

Draft Plan for Carolina North Campus
University of North Carolina at Chapel Hill
Public Meeting
August 28, 2007



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CAROLINA NORTH



Today's Speakers

- Jack Evans, Executive Director of Carolina North
- Anna Wu, Director of Facilities Planning
- Jerry Schuett, AEI Engineers
- John d'Epagnier, RK&K Engineering

discovery,
innovation
and learning



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- Information presented previously
 - Review of background for Carolina North
 - Review of updated 50-year and 15-year development footprints
- New information
 - Proposed plans for water management
 - Proposed plans for energy

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and learning



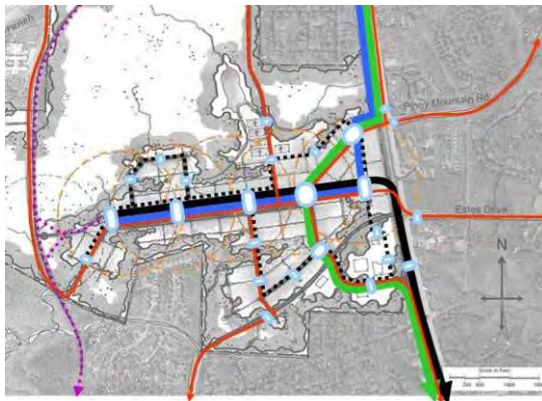
Developing a Plan for Carolina North: *some common themes*

1. Carolina North will support the mission of the University
2. Carolina North will be a compact, mixed-use academic community
3. Designs will support a sustainable, high-efficiency campus
4. Designs will reflect analysis and workshops

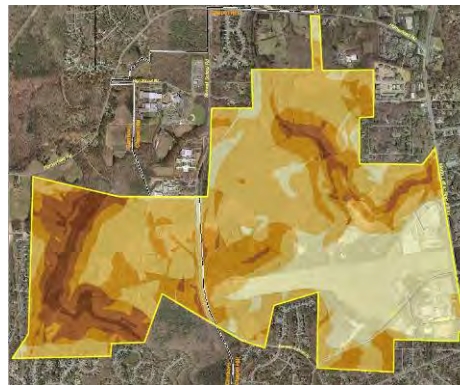


Design reflects analysis and workshops

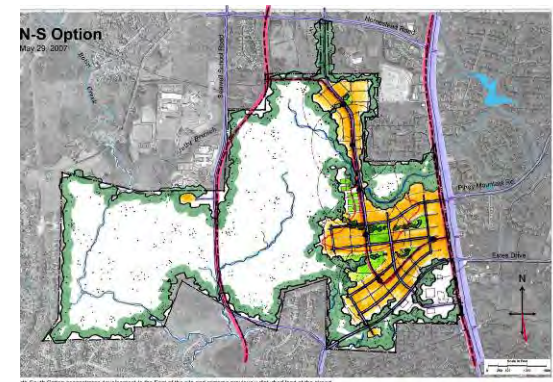
- Ecological Assessment Report
- Leadership Advisory Committee
- Infrastructure workshops with university planners and local technical experts
- Public sessions and community input



Transit Oriented Development



**Draft Ecological Assessment Composite Metric –
Suitability Analysis**
Biohabitats, Inc., March 2007



Multiple Scenarios



Key Topics from the Leadership Advisory Committee Report

Sections I and II: General and development management

Section III: Fiscal equity

Section IV: Environmental principles

Section V: Open space, natural areas, parks and recreation

Section VI: Housing, schools, commercial and other uses

Section VII: Transportation



A Scenario for 50 Years



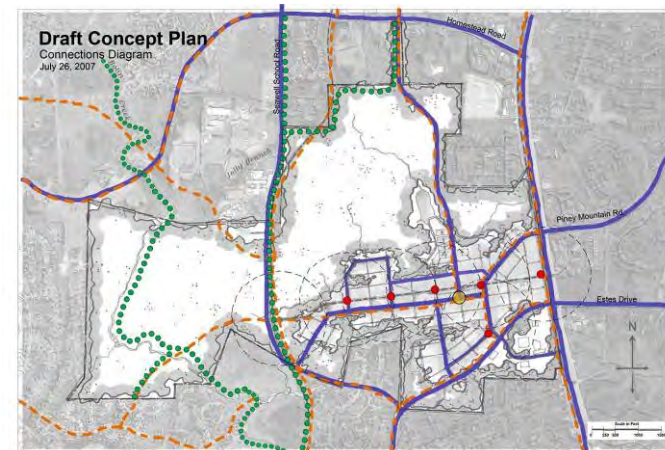
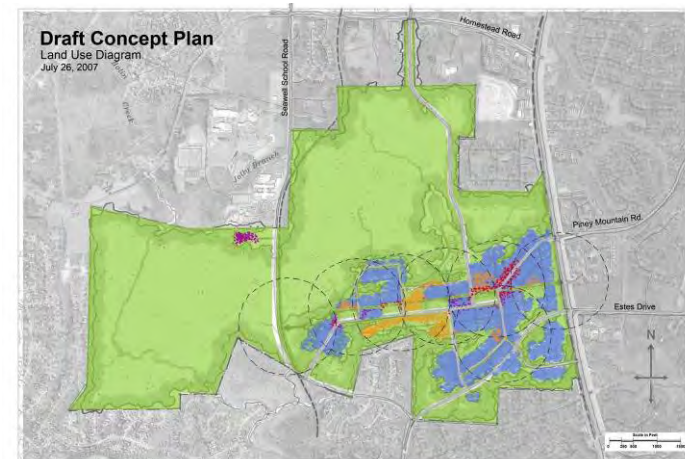


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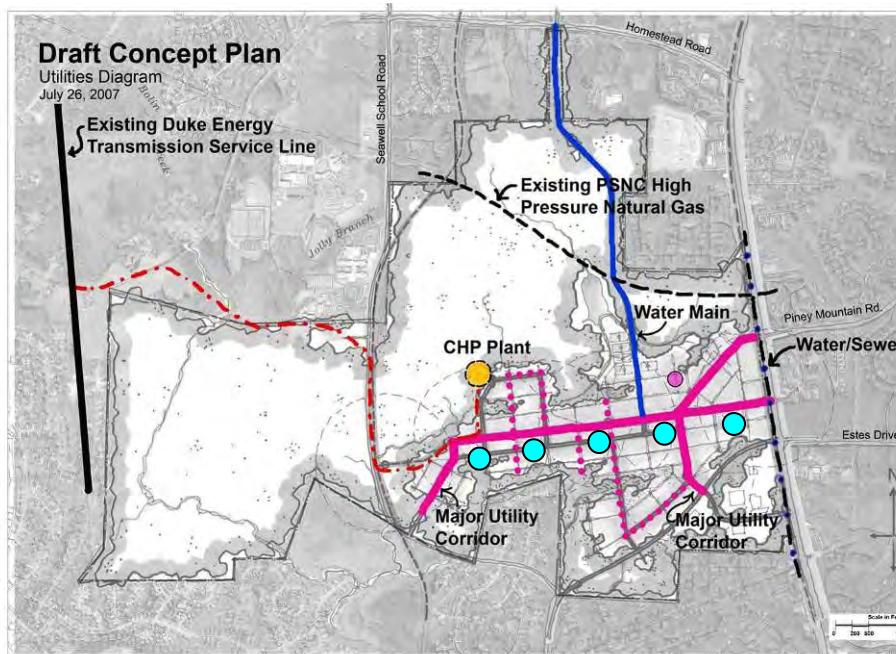
- Previous sessions
 - Mix of building types
 - On-site pedestrian and bike-ways
 - Transportation network and external connections
 - Open spaces and working landscape



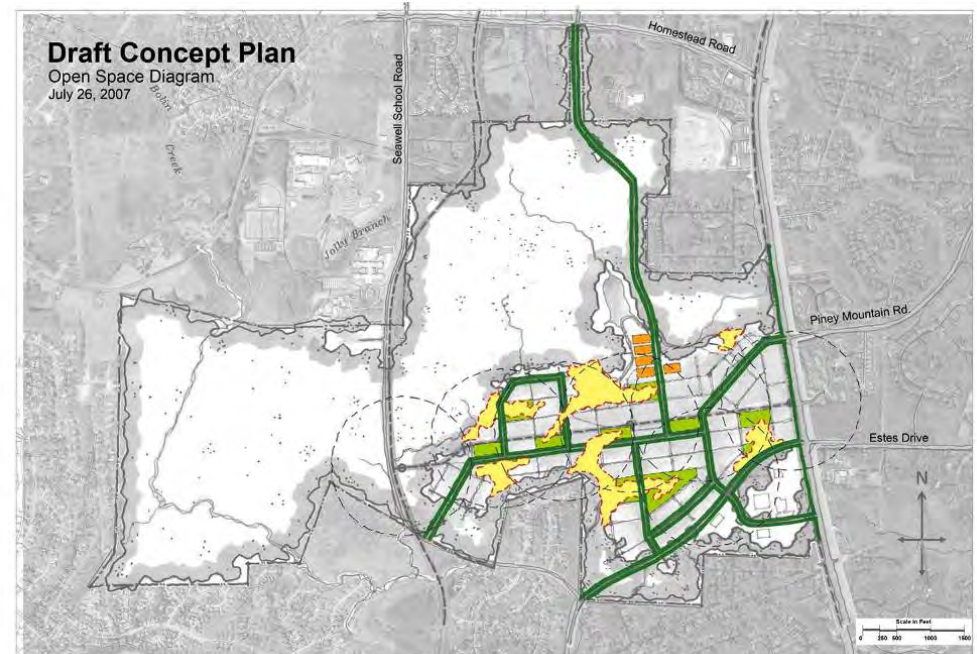
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Working Landscape and Utility Planning in Progress



- Central Plant
- Early Phase Plant
- - Electric Duct Bank
- Geothermal field



- Working Landscape
- Streetscape
- Greens and Parks
- Recreation Fields



Carolina North will be a compact, mixed-use academic community

Possible Development: the first 15 years

University Programs	Type	Estimated SF
Centers and Institutes - I	Research	122,000
Centers and Institutes - II	Research	93,000
Centers and Institutes - III	Academic/Research	100,000
First School - deleted per school board action		
Innovation Center	Private Sector	85,000
Interdisciplinary Research Center	Research	150,000
RENCI	Research	170,000
School of Law	Academic	200,000
School of Public Health	Research	155,000
UNC Health Care System	Patient Care/Offices	200,000
University Facilities Services	Support	75,000
Corporate Partners	Private Sector	525,000
Housing	Residential	500,000
Services (Retail, commercial, service, civic, etc.)		100,000
TOTAL Possible Program Space:		2,475,000 SF



Possible Development: the first 15 years

Building	SF	Relocated Activity	New/Expanded Activity	Other
University				
Centers and Institutes - I	122,000	122,000		
Centers and Institutes - II	93,000	93,000		
Centers and Institutes - III	100,000		100,000	
First School				
Innovation Center	85,000		85,000	
Interdisciplinary Research Center	150,000		150,000	
RENCI	170,000		170,000	
School of Law	200,000	200,000		
School of Public Health	155,000		155,000	
UNC Health Care System Carolina North Services facility	200,000			200,000
	75,000			75,000
Corporate Partners	525,000		525,000	
Housing	500,000		500,000	
Services	100,000			100,000
TOTAL SF	2,475,000	415,000	1,685,000	375,000

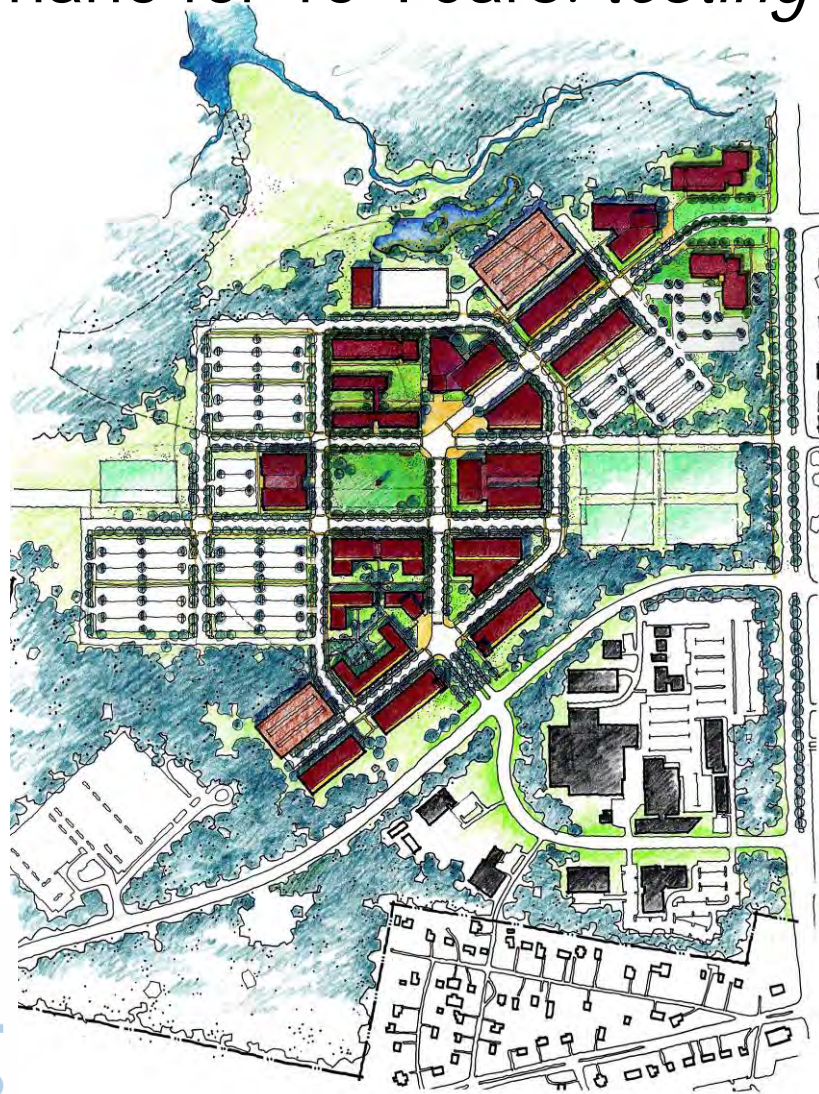


Possible Development: the first 15 years

- Respect the ecology of the site
- Focus on transit-oriented development
- Create a sense of identity and place
- Provide appropriate local connections for bike, pedestrian, transit & roadways
- Design for efficient land use with appropriate density

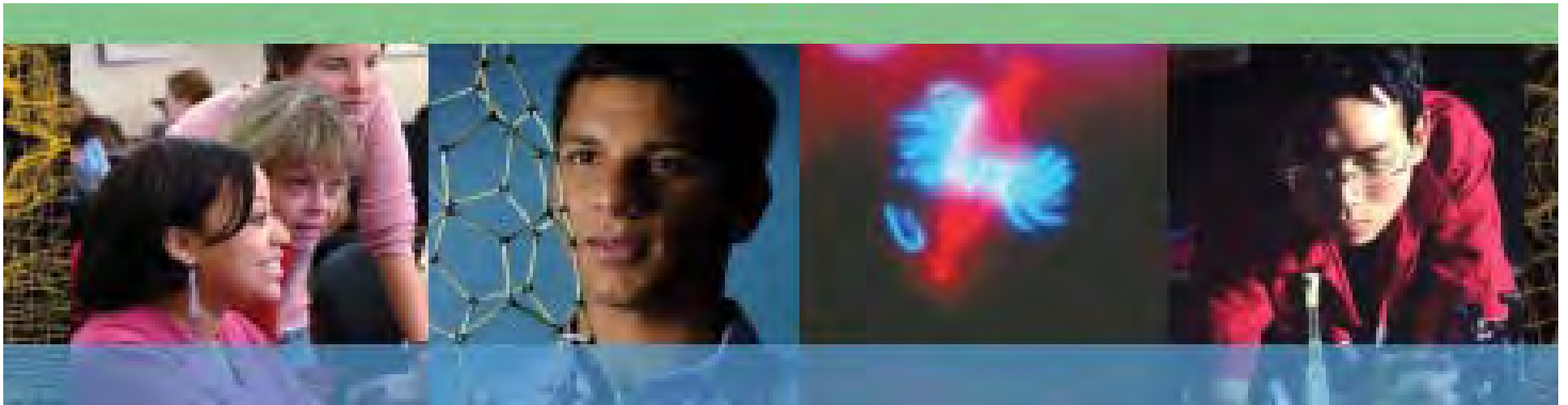


A Scenario for 15 Years: *testing a phase*



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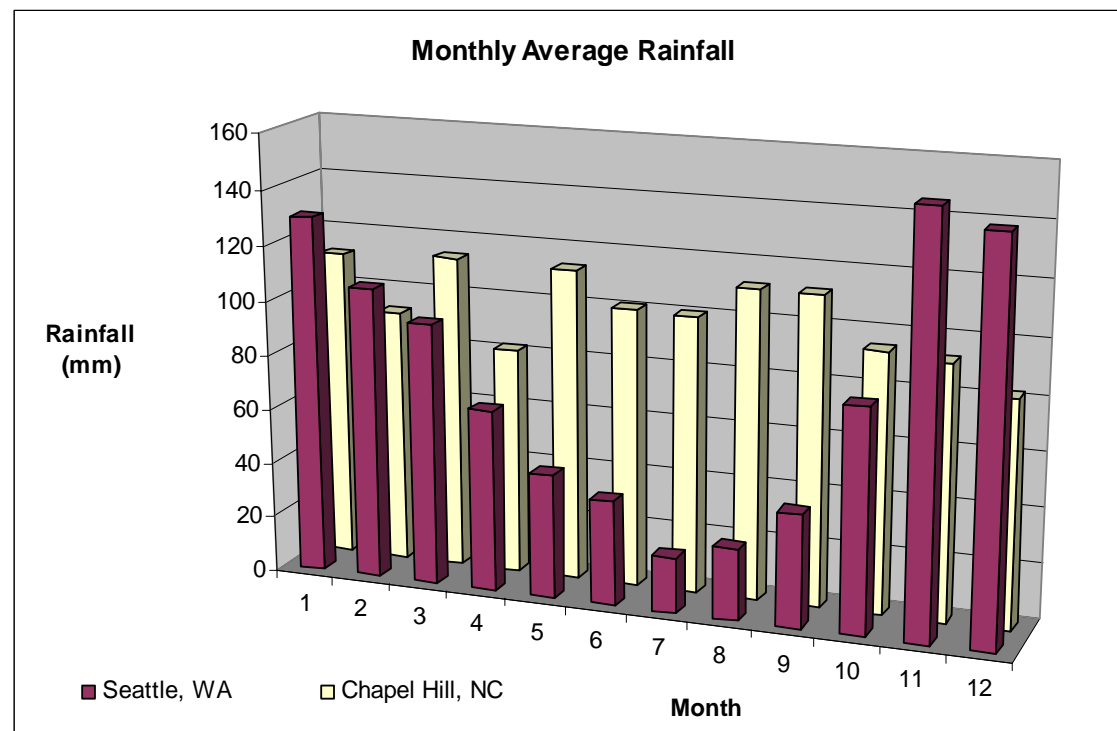
Water, Wastewater and Stormwater



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Rainwater Availability



Seattle annual total: 940 mm

Chapel Hill annual total: 1200 mm

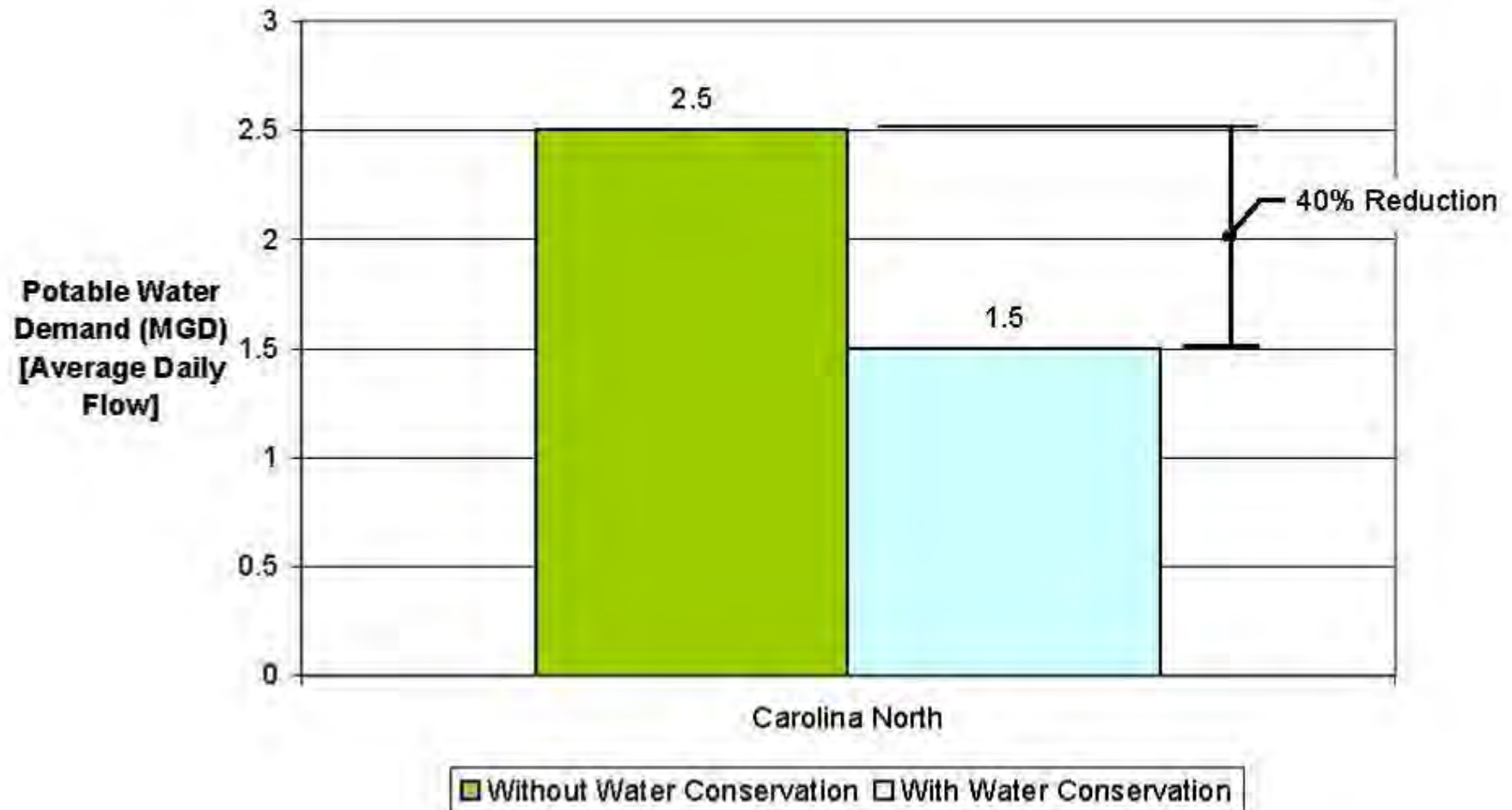


- Water reuse at Carolina North will take advantage of the opportunity to integrate research, education and outreach
 - Theme of sustainability at Carolina North
 - Scope of research and education interests of faculty at Carolina
 - OWASA's stated water resources management policies
 - "evaluate, with the University, the feasibility of reusing highly treated wastewater for appropriate purposes"





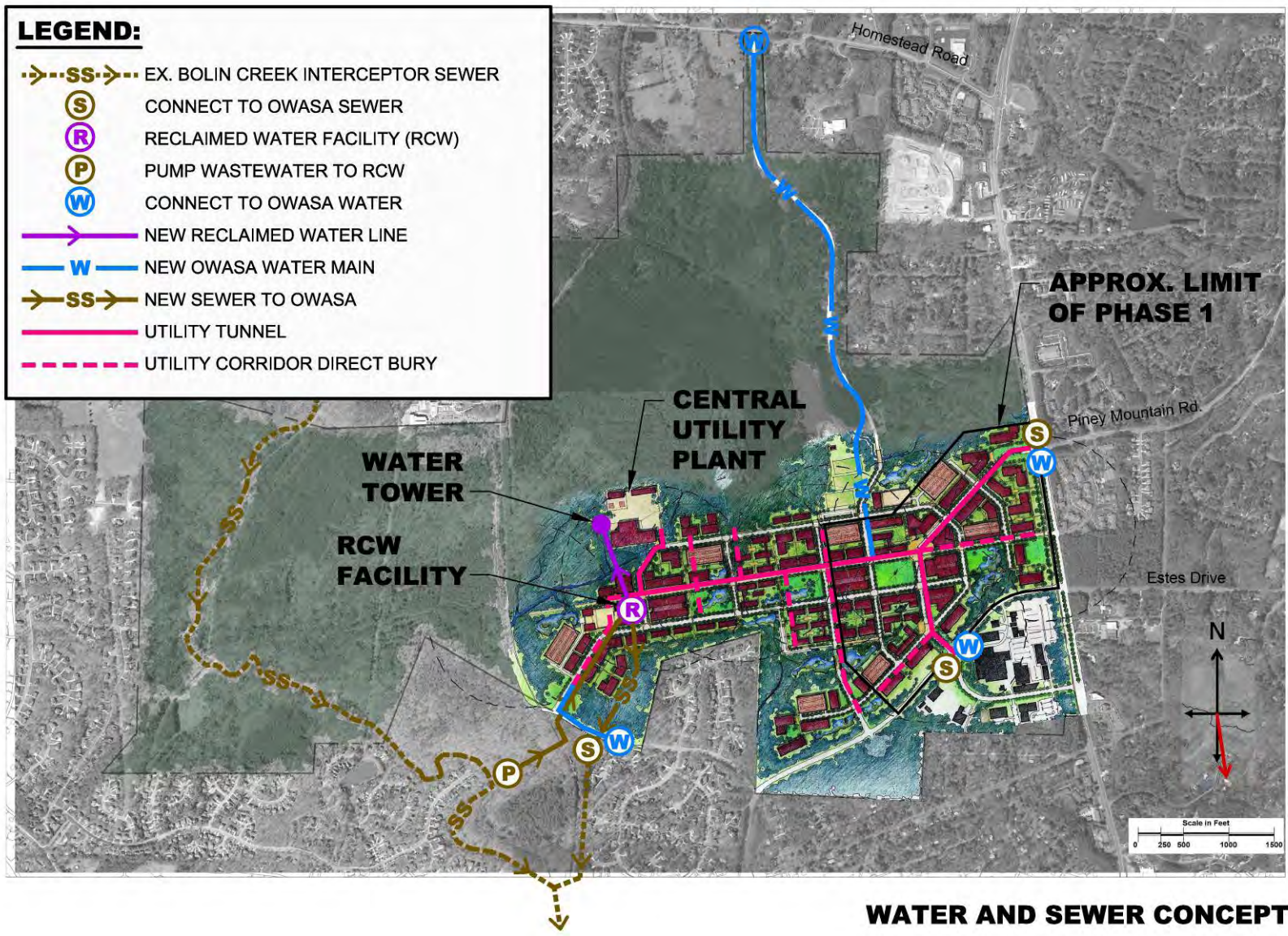
Projected Water Demand Over 50 Years



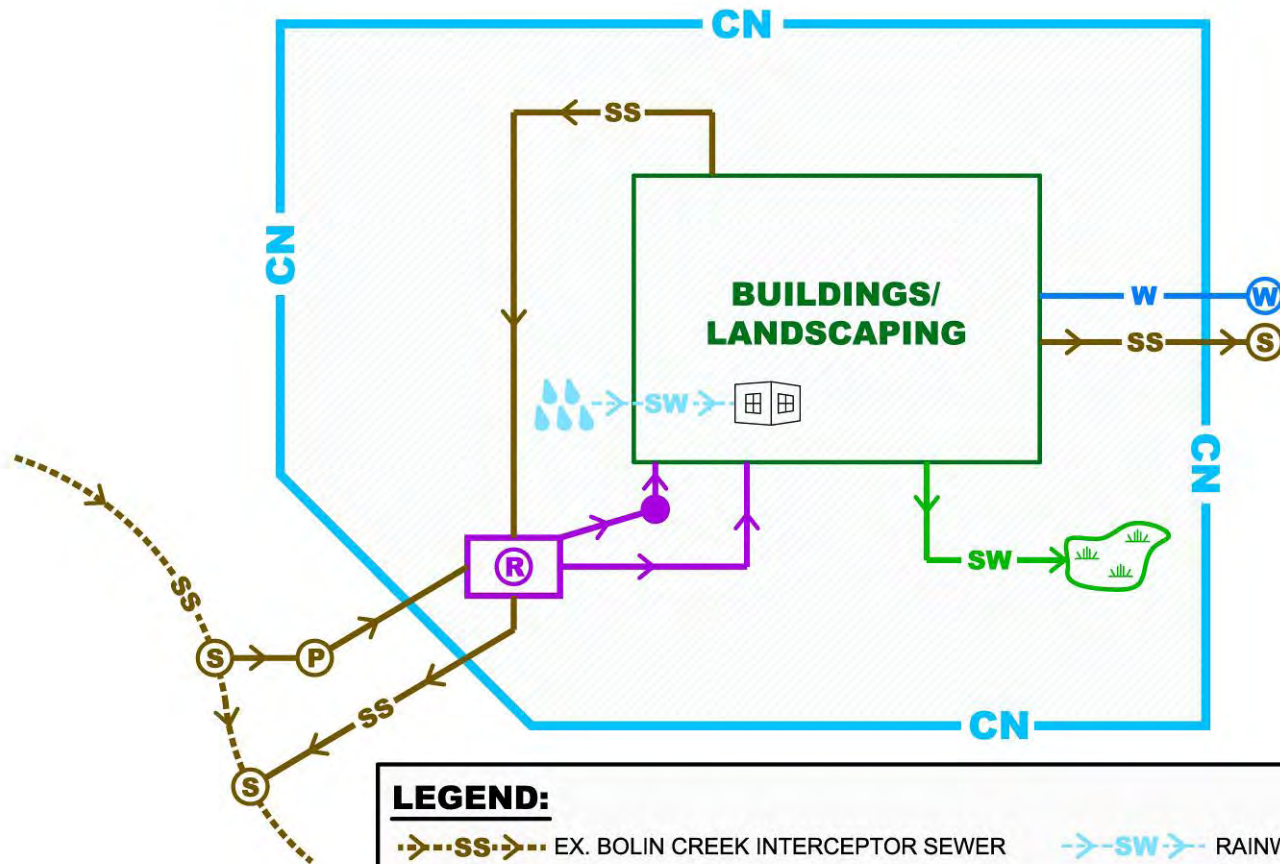


LEGEND:

- SS-→ EX. BOLIN CREEK INTERCEPTOR SEWER
- (S) CONNECT TO OWASA SEWER
- (R) RECLAIMED WATER FACILITY (RCW)
- (P) PUMP WASTEWATER TO RCW
- (W) CONNECT TO OWASA WATER
- NEW RECLAIMED WATER LINE
- W NEW OWASA WATER MAIN
- SS→ NEW SEWER TO OWASA
- UTILITY TUNNEL
- UTILITY CORRIDOR DIRECT BURY



WATER AND SEWER CONCEPT



LEGEND:

->--SS--> EX. BOLIN CREEK INTERCEPTOR SEWER
 (S) CONNECT TO OWASA SEWER
 (R) RECLAIMED WATER FACILITY (RCW)
 (P) PUMP WASTEWATER TO RCW
 (W) CONNECT TO OWASA WATER
 ● WATER TOWER
 -CN- CAROLINA NORTH BOUNDARY

->--SW--> RAINWATER HARVESTING
 -> NEW RECLAIMED WATER LINE
 -W- NEW OWASA WATER MAIN
 -SS- NEW SEWER TO OWASA
 -SW- NEW STORM DRAINAGE
 [SW] STORMWATER TREATMENT

SCHEMATIC: WATER AND SEWER CONCEPT



- Utilize reclaimed water for various non-potable purposes:
 - Cooling towers
 - Irrigation of athletic fields and landscaped areas
 - Toilet flushing
 - Firefighting
 - Street cleaning



Water tank and cooling tower



Field irrigation



- Integrate research opportunities with innovative technologies while addressing regulatory requirements
 - UNC Department of Environmental Sciences and Engineering
 - OWASA



Living Machine at Oberlin College



- On-site wastewater treatment
- Membrane bioreactor
- Architectural treatment
- Creemore Wastewater Treatment Plant in Ontario, Canada





- On-site wastewater treatment
- Architectural enclosure
- Membrane bioreactor
- Kill Devil Hills, NC



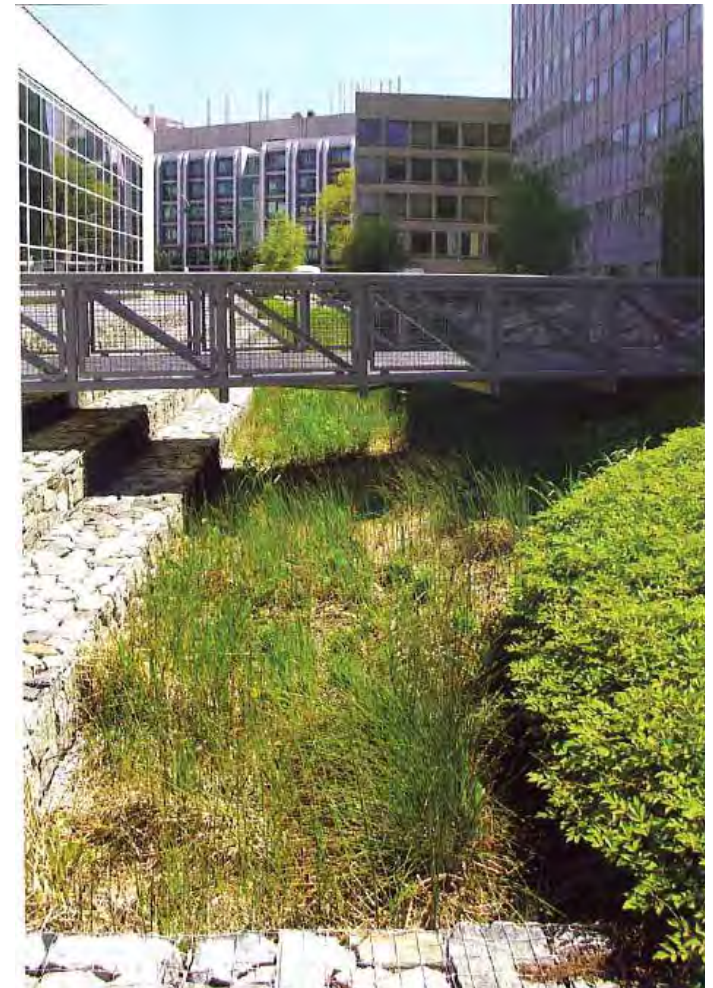
Membrane Facility, Kill Devil Hills, NC



Stormwater Systems

Stormwater systems shall replicate natural hydrology within disturbed and undisturbed areas

- Build on previously disturbed areas
- Manage runoff from the built environment close to its source
- Re-charge the groundwater
- Provide water quality treatment for all impervious areas
- Collect and re-use the runoff from impervious areas
- Meet or exceed regulatory requirements





Use of innovative Low Impact Development (LID) stormwater treatment methods

- Green streets





- Use of innovative Low Impact Development (LID) stormwater treatment methods
 - Bioretention
 - Green roofs
 - Permeable pavement
 - Rainwater harvesting
 - Tree box filters



Green roof



Chesapeake Bay Foundation Headquarters



Bioretention area in median

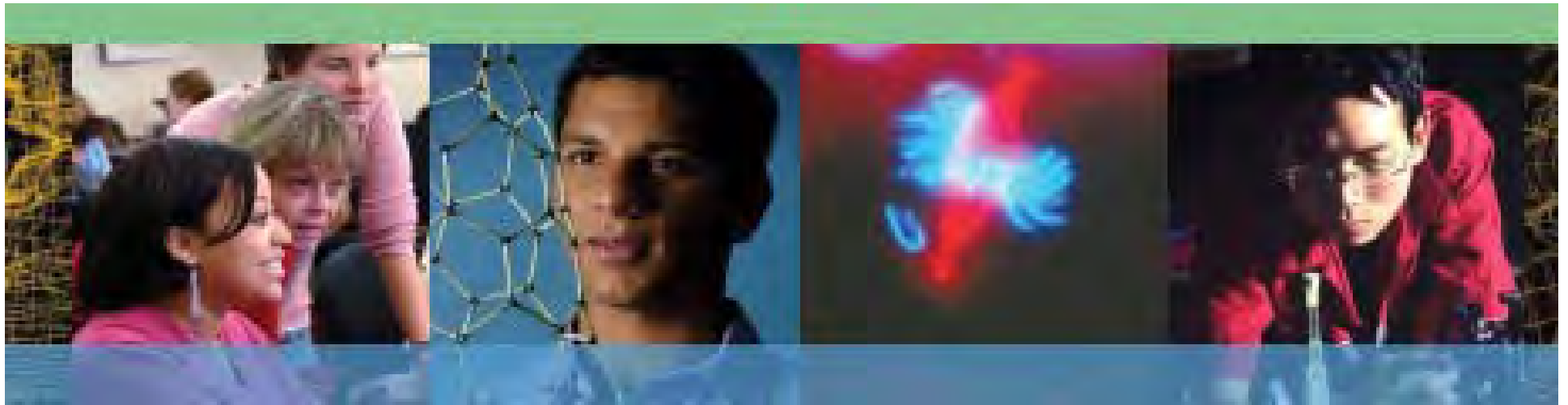


Treatment of rooftop runoff





Rain harvesting art!



Energy



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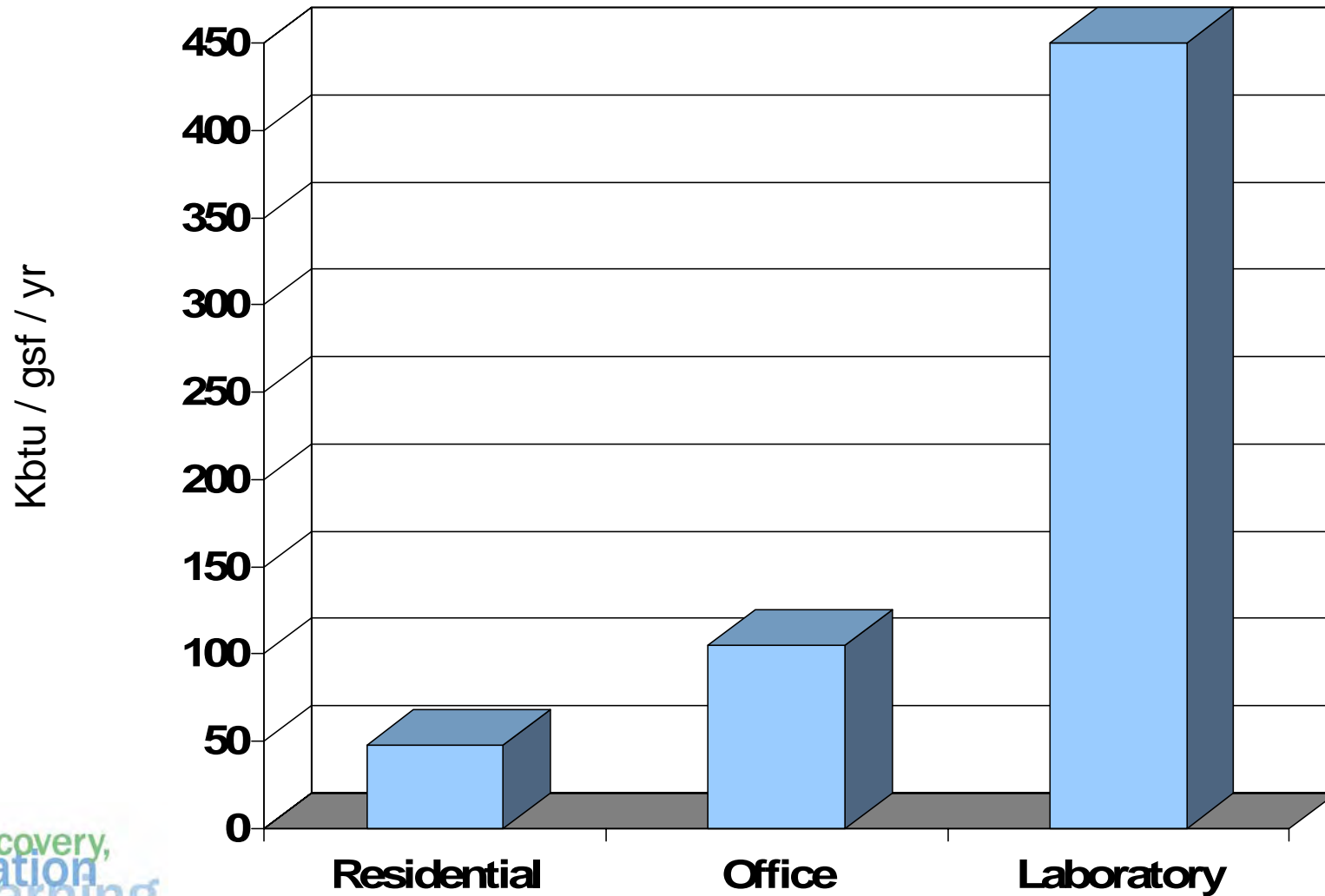


Energy Strategy

- Take advantage of “free resources” first
- Minimize building energy consumption
- Recycle energy where possible
- Maximize efficiency of utility plants
- Use renewable energy sources
- Recognize differences in building types



Recognize Differences in Building Types





Minimize Building Energy Needs



- Perimeter daylighting in office spaces



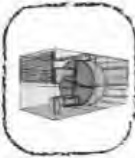
- Air change setbacks



- Improved envelope



- Chilled beams



- Total energy recovery



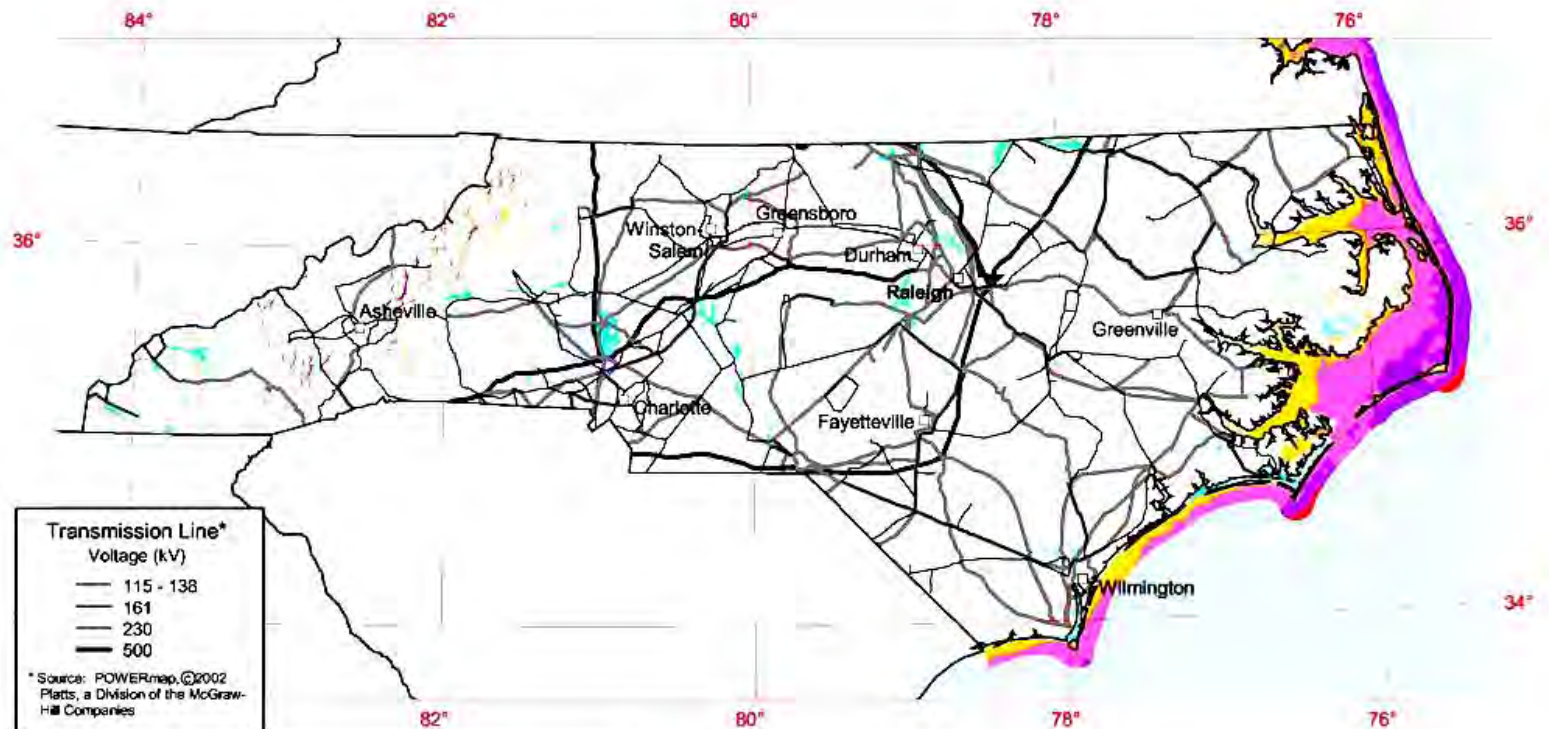
- Fume hood occupancy sensors



- Take advantage of “free resources” first
 - Wind energy
 - Solar energy
- Investigate Renewable Energy Options
 - Landfill gas
 - Geothermal
 - Animal waste digester (biogas)
 - Woody biomass
 - Torrified wood
 - Remote gasification

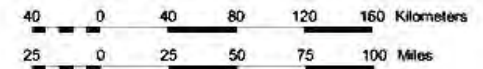


Wind Resource Map (at 50 m above ground)



Wind Power Classification				
Wind Power Class	Resource Potential	Wind Power Density at 50 m W/m^2	Wind Speed ^a at 50 m m/s	Wind Speed ^a at 50 m mph
1	Poor	0 - 200	0.0 - 5.6	0.0 - 12.5
2	Marginal	200 - 300	5.6 - 6.4	12.5 - 14.3
3	Fair	300 - 400	6.4 - 7.0	14.3 - 15.7
4	Good	400 - 500	7.0 - 7.5	15.7 - 16.8
5	Excellent	500 - 600	7.5 - 8.0	16.8 - 17.9
6	Outstanding	600 - 800	8.0 - 8.8	17.9 - 19.7
7	Superb	> 800	> 8.8	> 19.7

^a Wind speeds are based on a Weibull k value of 2.0



The annual wind power estimates for this map were produced by TrueWind Solutions using their Mesomap system and historical weather data. It has been validated with available surface data by NREL and wind energy meteorological consultants.

U.S. Department of Energy
National Renewable Energy Laboratory



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Current Realities of Solar Power



Lab Building Footprint

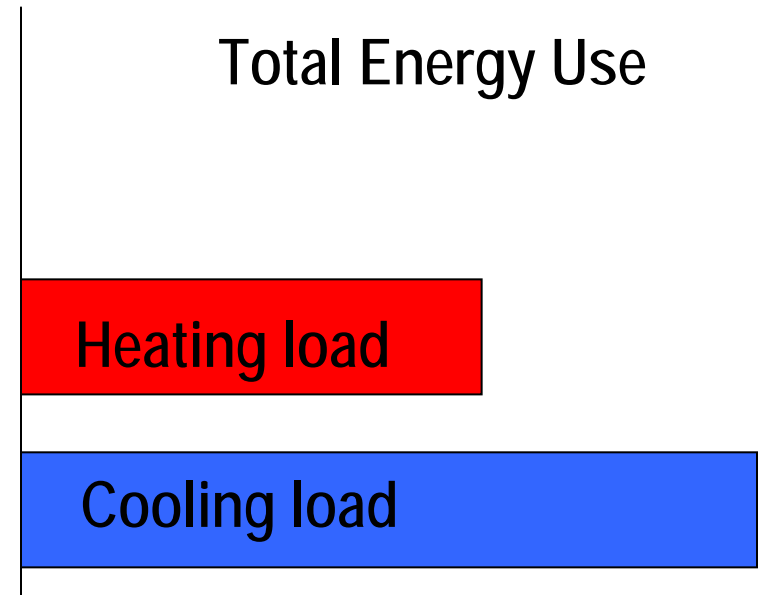
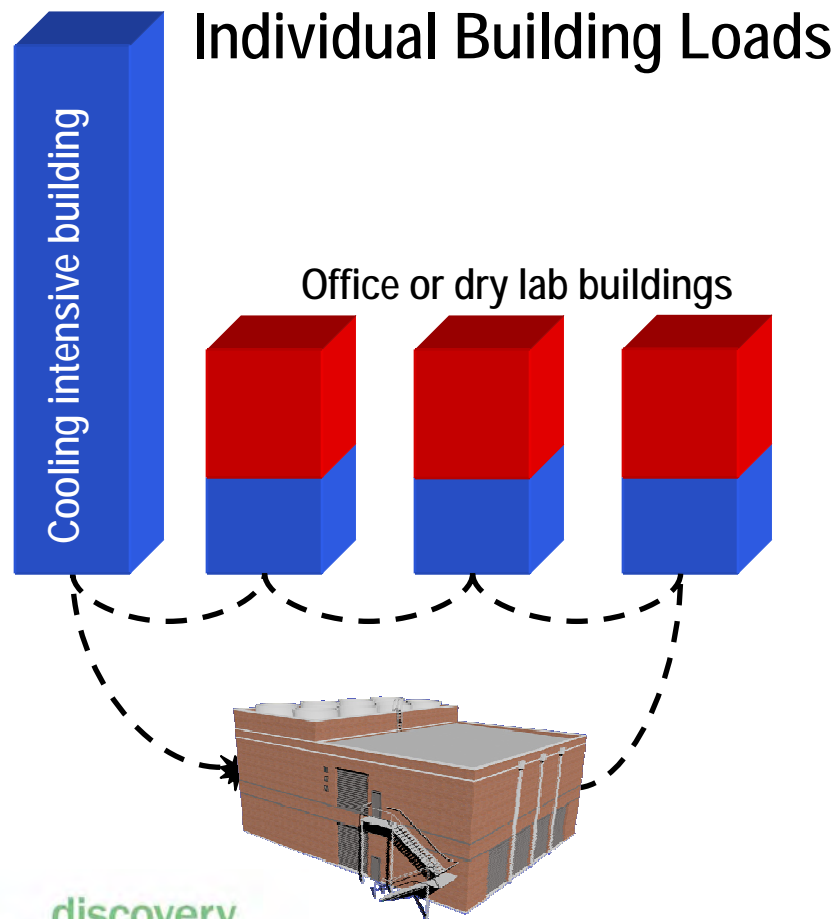
4 story building
35,000 SF footprint
1.0 MW load

Solar Array Footprint

Approx 5 acres/MW of power
216,000 SF footprint required
1.0 MW power production

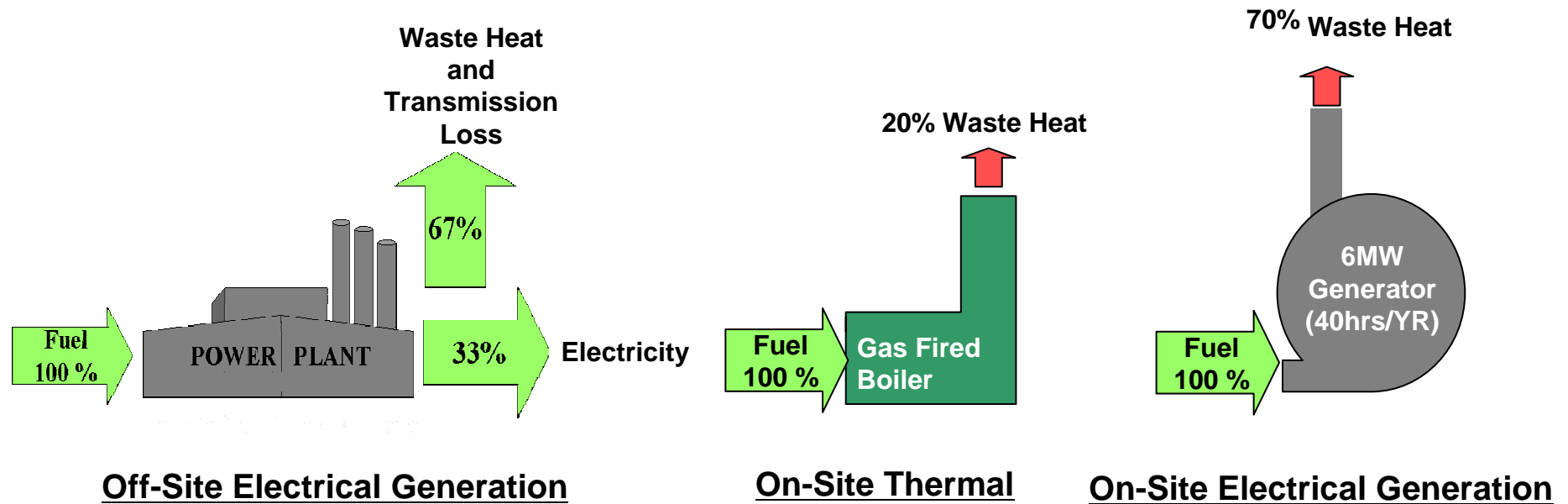


Recycle Energy (Waste = Food)



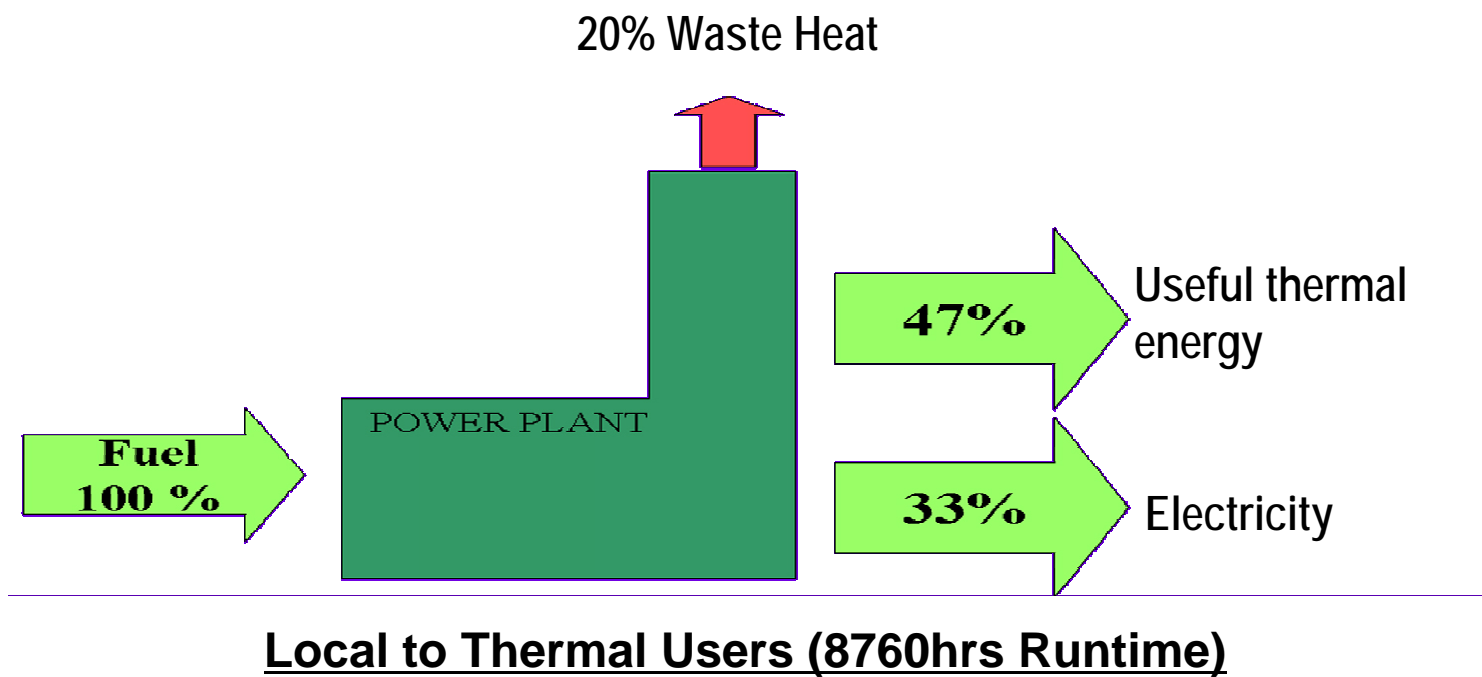


Traditional Electrical and Thermal Service



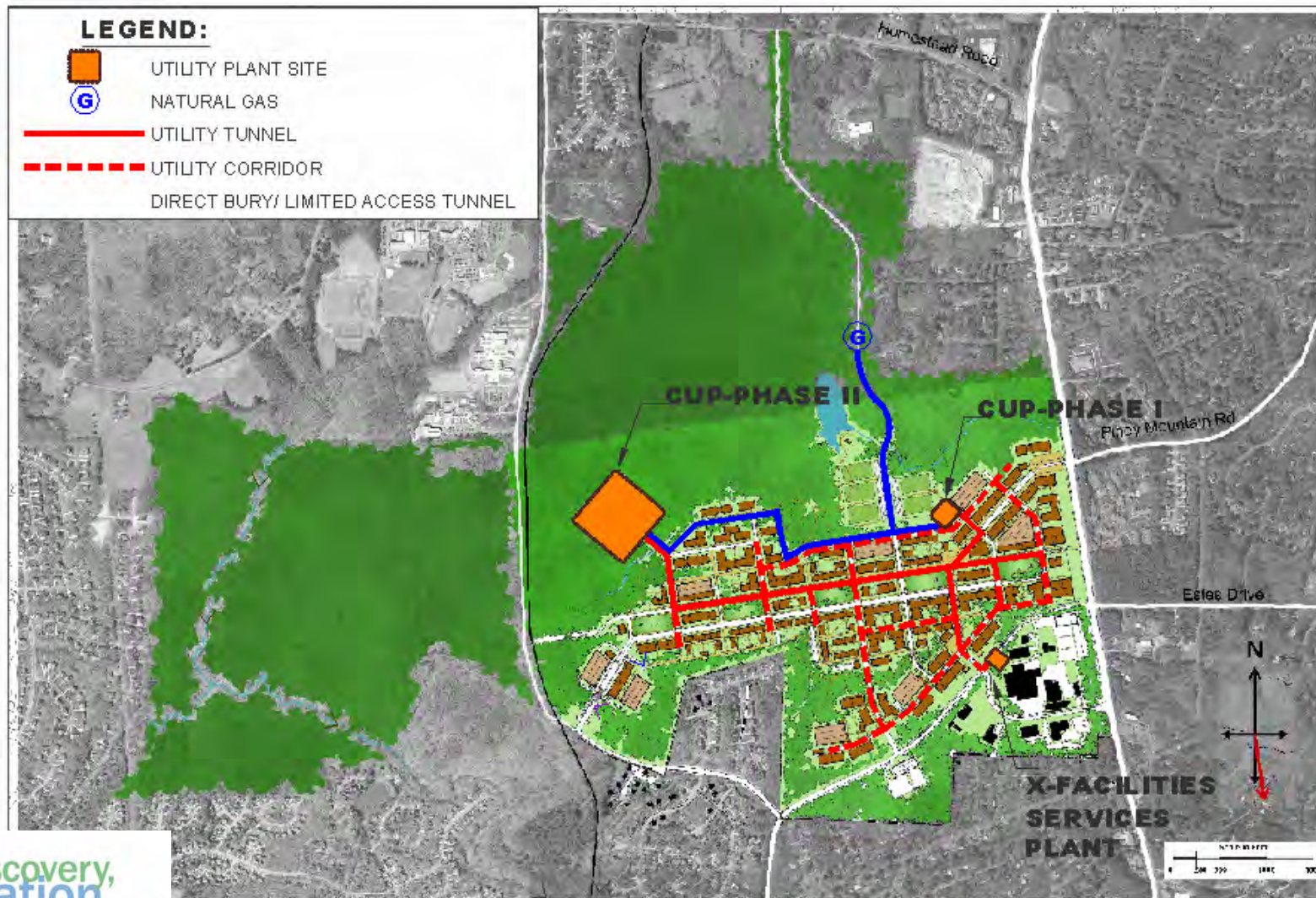


Combined Heat and Power





Preliminary Thermal and Electrical Utility Plan





Questions

