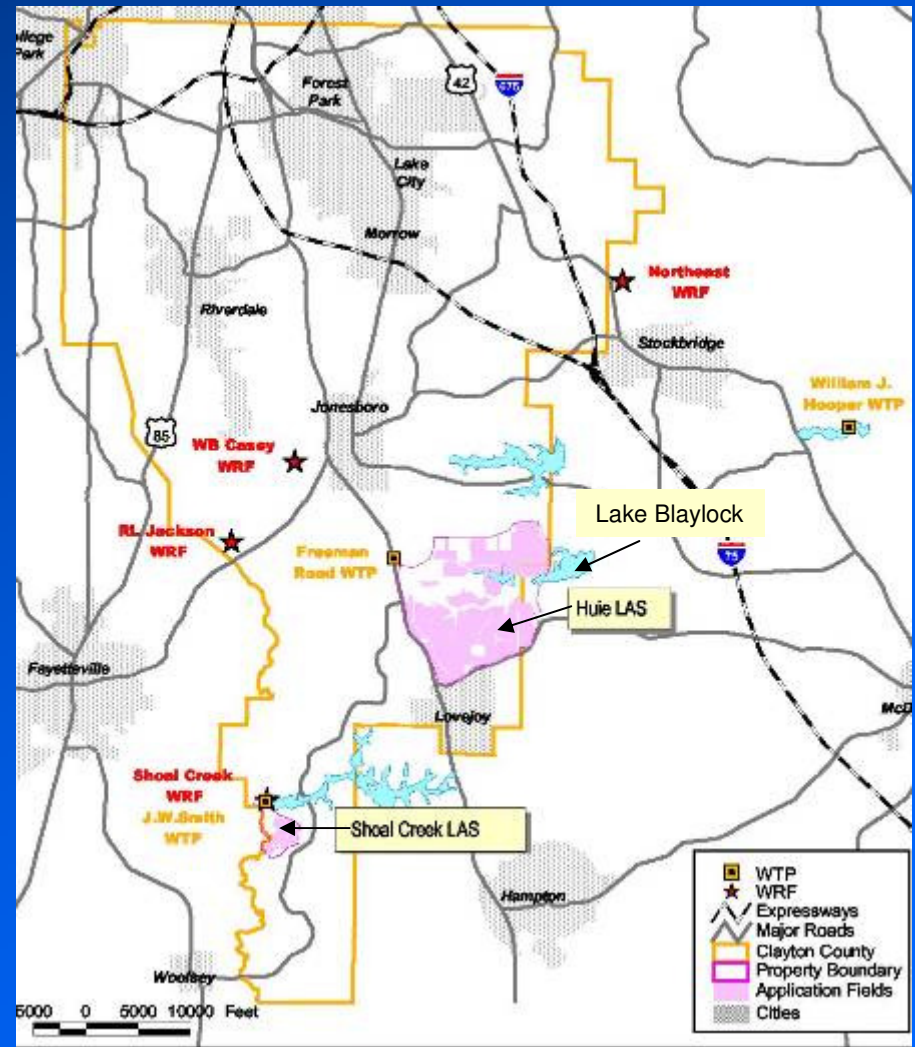
Leak Detection

- 1,400+ miles of water pipe
- Completed leak scan of entire system in 6 years
- Leak detection equipment and van cost \$106,000
- M-log system being deployed on water meters throughout the system
- Water and cost savings in the millions!



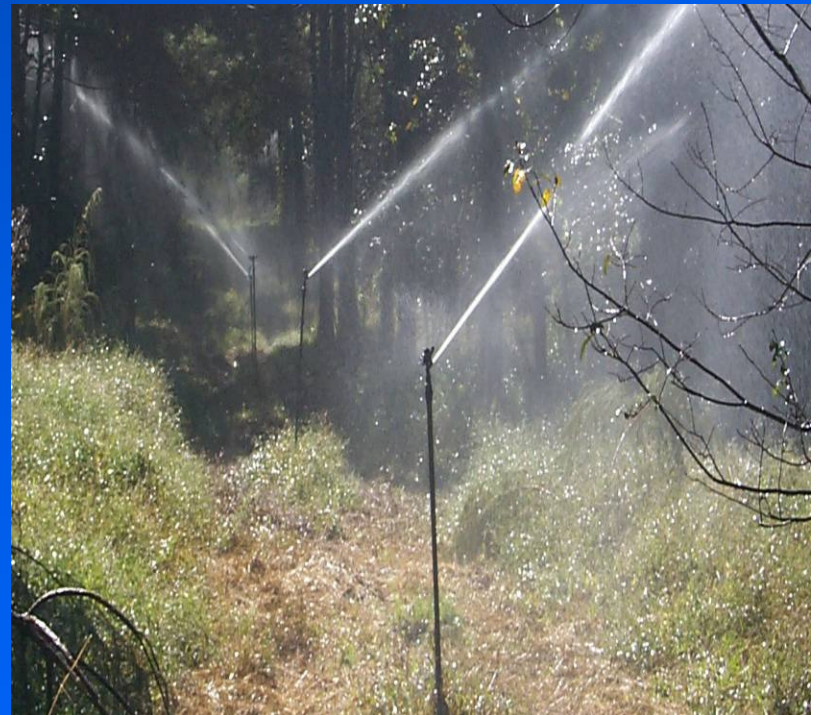
Wastewater / Water Reclamation

- Limited assimilative capacity
- Natural Treatment Systems
- Multiple barriers / environmental exposure
- Indirect potable reuse



Reclaiming Treated Wastewater – Land Application

- CCWA has utilized land application for reclaiming and recycling “used” water back into our water supplies for almost 30 years
- Over 2,400 forested acres receiving spray irrigation of treated wastewater
- 70% of the reclaimed water sprayed onto the site was returned as streamflow



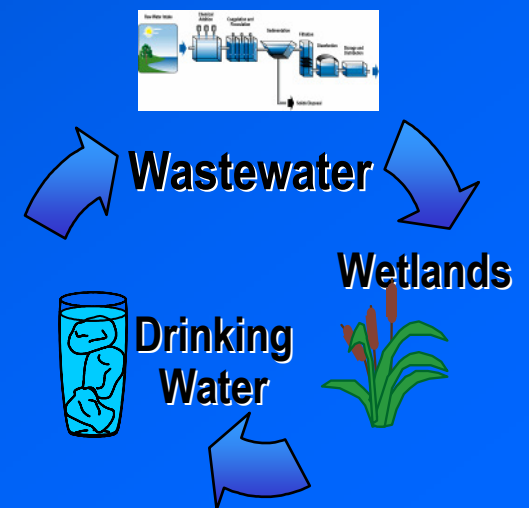
Land Application of Treated Wastewater

- Yield study determined that 70% of treated wastewater sprayed onto the site was returned as streamflow
- Withdrawal from Hooper reservoir 7 miles downstream has been in use since land application system was constructed in 1980
- Withdrawal from Blalock reservoir put into use in 1999

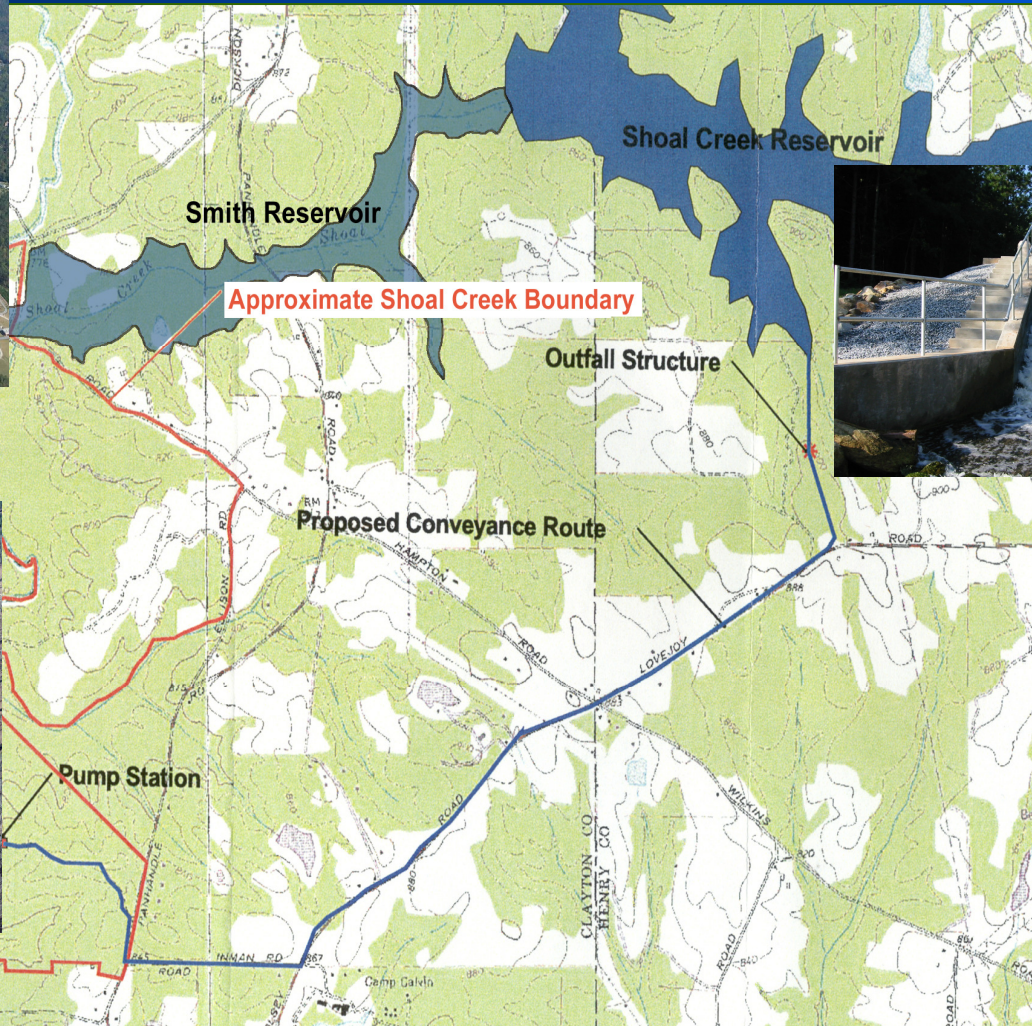


Indirect Potable Reuse

- One objective of CCWA's 2000 Master Plan was to recapture reclaimed water to insure a dependable water supply for Clayton County
- Planning for Indirect Potable Reuse involved the following steps:
 - Appropriate water reclamation and water treatment technologies
 - Review by independent experts
 - Source water protection
 - Water quality monitoring
 - Public relations and education



Indirect Reuse From CCWA's Perspective



Water Reclamation

- Constructed wetlands expected to provide an additional 10% to 20% removal of conventional pollutants
- Residence time in wetlands and reservoirs
 - Over 500 days under normal conditions
 - Over 180 days at design flows and drought conditions
- Raw water reservoirs with up to 2 billion gallons of storage with natural and pumped inflows



Transition from Land Application to Constructed Wetlands

- Existing land application acreage being converted to constructed wetlands
 - Will increase treatment capacity
 - More efficient water recharge
 - Lower maintenance and operational costs
 - Recreational & educational benefits
 - Continues tradition of natural treatment



Wetland Design Resources



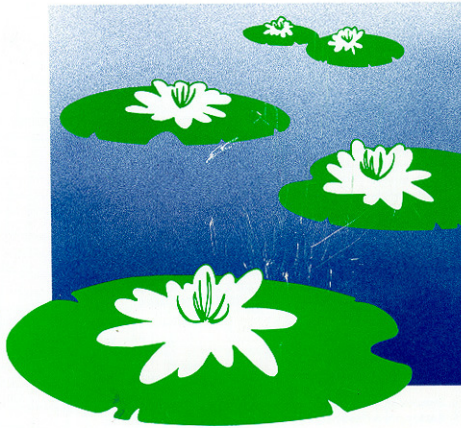
United States
Environmental Protection
Agency

EPA832-R-93-005
September 1993

Constructed Wetlands for Wastewater Treatment and Wildlife Habitat

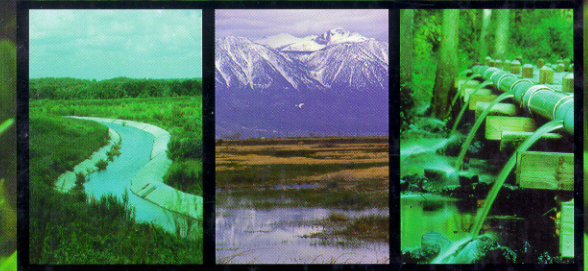
17 Case Studies

Natural Systems for Wastewater Treatment



MANUAL OF PRACTICE

Manual of Practice FD-16



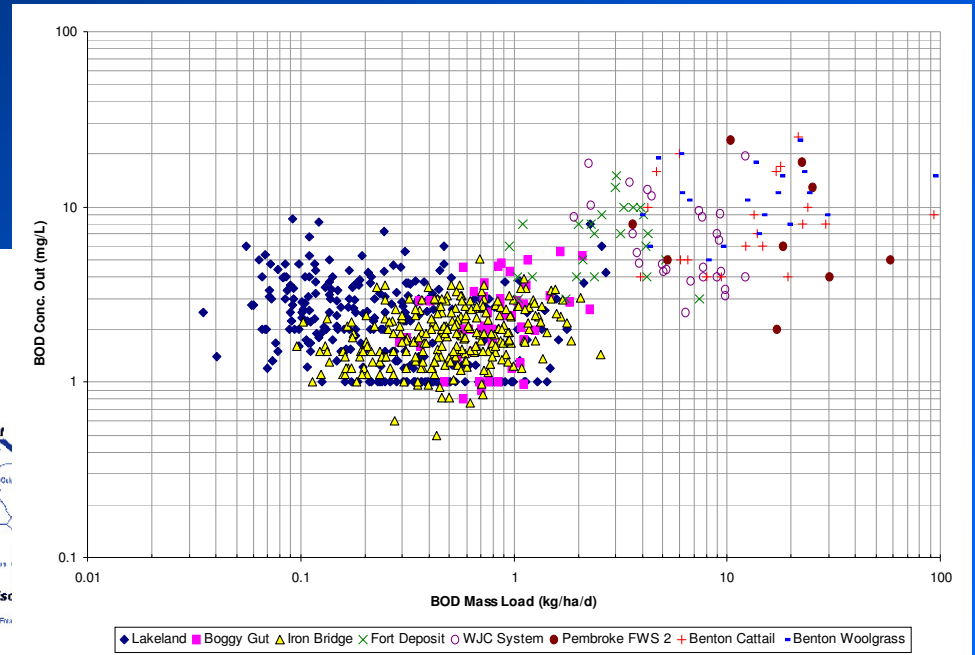
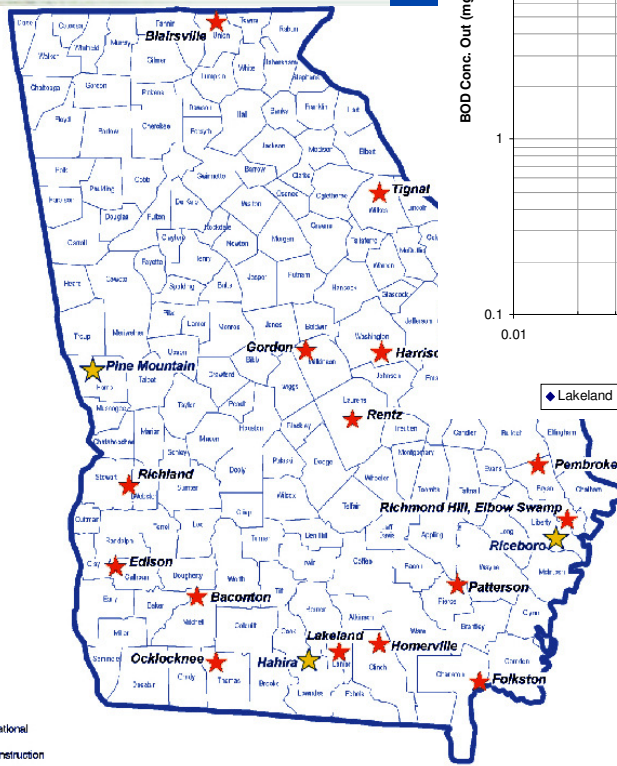
TREATMENT WETLANDS

Robert H. Kadlec • Robert L. Knight

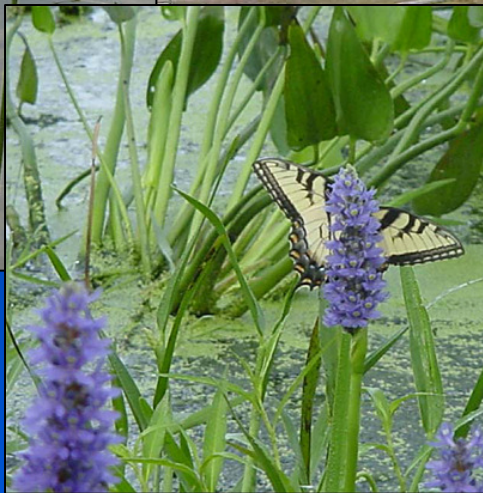
Developing Treatment Models for the CCWA Program

REVIEW OF GEORGIA'S CONSTRUCTED TREATMENT WETLANDS AND THEIR PERFORMANCE

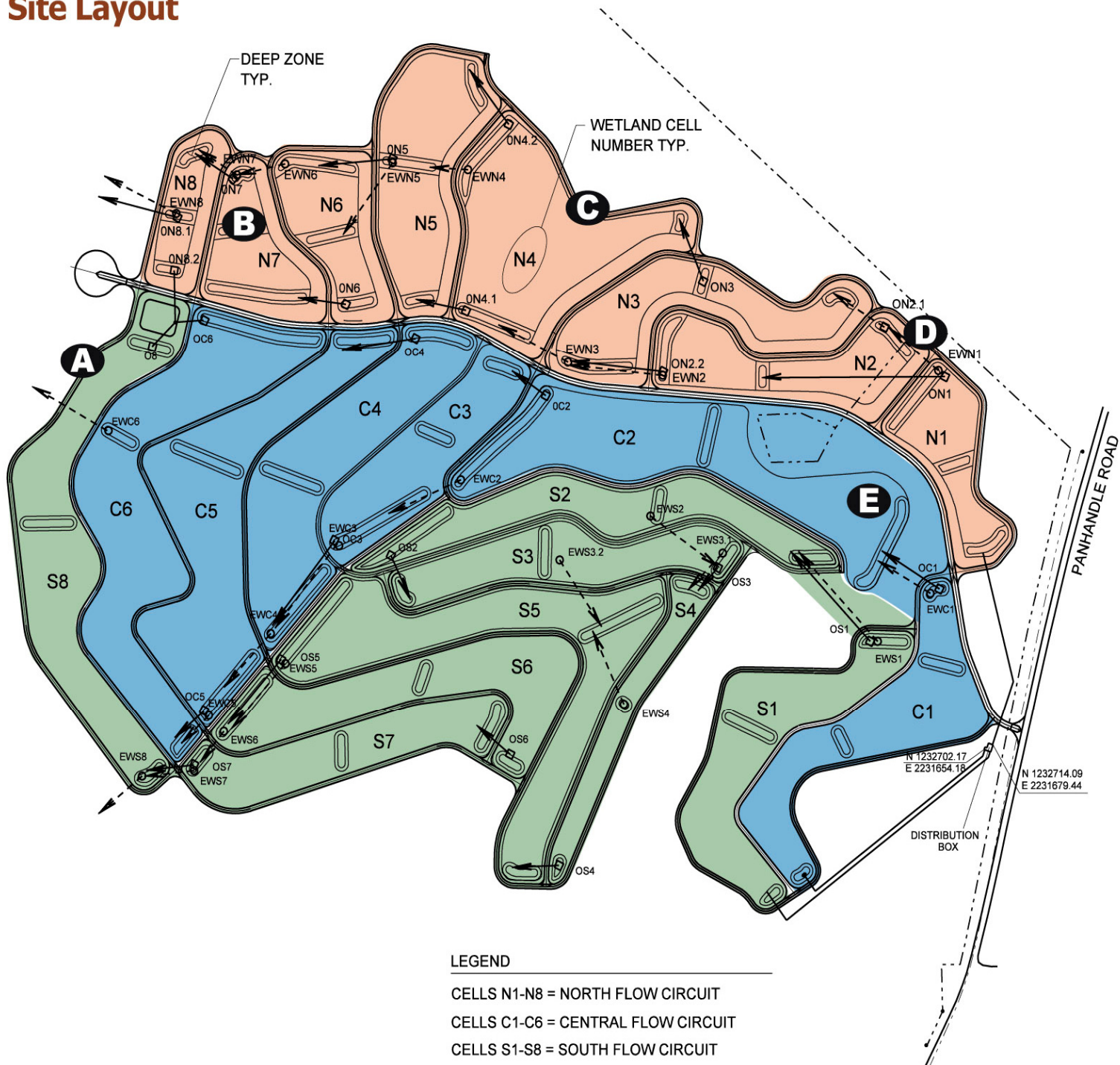
Brad Inn



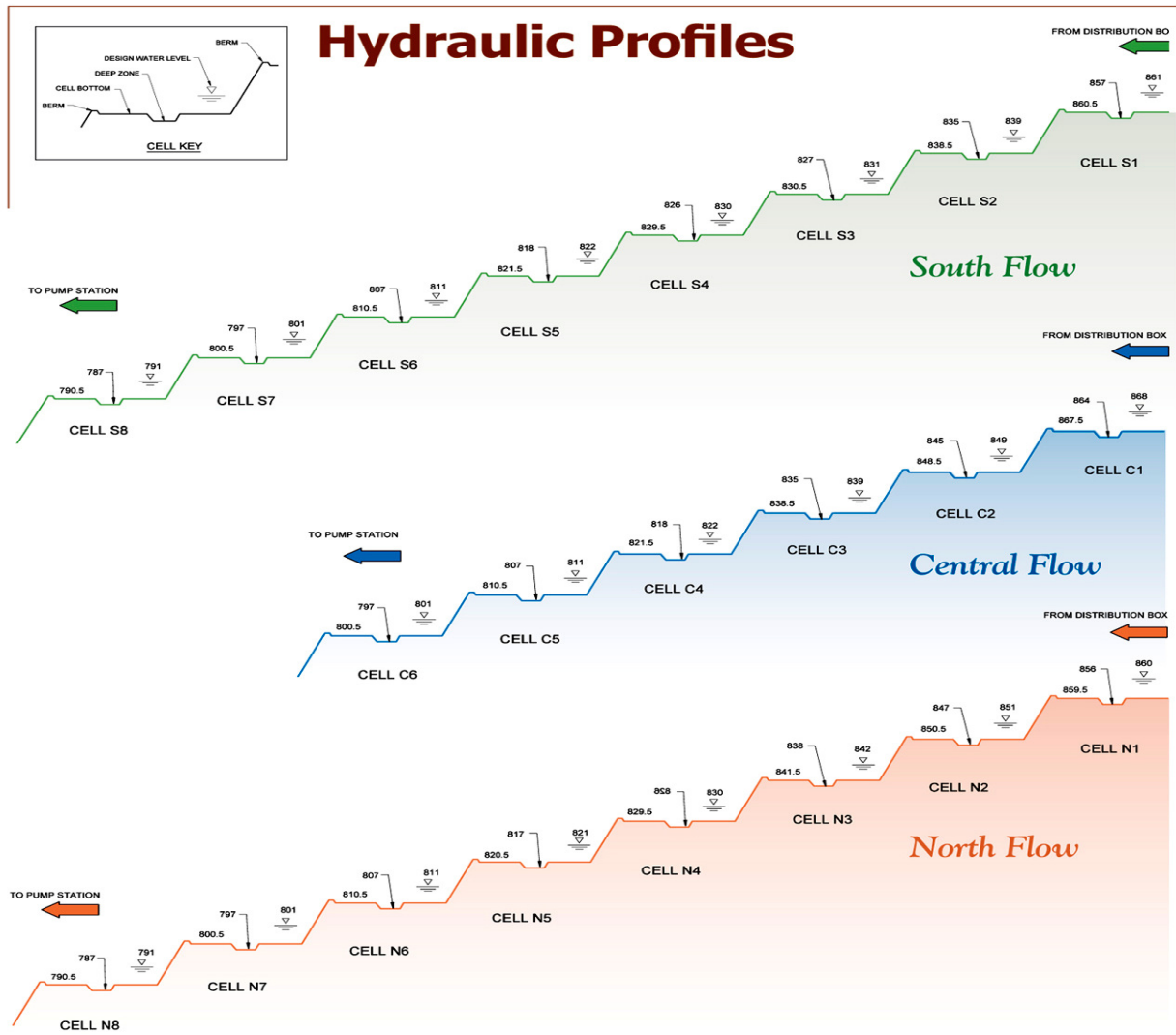
Panhandle Road Constructed Wetlands



Site Layout



Panhandle Road Constructed Wetland Profiles



Initial Site Construction



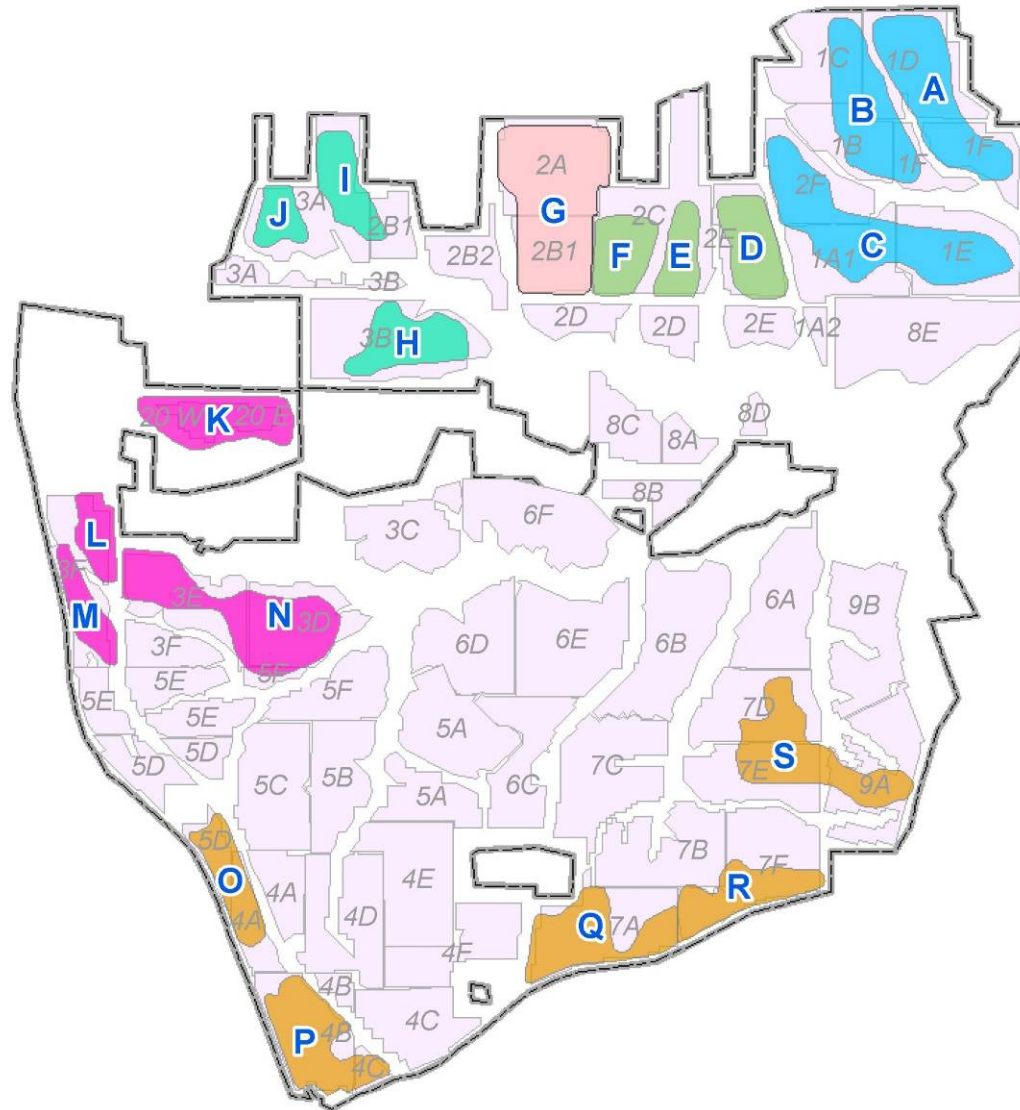


NPDES Permit Limits

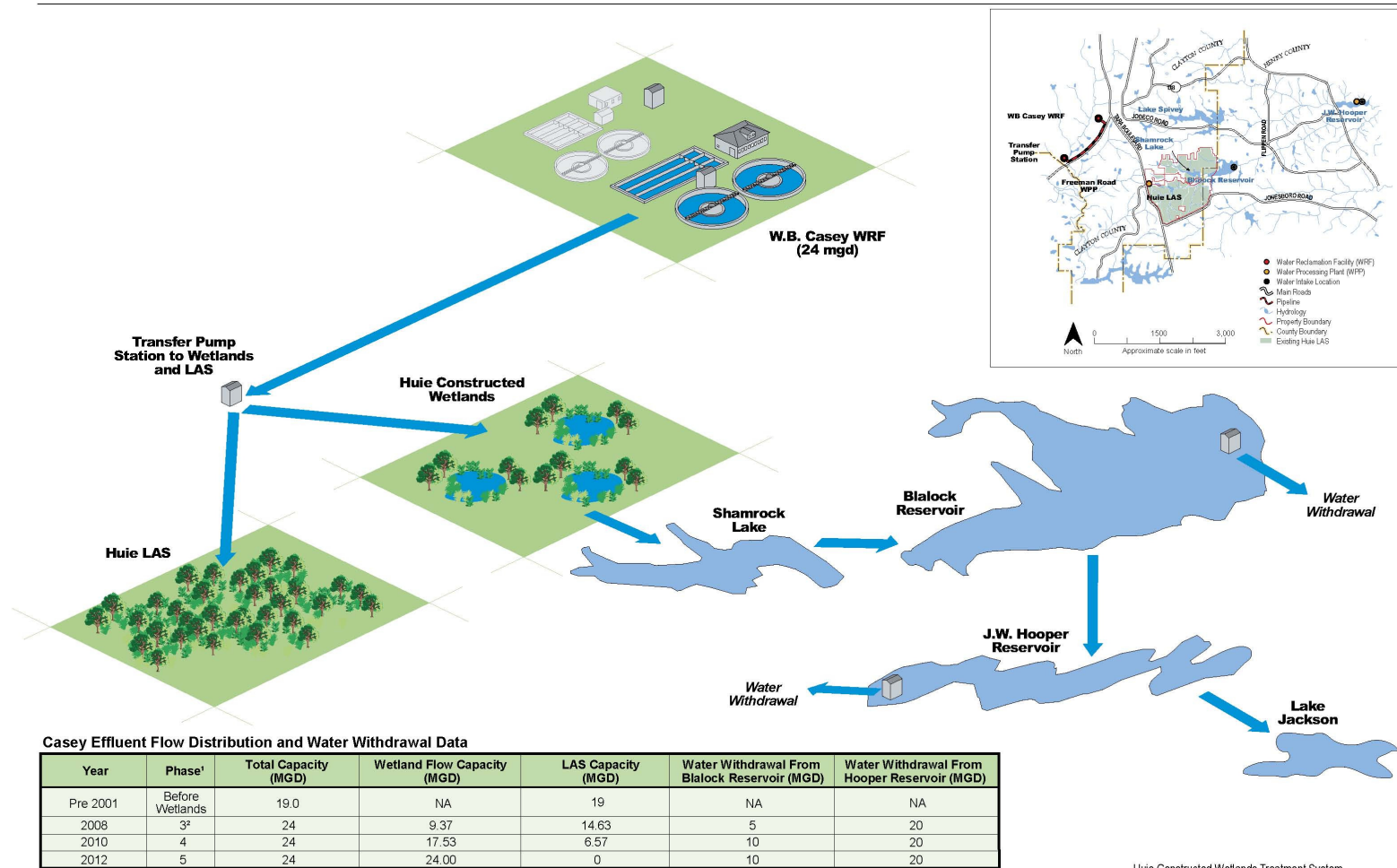
Parameter	Limit (mg/L)
Flow	monitor only
BOD ₅	10/15*
TSS	30/45*
NH ₃ -N	4/6* (May-Oct.) 8/12* (Nov.-Apr.)
TP	2/3*
Fecal Coliform	100/200* per 100ml
Temperature	monitor only
DO	6 (May-Oct.) 5 (Nov.-Apr.)

*Monthly/Weekly Averages

Huie Site Constructed Wetlands



Huie Site Master Plan Provided CCWA with a Phased Plan



Casey Effluent Flow Distribution and Water Withdrawal Data

Year	Phase ¹	Total Capacity (MGD)	Wetland Flow Capacity (MGD)	LAS Capacity (MGD)	Water Withdrawal From Blalock Reservoir (MGD)	Water Withdrawal From Hooper Reservoir (MGD)
Pre 2001	Before Wetlands	19.0	NA	19	NA	NA
2008	3 ²	24	9.37	14.63	5	20
2010	4	24	17.53	6.57	10	20
2012	5	24	24.00	0	10	20

¹ Phases listed correspond with Huie Master Plan 2005.
² Phase 3 corresponds with existing NPDES Permit.

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NPDES Limits

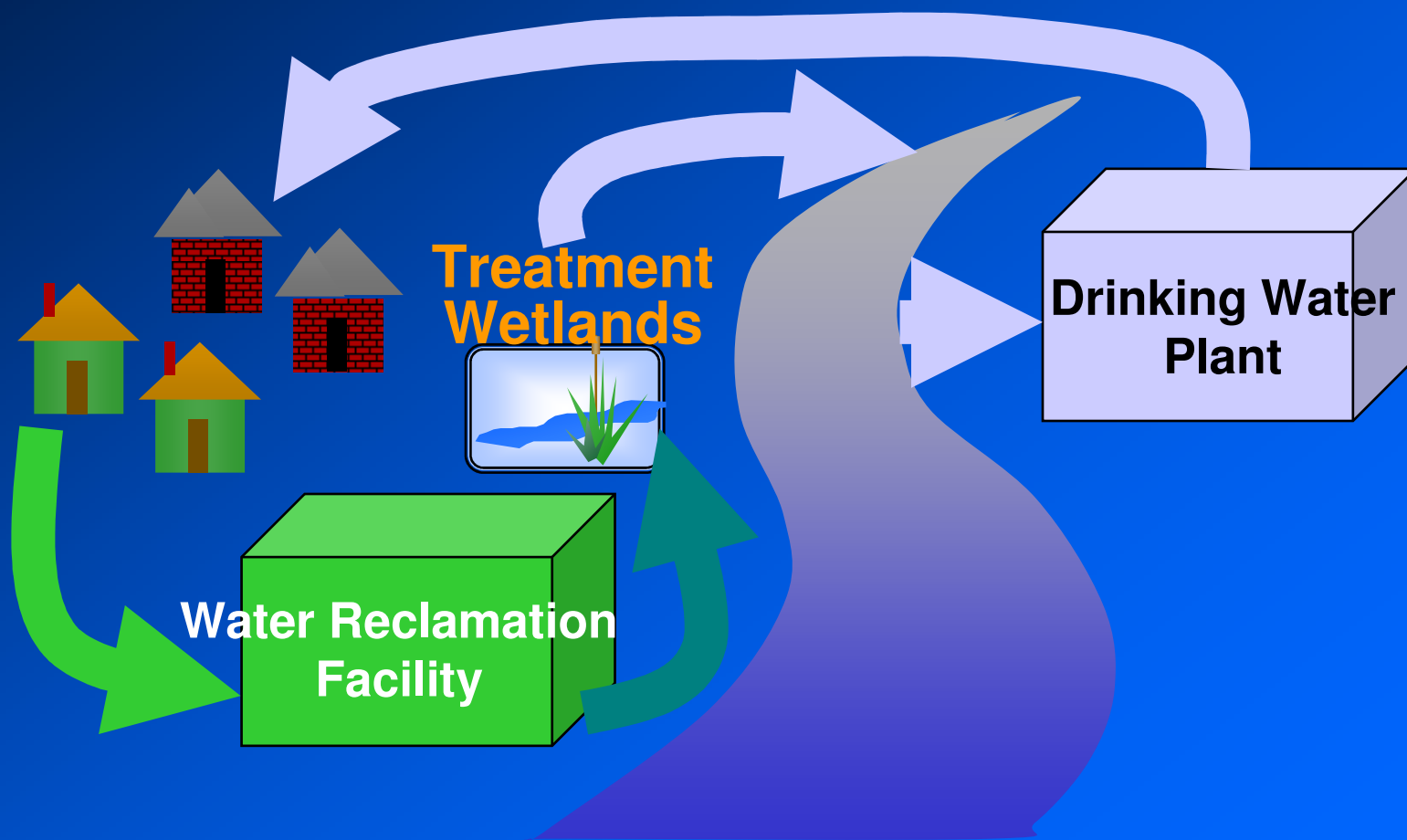
Parameter	Limit (mg/L)
Flow	monitor only
BOD ₅	10/15*
TSS	15/22.5*
NH ₃ -N	2.5/3.8*
TP	0.6
Fecal Coliform	100/200* per 100ml
Temperature	monitor only
DO	6 (May-Oct.) 5 (Nov.-Apr.)

*Monthly/Weekly Averages

What is CCWA's Capital Investment for the Huie Site?

Construction Phase	Sites	Estimated Treatment Capacity (mgd)	Construction Costs (\$)	Unit Cost per Gallon (\$/gal)
Phase 1	G	3.6	\$7,683,000	\$2.13
Phase 2	D, E, F	3.0	\$5,782,000	\$1.93
Phase 3	B, C, H, I	2.8	\$5,956,450	\$2.13
Phase 4	A	8.2	\$11,477,550	\$1.40
Phase 5	L, N,O,Q	5.4	\$11,406,000	\$2.11
Phase 6	M	1.1	TBD	TBD
TOTAL		24.0	\$42,305,000.20	\$1.85

Public Relations & Education



CCWA's Wetlands Education Center

Since its opening in 1995, the Wetlands Center has accommodated 20,000 visitors per year.



The Wetlands Center features a half-mile scenic nature walkway.



Positive Press Coverage

WHAT WATER CRISIS?

Clayton County's antidote to drought

Clayton wetlands project a clean hit

It's not nice to fool Mother Nature, but that doesn't mean you can't work with her to the benefit of everybody involved.

Hats off to Clayton water and sewer officials for embarking on such a venture. They have opted to invest in wetlands, with the intent of cleaning up county waste water and, at the same time, creating an enlarged habitat for wetland plants and animals.

to have the wetlands put a finishing touch on waste water already processed in the county's treatment facilities.

As the water descends through the wetland system, pollutants are absorbed by aquatic plants and microbes or removed by evaporation and sheer gravity. It's nature's way of restoring water purity, and it's more cost-

Building Sustainability thru Total Water Management

- Water is Water
- Integrating water resource protection, supply management and reuse
- Fringe benefits – recreation, economic development, green practices, water supply reliability

Questions?

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