Eastern Band of Cherokee Indians

Strategic Energy Plan

Funded By: Department of Energy

Technical Support: SCIES at Clemson University

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EBCI Tribal Government

- Three-branch Government
- There are over 13,725 enrolled members of the Tribe today
- 8,200+ members live on the land held in trust for the ECBI by the US government called the "Qualla Boundary"
- 52 tracts totaling 56,688 acres in 5 NC counties
- • Bordered by the Great Smoky Mountains National Park

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Project Overview

- Strategic Energy Plan
  - Identify renewable energy and energy efficiency alternatives available on the Qualla Boundary
  - Assess the benefits and costs of each alternative
  - Create a strategic plan for the development and implementation of the selected alternatives

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Project Location

- The home of the Eastern Band today is the 56,698-acre Qualla Boundary in Western North Carolina adjacent to the Great Smoky Mountains National Park.

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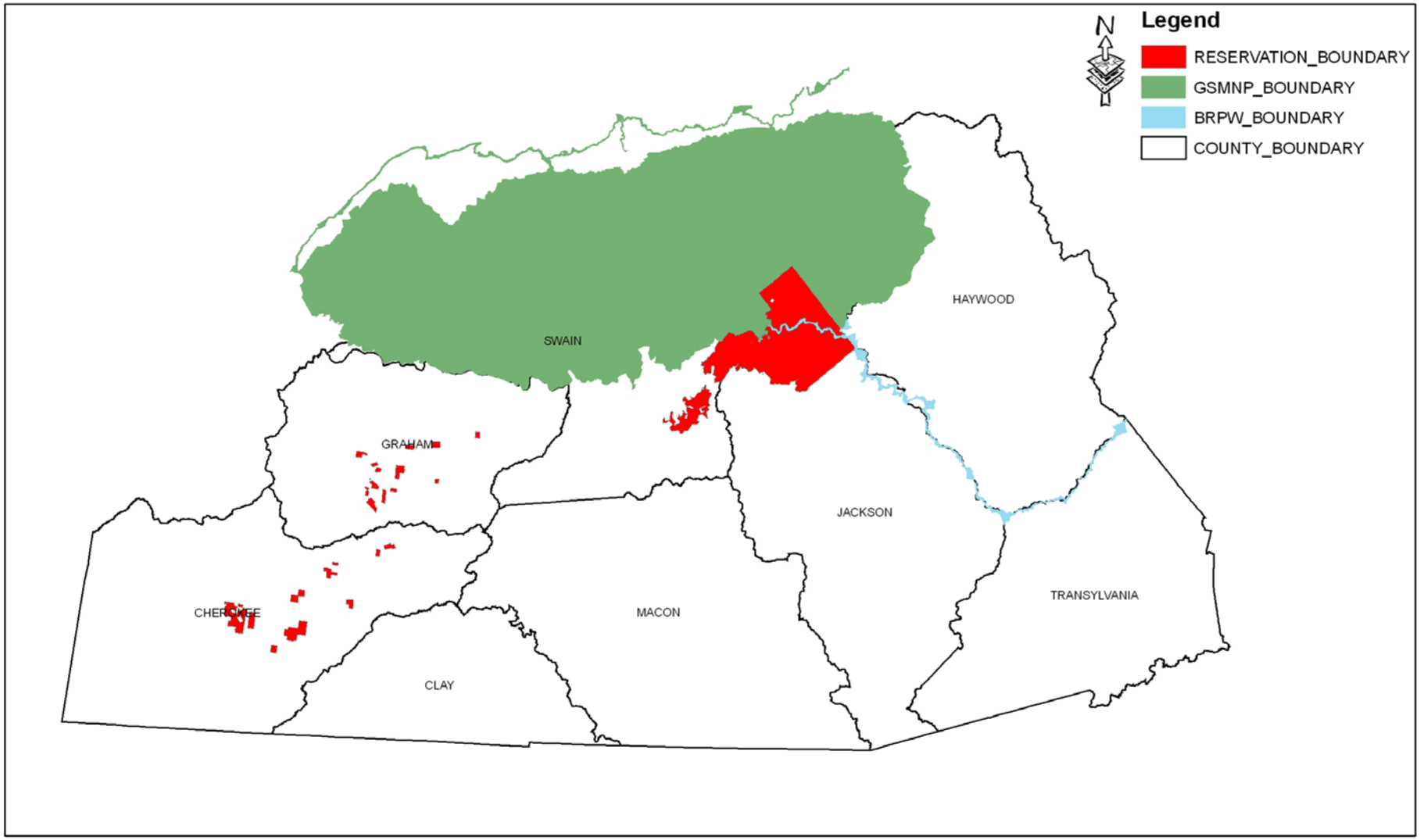
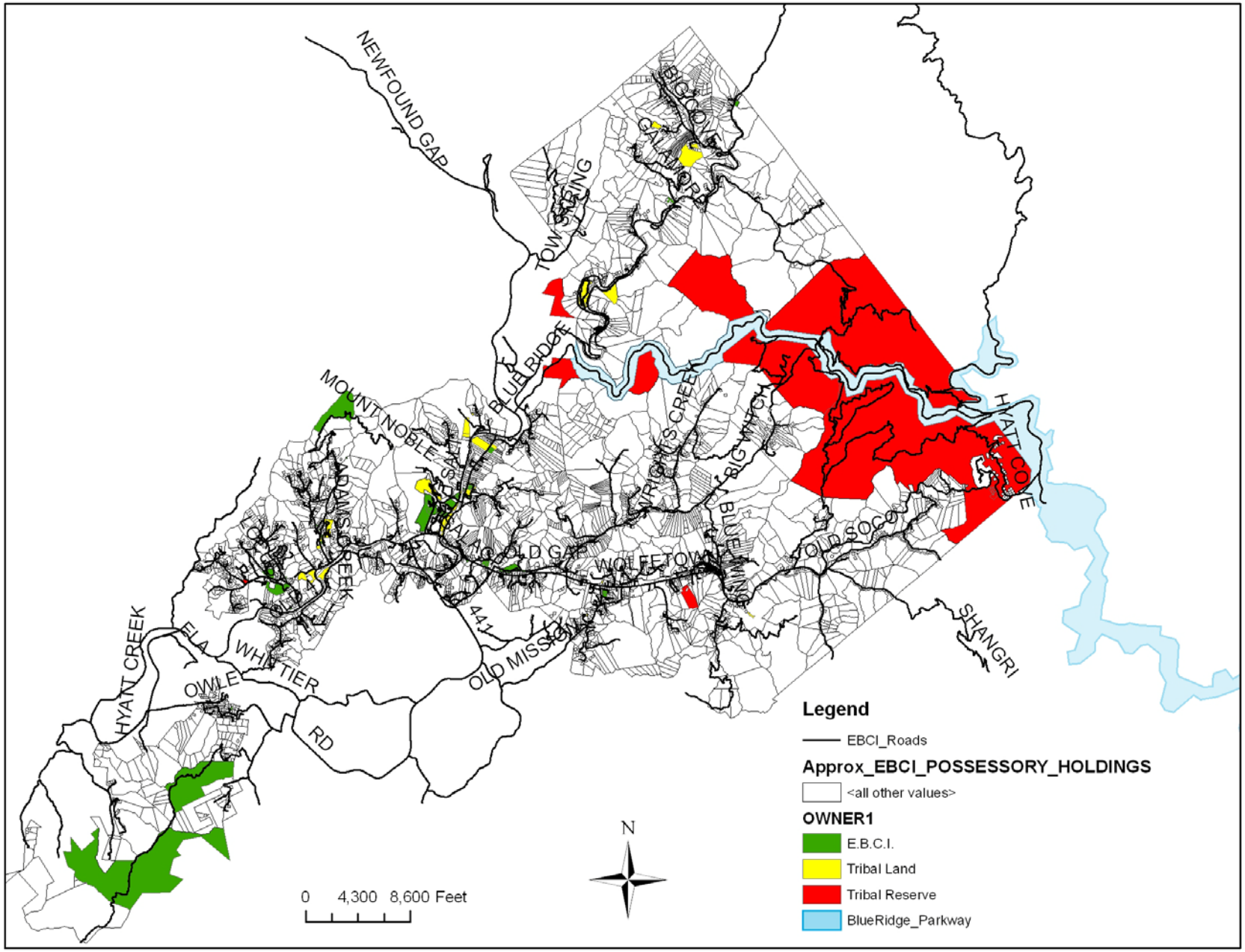
Project Location, cont.



Qualla Boundary



Project Participants

- Sub consultant and Energy Committee
  - Energy Committee: Staff from CDOT, Planning and Development, Environmental Department, Executive Office, GIS Department, and Directors of Finance and Natural Resources and Construction
- Tribal Council and Business Committee

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Project Participants, cont.

- Generations Qualla

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Objectives

- Analyze all available energy production and conservation options.
- Complete Strategic Energy Plan with a list of ‘next steps’
- Have The Executive office and Tribal Council adopt the plan.
- Begin implementation of the next steps

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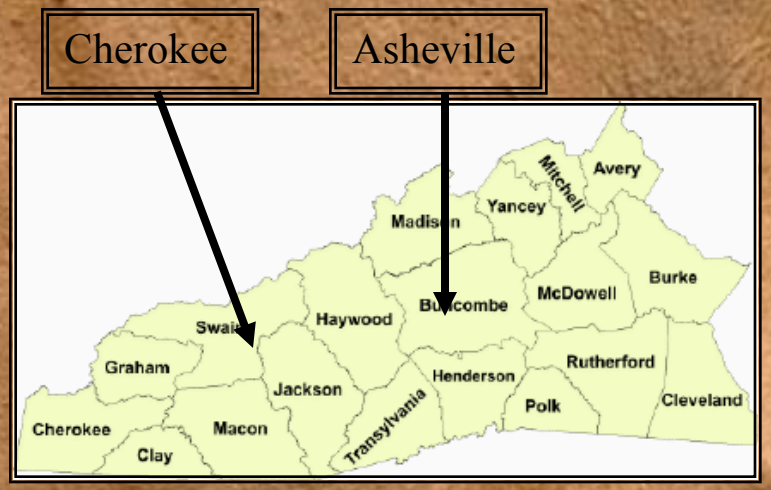
Demographics

- Qualla Boundary population: 8,092 (US Census, 2000)
- Median Family Income: $31,723 (US Census, 2000)
- Population within 50-mile radius (the distance to Asheville) approximately 350,000
- Largest area employer is Harrah's Cherokee Casino and Hotel which employs 1,830
  - ➢ Largest employer in NC west of Asheville
- EBCI Tribal Government employs over 1,000
- Other major employers:
  - Cherokee Indian Hospital: 236 employees
  - Cherokee Boys Club: 620 employees



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Cherokee: A Major Tourist Destination

- A gateway to both the Blue Ridge Parkway and the Great Smoky Mountains National Park – two of the top three most visited recreation areas in the United States
  - 2,267,625 visitors at Cherokee entrance to GSMNP
  - Over 536,000 visitors from the Blue Ridge Parkway
- Over 3.6 million visitors to Harrah's Cherokee Casino
- Over 1,460,000 overnight visitors on the Qualla Boundary in 2006 (76,394 campsite nights, 507,545 hotel/motel nights*)
- 2,489 hotel/motel rooms and 2,106 campsites are available on the Qualla Boundary

(Sources: National Park Service, NC Department of Transportation, and Blue Ridge Parkway)

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Processes for Plan Formulation

- Information Gathering
  - Very difficult and time consuming
  - Information was very informative
  - Had to project information to fill in the gaps
  - Outside Agencies can be an asset or detriment
- Analysis
  - Results may be surprising
  - Example: EBCI spent over $1million in Electricity, and $1million in vehicle fuel*
- Projections/Results
- Action Steps

*Gov. expenses, tribal enterprises not included.

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Energy Project Selection Criteria

- Four criteria established in the Tribe's Comprehensive Economic Development Strategy were used to assess each energy alternative
  - Consistency with community values, goals and plans
  - Community impact
  - Readiness to proceed
  - Management capacity

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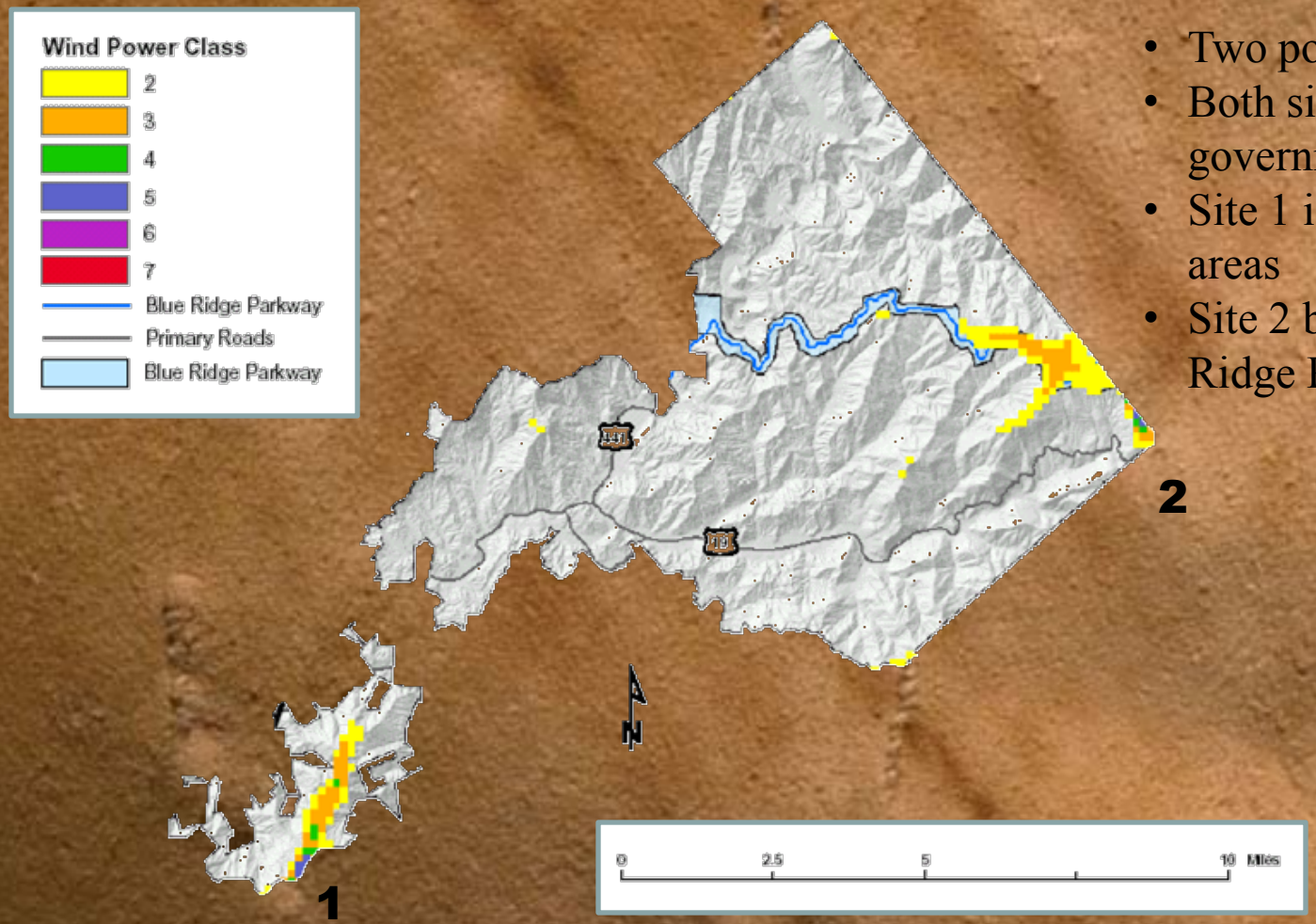
Preliminary Findings – Wind Energy



- Two potential sites
- Both sites owned by Tribal government
- Site 1 is away from tourist areas
- Site 2 borders the Blue Ridge Parkway

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Site Topography & Dominant Wind Direction

Site 1

Site 2

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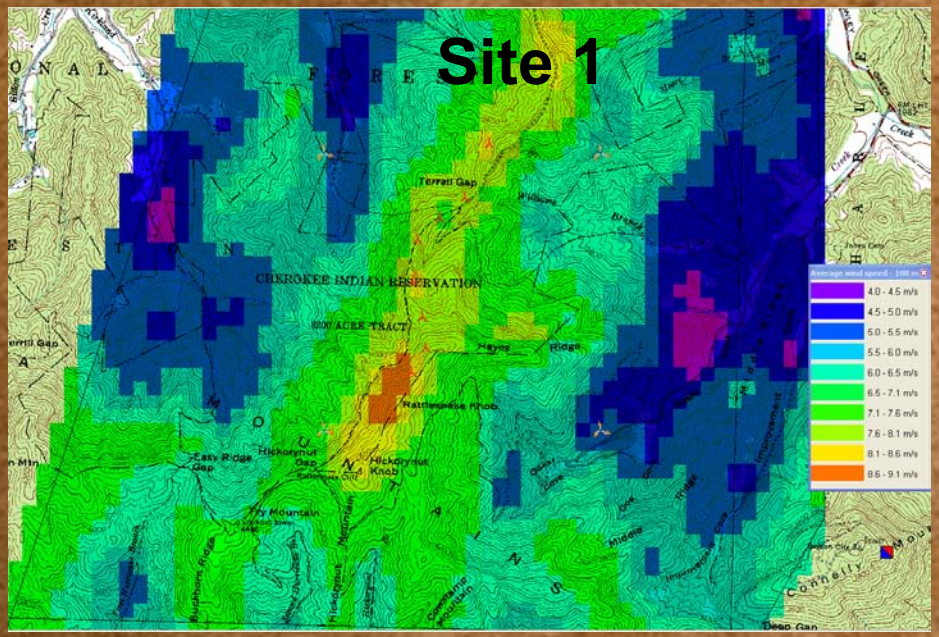
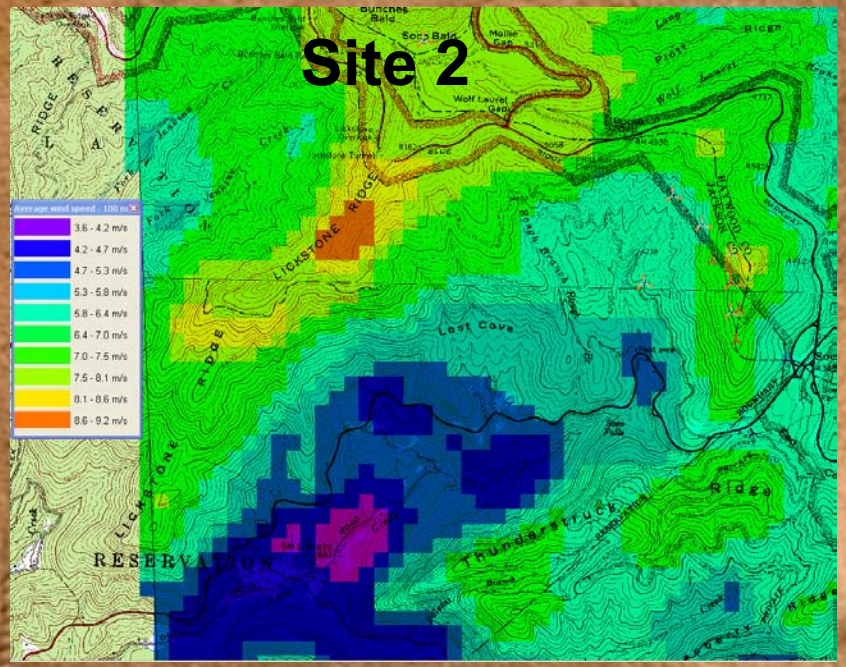
Wind Results and Recommendations





- Site 1- Analysis for 8 1.5 MW turbines predicts 40% capacity factor. This site is recommended for feasibility study.
- Site 2 - Not recommended due to lower predicted capacity factor (30%) and proximity to the Blue Ridge Parkway
- A 3rd site was identified and recommended for initial screening

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Preliminary Findings – Solar/Biomass

Eliminated due to:

- High cost
- Lack of adequate resource
- Lack of land / topography

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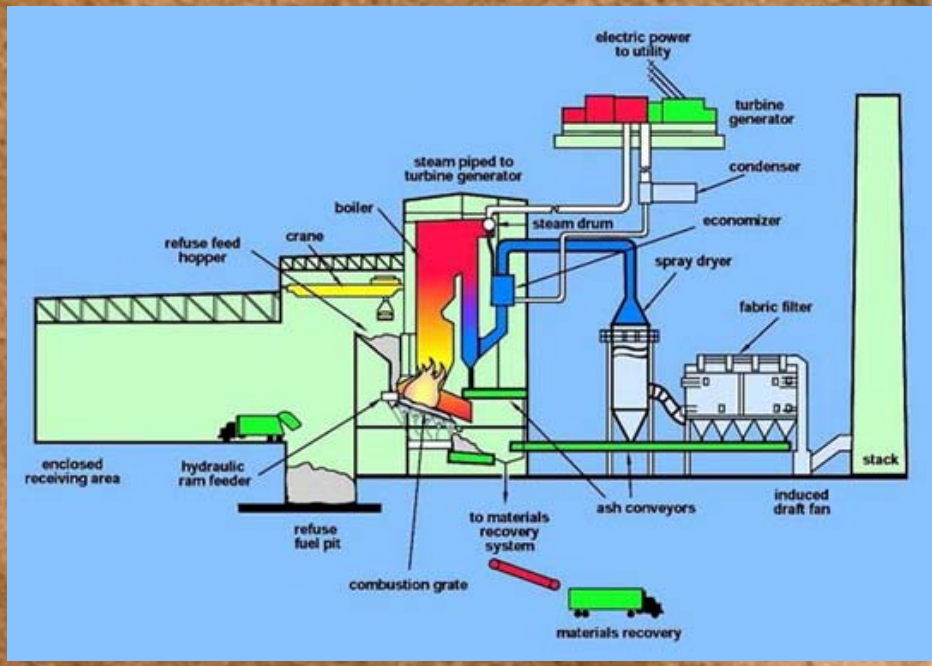
Preliminary Findings - Municipal Solid Waste (MSW) to Energy

- Proven technology
  - Currently 89 facilities in the US with a capacity of 2700 MW
- Current situation
  - Tribe collects MSW on the Boundary and for surrounding counties
  - 3 tractor trailers are used to haul 60 tons per day to landfill in GA
  - Tipping fees paid
- Given avoided cost potential + revenue from electricity generation, does MSW-to-Energy make sense?



Results

- Cost savings ($840K/yr) and electricity sales income ($0.6-1.2 M/yr) outweighed by capital ($9M) and operating costs ($1.2M/yr)
- Not recommended

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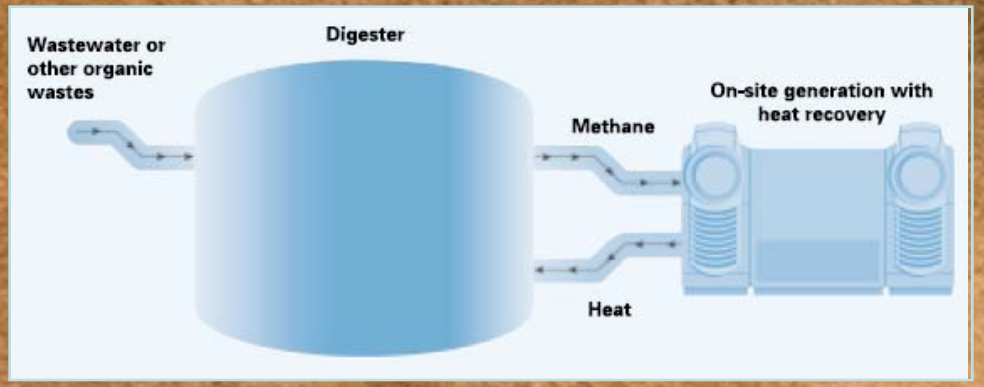
Municipal Waste Water to Energy

Proven technology

- 22% of MWW plants in US use anaerobic digestion
- 266 plants convert gas to power

Current situation

- Tribe operates 1.8 MGD waste water treatment facility
- One of the top three consumers of electric power
- Existing facility not conducive to energy production
  - Uses aerobic processing
  - Too small
- However, the Tribe has plans to install a 5.5 MGD facility in the near future
  - 126 KW power
  - 192 KW of excess heat



Recommendation

Given the small additional cost of a CHP unit, this project was recommended for further study

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Biodiesel from Waste Oil & Grease

- Tribe is located in a high tourist area
  - 1,100 food service establishments within 50 miles of Cherokee
  - Phone survey of 30% of restaurants in 3 counties used to estimate available supply
    - Total – 14,500 gal/month
    - Possible – 8,700 gal/month
  - Tribe currently uses 270,000 gal of diesel per year
    - 22,500 gal/month
    - 4,500 gal of B100 required for B20 blend
    - Can meet Tribe's need + external sales
- Cost analysis underway
- Recommendation TBD based on cost analysis
  - Appears positive at this time

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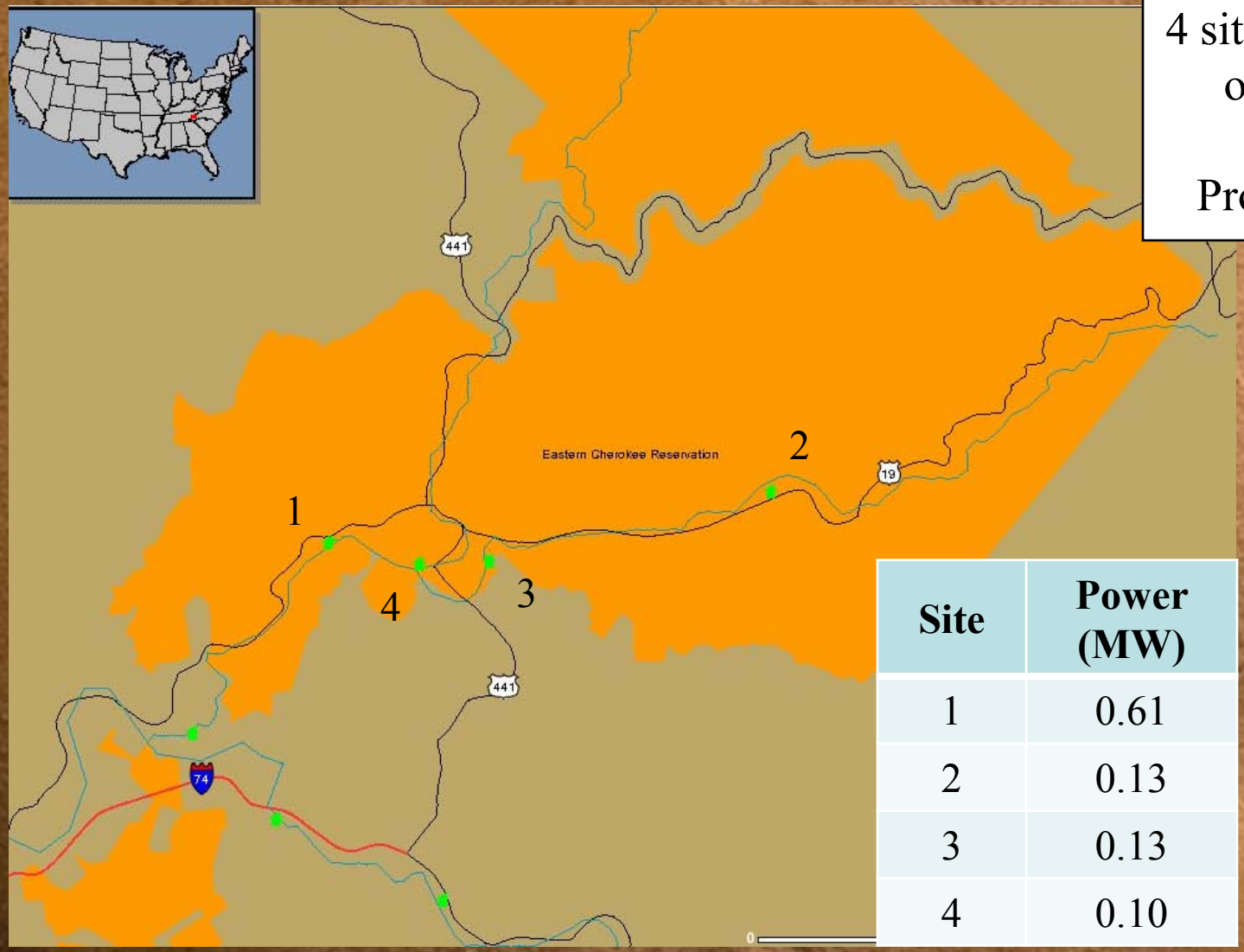
Preliminary Findings - Hydropower



4 sites surveyed based on DOE Virtual Hydropower Prospector website

Site	Power (MW)
1	0.61
2	0.13
3	0.13
4	0.10

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Hydropower Assessment Process/Results

- Analysis performed using
  - Flow data from VHP website and NCDNR
  - RETSCREEN hydropower cost model
- Site visits
- Results – No sites recommended due to cost and impacts on other uses
  - Gradual slope would require long penstock or significant dam
  - Impacts on tourism, fishing, swimming, etc.

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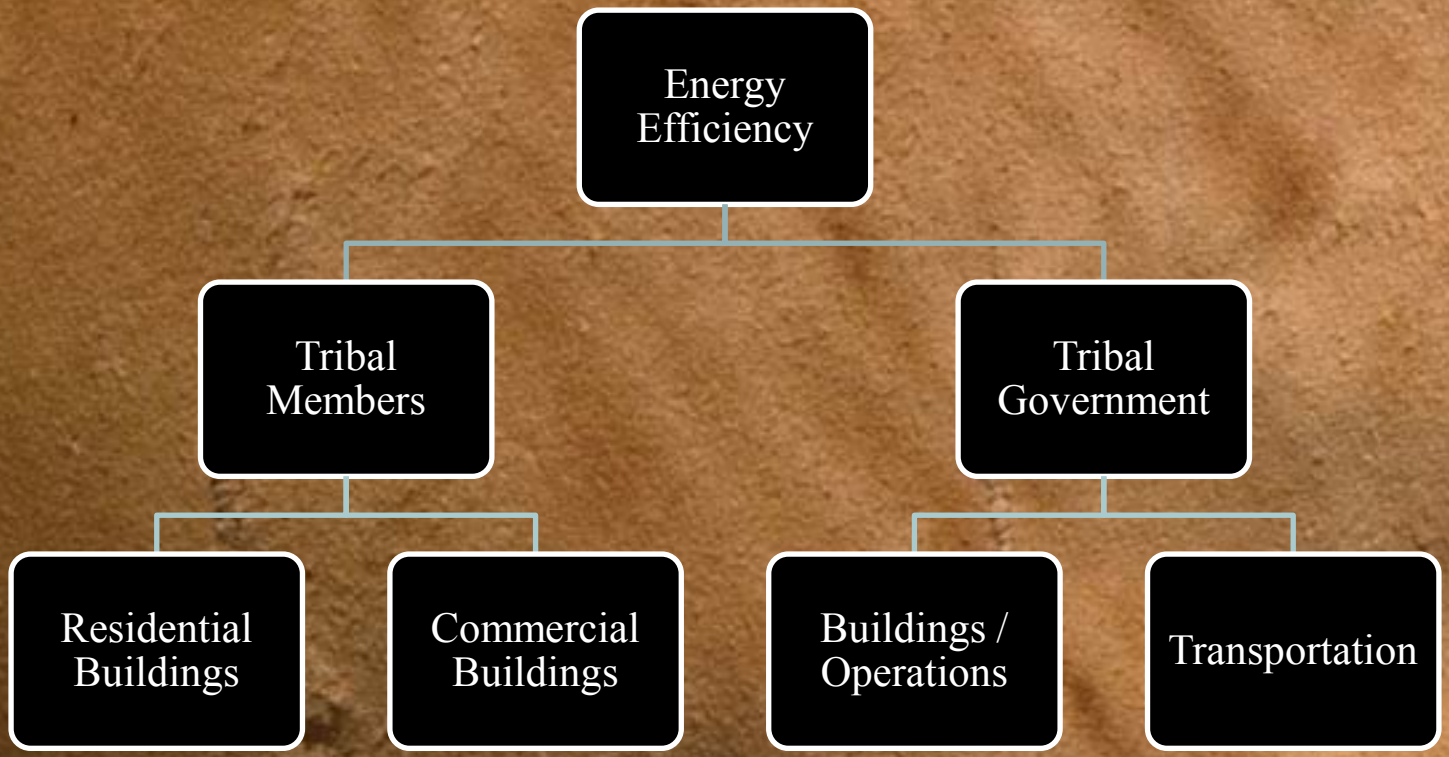
Preliminary Findings – Energy Efficiency



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Preliminary Findings – Energy Efficiency, Cont.

- **Energy Efficiency for Tribal Members**
- No data for individual tribe members available
- Regional data suggests the "big 3" are
  - Space heating
  - Lights and appliances
  - Water heating
- Numerous options assessed based on
  - Cost
  - Ease of implementation
  - Energy savings potential

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Energy Efficiency for Tribal Members

- Recommendations
  - Routine HVAC service and repair
  - Weatherization program including HVAC duct testing and sealing
  - Compact florescent lighting
  - Energy Star replacement HVAC & appliances
  - Assess codes and standards used for new construction
  - Energy education
  - Consider cash incentives to encourage purchase of high efficiency equipment

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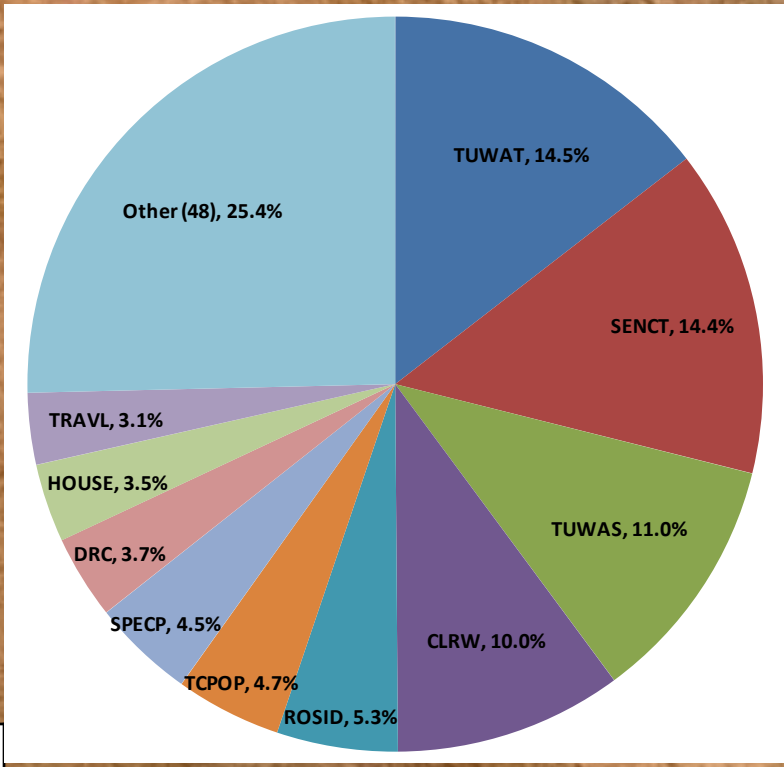
Energy Efficiency for Tribal Government Buildings & Operations

- Electricity data available by Tribal Gov't division & program
- Total Usage = $1.0M/yr
- Top 10 users consume 75% of total
- Recommendations
  - Energy Audits of major buildings (20 planned)
  - Energy offset for sewer system
  - High efficiency street lighting



Area Code	Fund	Division	Program
TUWAT	Water & Sewer	Tribal Utilities	Water Treatment
SENCT	Senior Citizen	Social Services	Public Assistance
TUWAS	Water & Sewer	Tribal Utilities	Sewer
CLRW	Qualla Recreation	Economic Development	Civic Center
ROSID	Roads	Roads	Street Lights
TCPOP	Tsali Care	Health & Medicine	Tsali Care
SPECP	Special Projects	Economic Development	Building Construction
DRC	Wraparound	Social Services	Tribal
HOUSE	Housing	Housing	Housing
TRAVL	Travel & Promotions	Economic Development	Fairgrounds

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Energy Efficiency for Tribal Government Transportation

- Tribe currently operates 423 vehicles & uses 487,651 gallons of fuel / year
- Recommendations
  - Right sizing of vehicle fleet
  - Driver training
  - Increased use of hybrids & electric vehicles where possible
  - Add fuel economy as a requirement for future vehicle purchases

Fleet Inventory (as of June 2008)	
Light Duty Vehicles	
Autos	53
Pickup Trucks	101
SUV's	57
Vans	48
Hybrid Vehicles	1
Heavy Duty Vehicles	
All	55
Off-road	
Construction	69
Other	39
Total	423

Fuel	Gallons	% of Total Fuel
Unleaded	218,036	44.7%
Diesel	213,267	43.7%
Biodiesel	56,348	11.6%
Total	487,651	100%

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Project Status/Activities to Complete

- Energy efficiency opportunities for Tribe members and Tribal government identified
  - Energy audits of government buildings and assessment of high efficiency street lights already underway
- 11 renewable energy opportunities assessed
  - 3 recommended for more detailed feasibility studies
    - Wind farm on Rattlesnake Mountain
    - CHP unit for new MWW facility
    - Biodiesel production facility (pending)
- One additional opportunity identified
  - Wind resource on Lickstone Ridge

- Finalize Findings and action steps
- Present to Tribal Council
- Adopt the plan
- Continue integration with Generations Qualla
- Determine funding avenues

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Future Plans

- Wind Feasibility Studies
- Proceed with a proposed EBCI funded renewable energy fund to complete energy efficiency projects on existing facilities and other small projects
- Continue Negotiations with Duke Energy on solar installations

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QUESTIONS


Opportunity like this takes 11,000 years to create.
Welcome
Cherokee Indian Reservation
OFFICE OF PLANNING AND DEVELOPMENT
EASTERN BAND OF CHEROKEE INDIANS
CHEROKEE, NORTH CAROLINA
• Advanced Infrastructure • Tax Incentives • Sovereign Nation Benefits
• Over 5 Million Visitors Annually • Supportive Agencies & Programs