UNC Integrated Water Management

Objectives…

- Provide overview of
  - UNC's Water Management
  - Potable Water
  - Non-Potable Water
  - Lessons Learned
- Answer your questions

How we got here

- UNC Campus Master Plan 2001
  - Environmental Master Plan 2002
  - Stormwater Management Plan 2004
- Droughts of 2001-02 and 2007-08
- Reclaimed Water Feasibility Study and Master Plan
- NC Water Regulations
- Jordan Lake Nutrient Rules

UNC Environmental Master Plan 2002

1. Balance Growth with preservation of the natural drainage system.
2. Manage stormwater as an opportunity not as a problem.
3. Recognize that the University of North Carolina at Chapel Hill is part of the Cape Fear Watershed.
4. Reinforce the University's position as a Role Model.

UNC Stormwater Management Plan

- Low Impact Development
- Stormwater Management Best Management Practices (BMPs)
  - Cisterns
  - Green Roofs
  - Infiltration Beds
  - Porous Pavement
  - Stream Daylighting

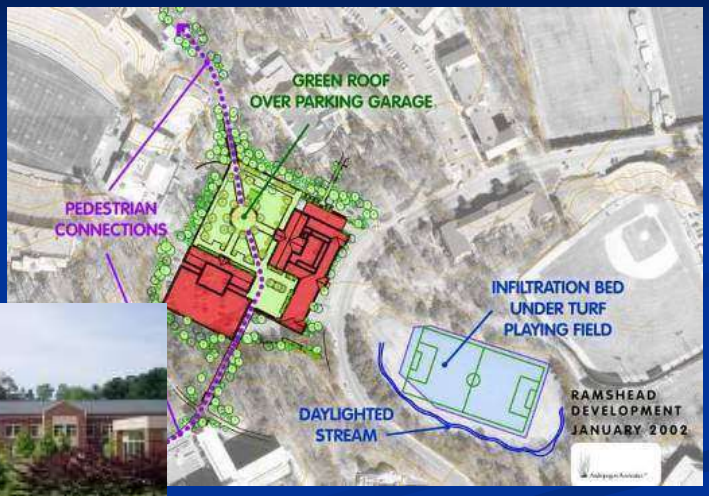
Cisterns

- Hooker Field
- Rams Head
- Fed-Ex Global Education
- Bell Tower Project
  - Genome Sciences Building
  - Kenan Stadium Irrigation
- Marsico Hall
- Hanes Hall
- NC Botanical Gardens

Hooker Field Cistern

Rams Head Center Cistern

Cistern and Green Roof



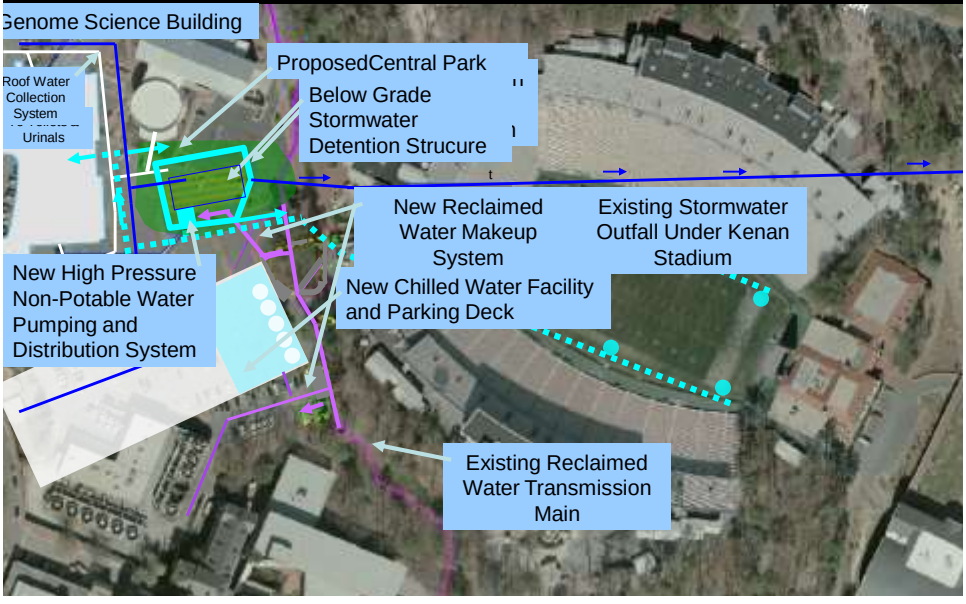
Fed-Ex Global Education

Cistern and Green Roof

UNC Bell Tower Development

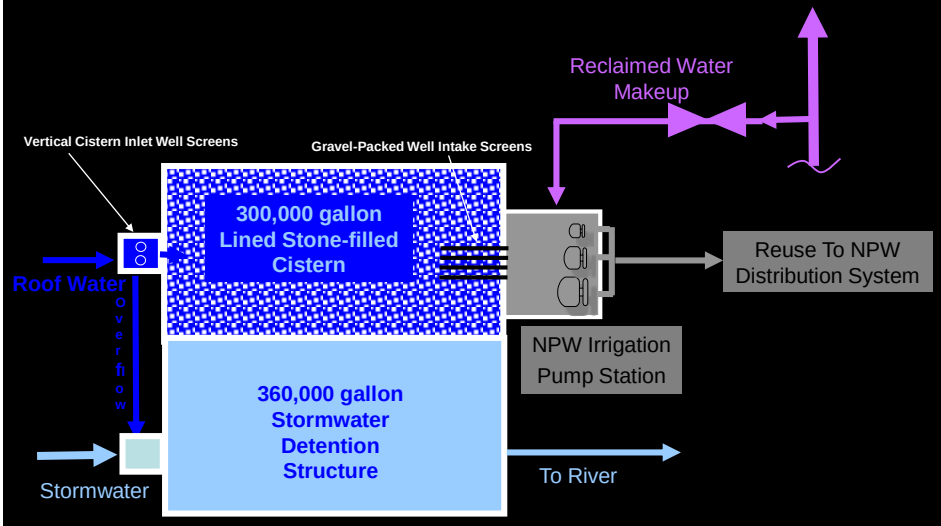
Bell Tower Non-Potable Water System

Using roof and groundwater from the cistern with Reclaimed Water Makeup



Roof Water Cistern Design Concept

for Non-Potable Water Supply



Detention & Cistern

Cistern Start and Sealing

Cistern Gravel Fill

Water Sources

Historic Water Sources

- Well Water
- Potable Water

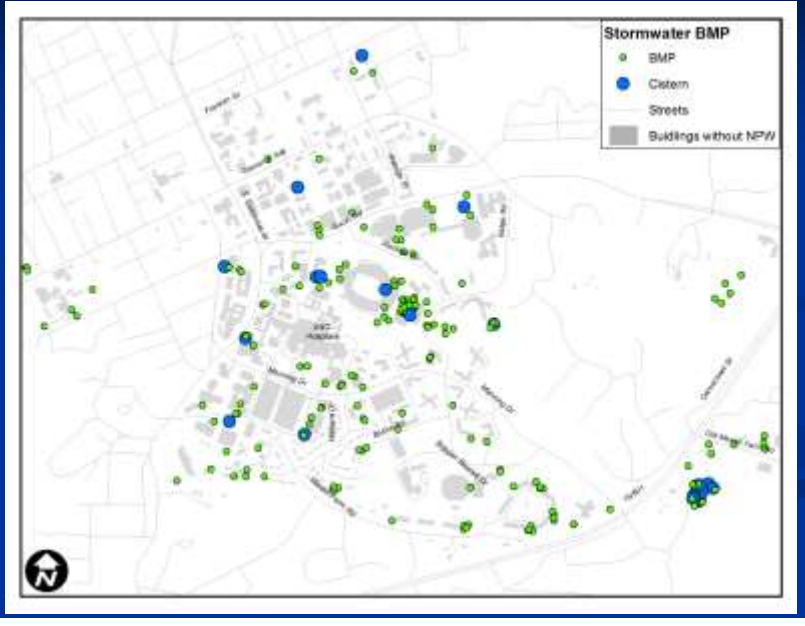
Current Water Sources

- Potable Water (OWASA)
- Reclaimed Water (OWASA)
- Stormwater
- Well Water

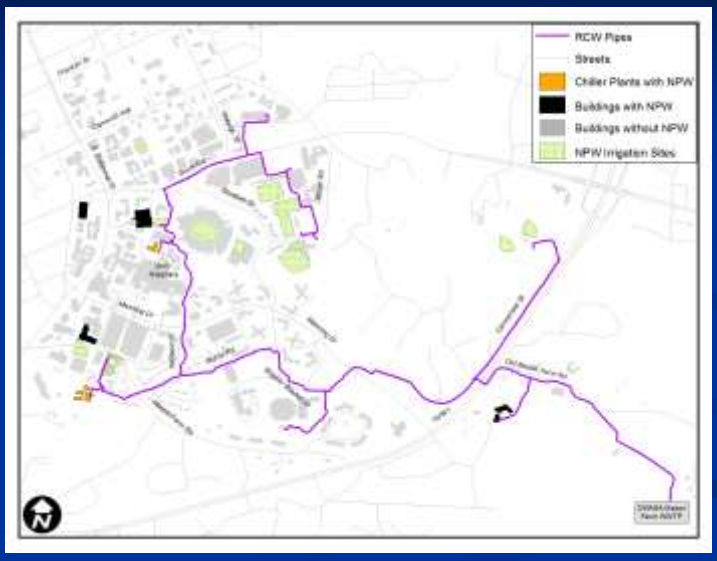
UNC Non-Potable Water System

- Providing non-potable water to the quality needed for use
  - Reclaimed Water – Cooling Tower Make-up, Irrigation, and Toilet Flushing
  - Stormwater – Irrigation and Toilet Flushing
  - Groundwater (wells) – Localized Irrigation

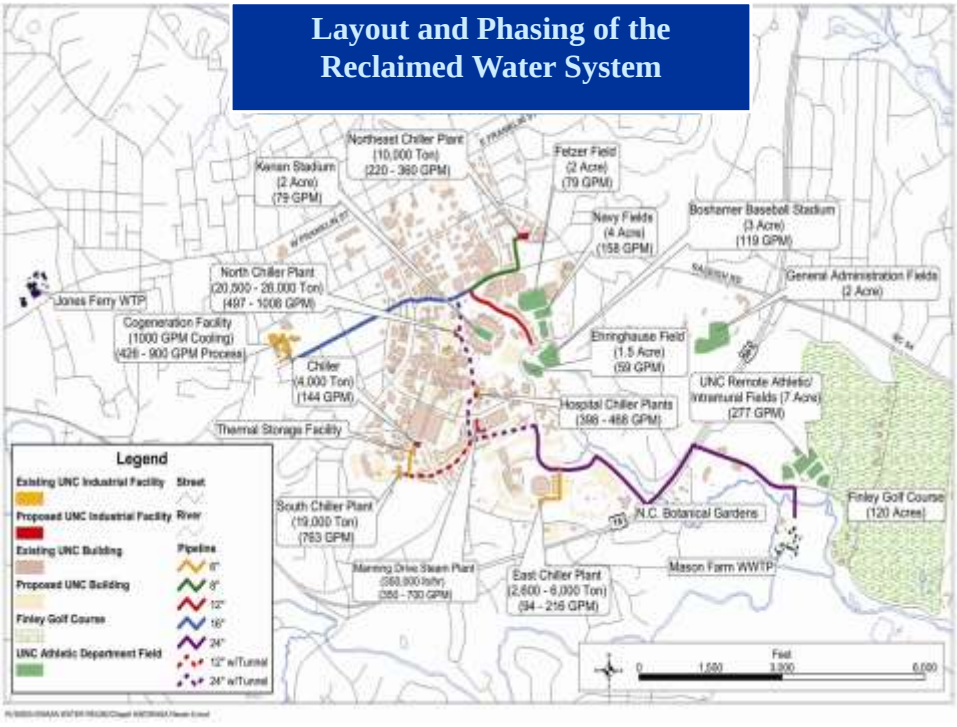
Stormwater BMPs

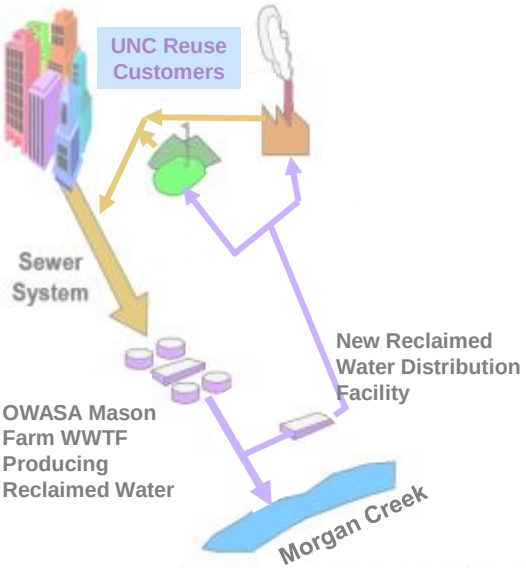


Reclaimed Water Piping



Layout and Phasing of the Reclaimed Water System





UNC-OWASA Reclaimed Water System for Main Campus

Reclaimed Water System

- Joint UNC – OWASA feasibility study 2003
- Master Plan and feasibility study - McKim & Creed, Burton feasibility study ~ 2005
- UNC OWASA reuse contract 2006
- UNC paid costs (less grants obtained by OWASA)
- Phase 1: RCW water main and pump station, serving the East, South and Tomkins Chiller Plants.
- Phase 2: RCW extension internal to campus to UNC Hospitals, North Chiller, Kenan Stadium, Cobb Chiller, Hooker Field, Football Practice Fields, Boshamer and Anderson Stadium.

Identifying Potential Reclaimed Water Uses On Campus

- Identified all non-potable water uses
- Estimated demands
  - Average day
  - Peak day
  - Peak hour
- Initial Phase Focused on "low hanging fruit"
  - Cooling tower makeup

Feasibility Study Results

- **Feasible for use in cooling towers**
  - **Represented more than 90% of projected demand**
- **Feasible for irrigation use, toilet flushing**
- **Other future uses may also be possible**

Athletic Facilities

Cooling Towers

Potential Reuse Demands* vs. Projected Potable Water Demands (2003 Study)

	Reclaimed Water (mgd)	Potable Water (mgd)	Total Demand (mgd)	Reclaimed as % of Total
2009	0.66	8.21	8.87	7.4%
2028	1.94	10.96	12.90	15%

* Demands shown are for cooling tower make-up water and irrigation uses, only. Potential demands may be higher if other uses are met through reuse.

Water reuse may also be a strategy for meeting Carolina North water needs, but that potential is not reflected in the above table.

Demand Projections

(from 2005 feasibility study)

Facility		Annual Daily Demand (gpd)	
	2010	2012	2020
East, South, and Tomkins Chillers	328,000	328,000	511,000
North and Cobb Chillers		270,000	396,000
UNC Hospitals Chillers		214,000	250,000
NC Botanical Garden		8,000	10,000
UNC Athletics		48,000	48,000
Cogen Cooling Towers		293,000	330,000
Total Demand	**328,000**	**1,160,000**	**1,540,000**

UNC Chilled Water System





- (5) Interconnected Central Plants
- 50,000 tons installed capacity
- Serving 145 research and academic buildings

UNC Hospitals

The 2007-2008 Drought and UNC's Athletics

UNC Athletics –Irrigation Demand

(Evaluated as part of Phase 2 extension ~ 2008)

Facility	Estimated Irrigation Demand	
	Total Gallons per Year	Peak Irrigation Day Gallons per Day
Kenan Stadium	12,905,000	12,625
Navy Field/Henry Stadium	15,514,800	13,200
Boshamer Stadium	12,216,000	23,000
Fetzer Field	10,980,000	11,285
Williams Field/Anderson Stadium	24,192,000	20,800
Total Athletics Irrigation Demand	**77,100,000**	**88,610**

Athletics Field Irrigation

Kenan Stadium

Boshamer Stadium

Athletics Field Irrigation

Navy Field
Football Practice Fields

Anderson Stadium

Lessons Learned

- Need back-up water source
- Need system redundancies
- Where true full air gap not possible, provide air gap with spool piece and break in pipe
- Complete Operation and Maintenance Manual
- System ownership
- Training, Training, Training

Questions?