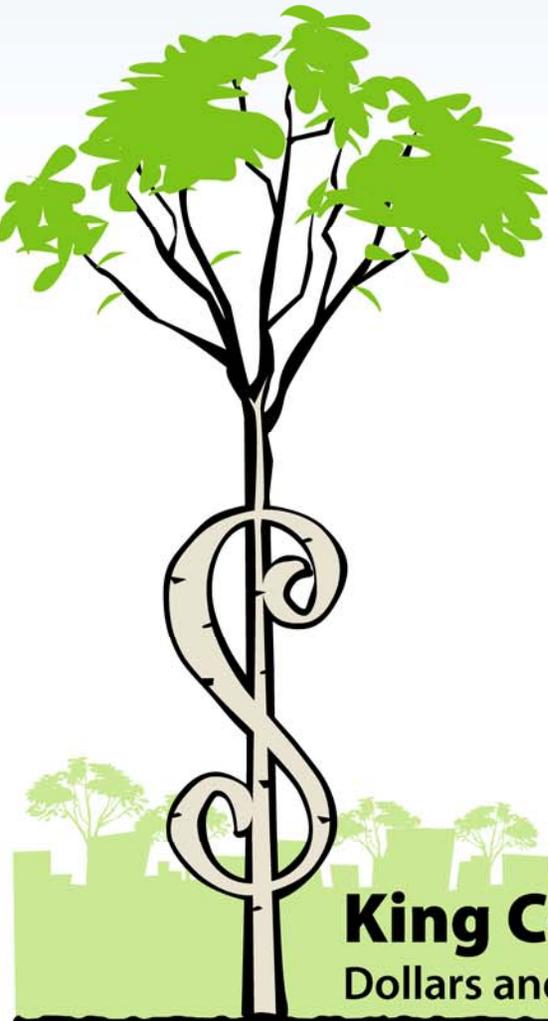


Pushing the Envelope: Sustainable Design and LEED™ for Brightwater

Michael Popiwny – King County
Andrea Ramage – CH2M HILL
February 15, 2006



King County Building Summit:
Dollars and Sense Tools to Green Your Project



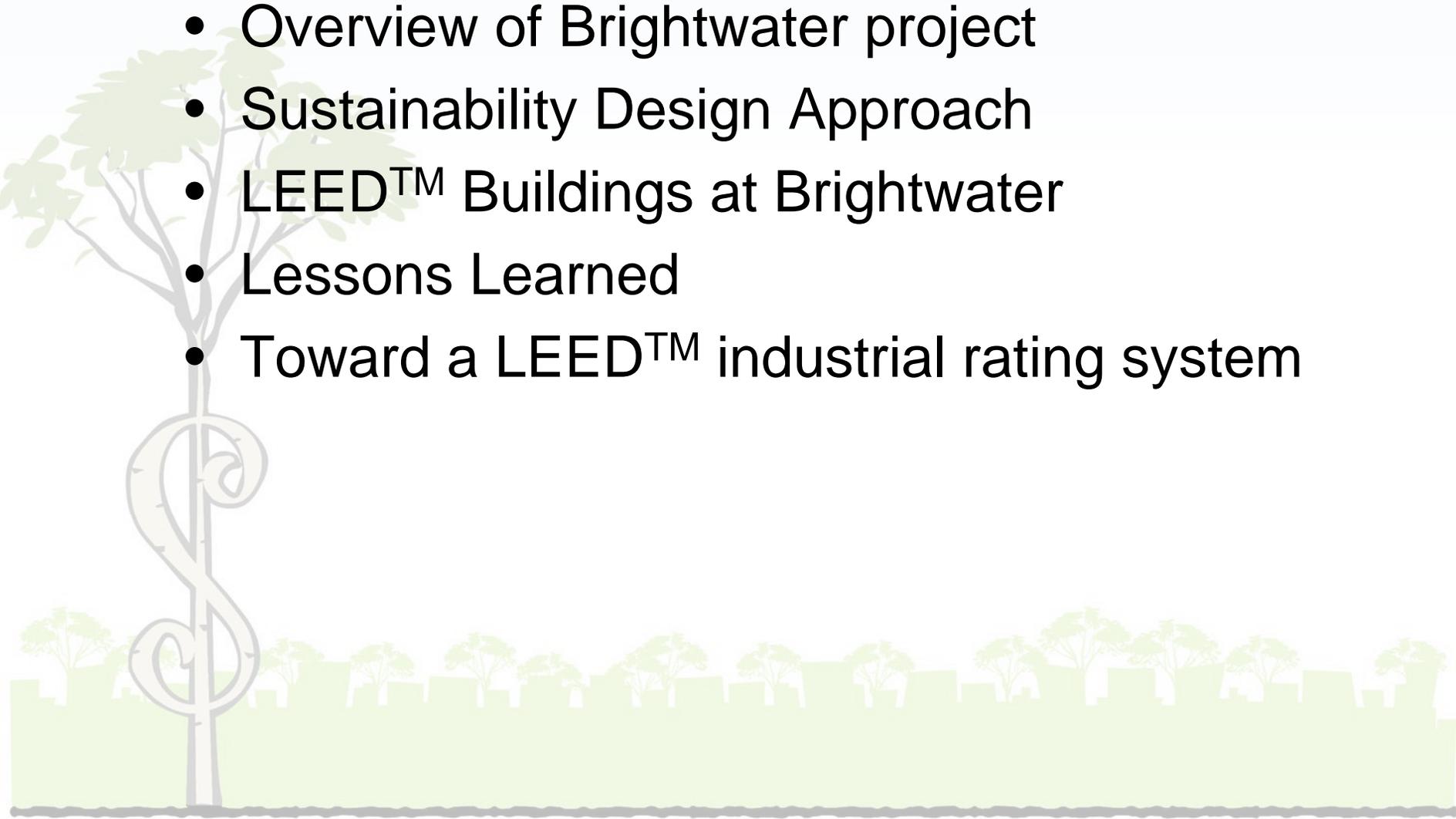
King County

Acknowledgements

- Brightwater Sustainable Design Team Leads
 - King County – Michael Popiwny
 - CH2M HILL – Andrea Ramage and Eleanor Allen
 - Paladino and Company Inc. - Tom Paladino and Treasa Sweek
 - Mithun - Sean Cryan

Outline

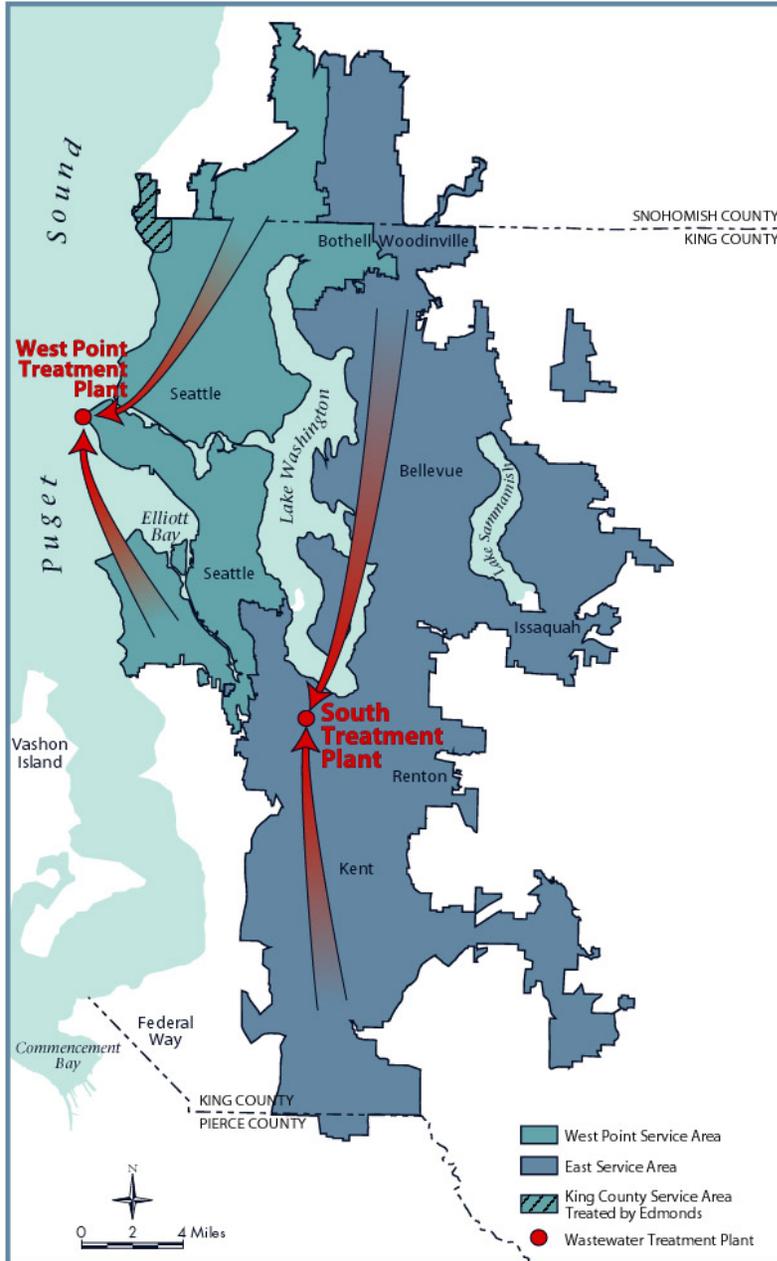
- Overview of Brightwater project
- Sustainability Design Approach
- LEED™ Buildings at Brightwater
- Lessons Learned
- Toward a LEED™ industrial rating system



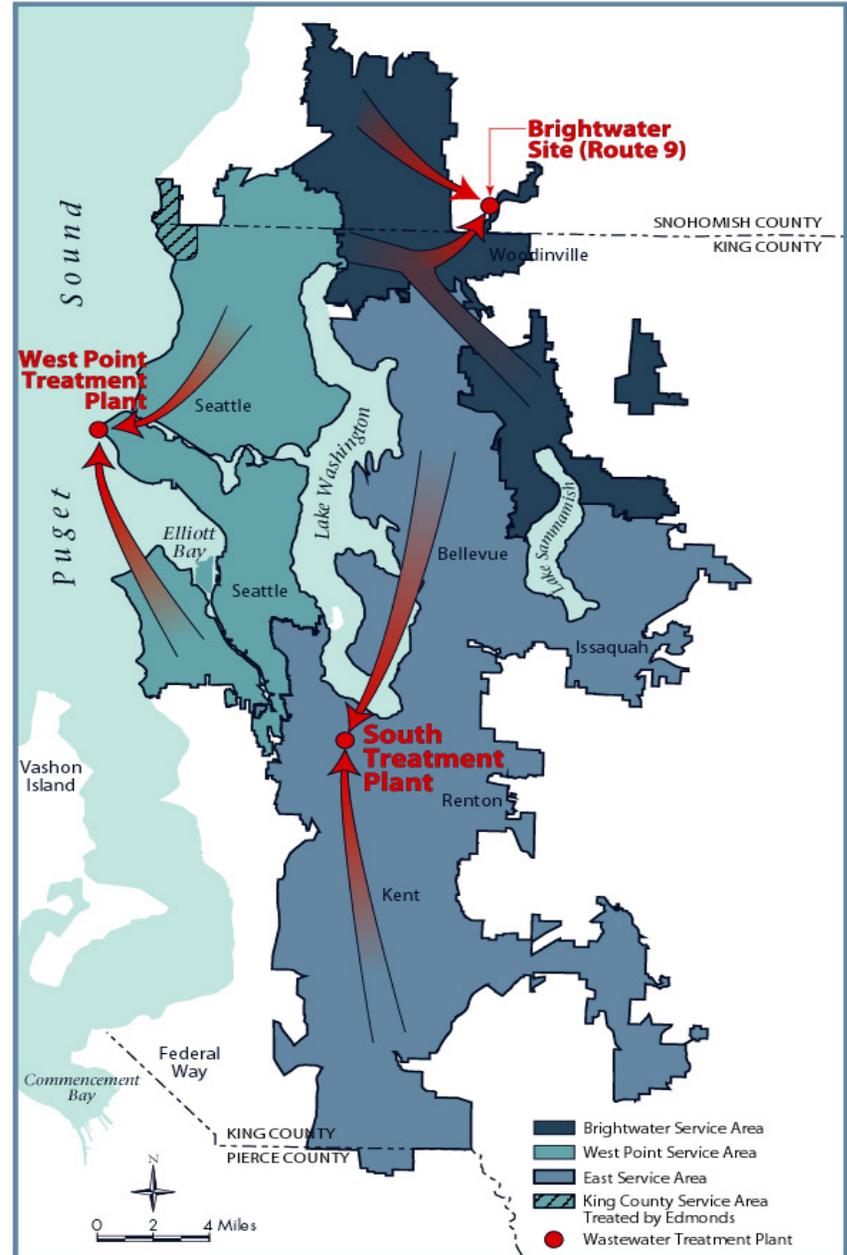
Project Overview



EXISTING KING COUNTY WASTEWATER TREATMENT SYSTEM



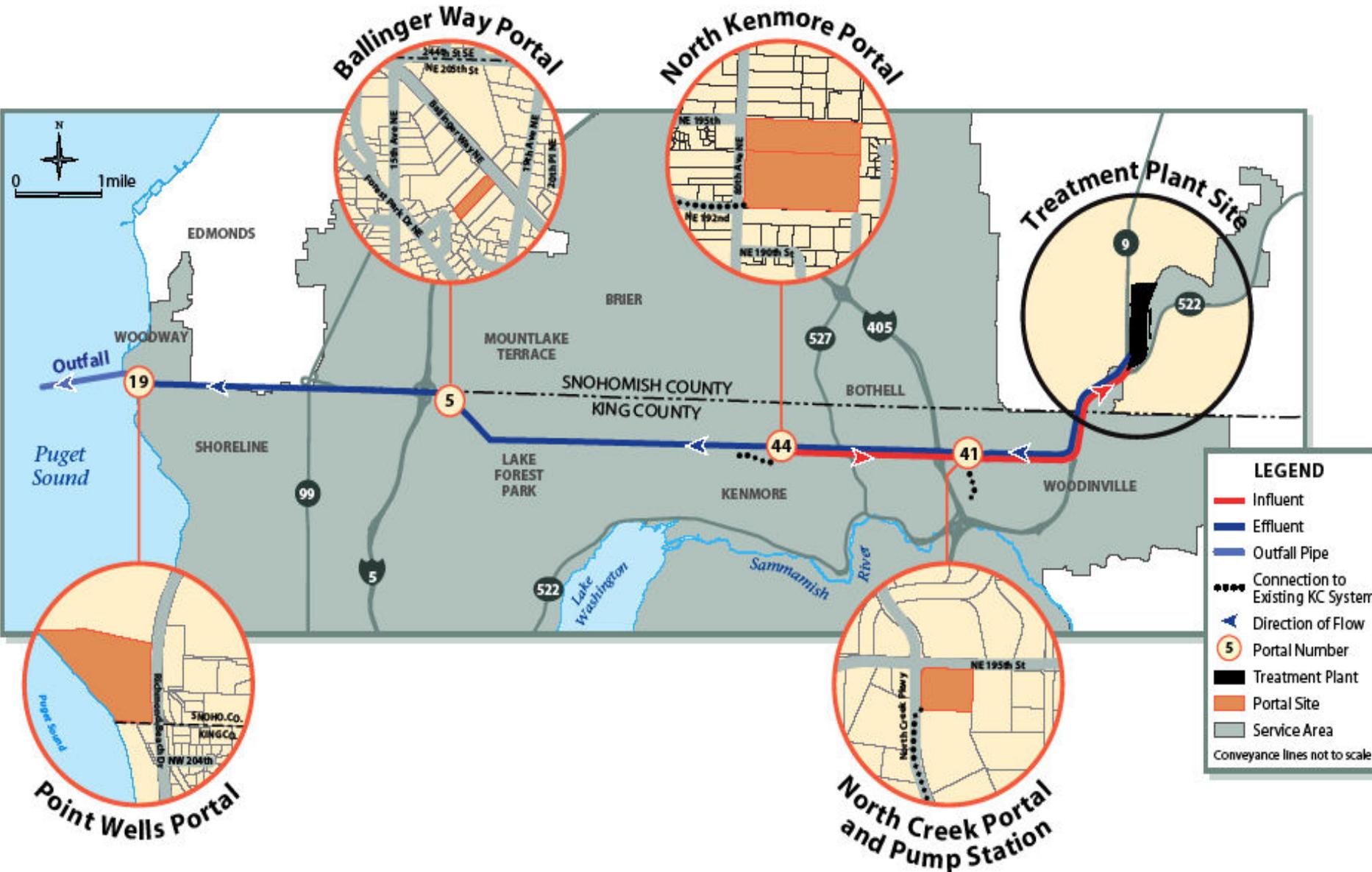
FUTURE KING COUNTY WASTEWATER TREATMENT SYSTEM WITH BRIGHTWATER



Brightwater System Elements

- System Capacity:

	<u>Avg. Flow</u>	<u>Peak Flow</u>
• Phase I (2010)	36 mgd	130 mgd
• Phase II (2040)	54 mgd	170 mgd
- 14 miles of tunnels & pipes
- Tunnels 10 – 14' in diameter
- Outfall – discharges 5,200 feet off-shore in 600 feet water
- Treatment plant located north of Woodinville
- Design will be completed in 2006
- Construction 2007 - 2010



LEGEND

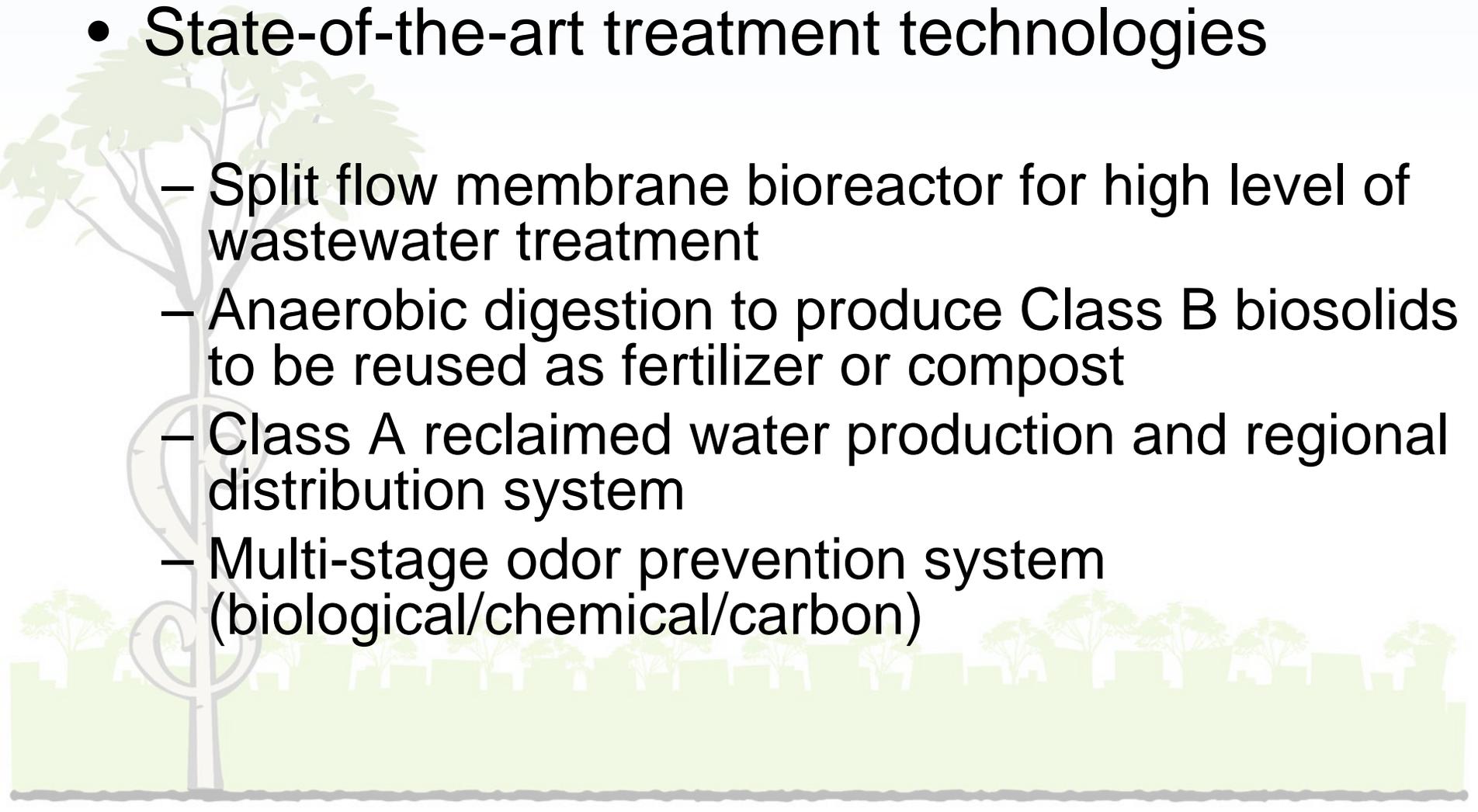
- Influent
- Effluent
- Outfall Pipe
- Connection to Existing KC System
- ▶ Direction of Flow
- 5 Portal Number
- Treatment Plant
- Portal Site
- Service Area

Conveyance lines not to scale

Brightwater System Elements

- Innovative components
 - Extensive reforestation of a former industrial site
 - Improvements to the watershed
 - High level of stormwater treatment
 - Community elements
 - Environmental education and community center
 - Classroom in the woods (field house pavilion)
 - Extensive trail system

Brightwater System Elements

- State-of-the-art treatment technologies
 - Split flow membrane bioreactor for high level of wastewater treatment
 - Anaerobic digestion to produce Class B biosolids to be reused as fertilizer or compost
 - Class A reclaimed water production and regional distribution system
 - Multi-stage odor prevention system (biological/chemical/carbon)
- 
- A decorative background illustration featuring a large, stylized tree on the left side and a city skyline silhouette at the bottom. The tree has a thick trunk and a canopy of green leaves. The city skyline consists of various rectangular buildings of different heights. The entire illustration is rendered in a light green and grey color palette.

Project Site



Brightwater Treatment Plant



Brightwater Treatment Plant – View from Route 9

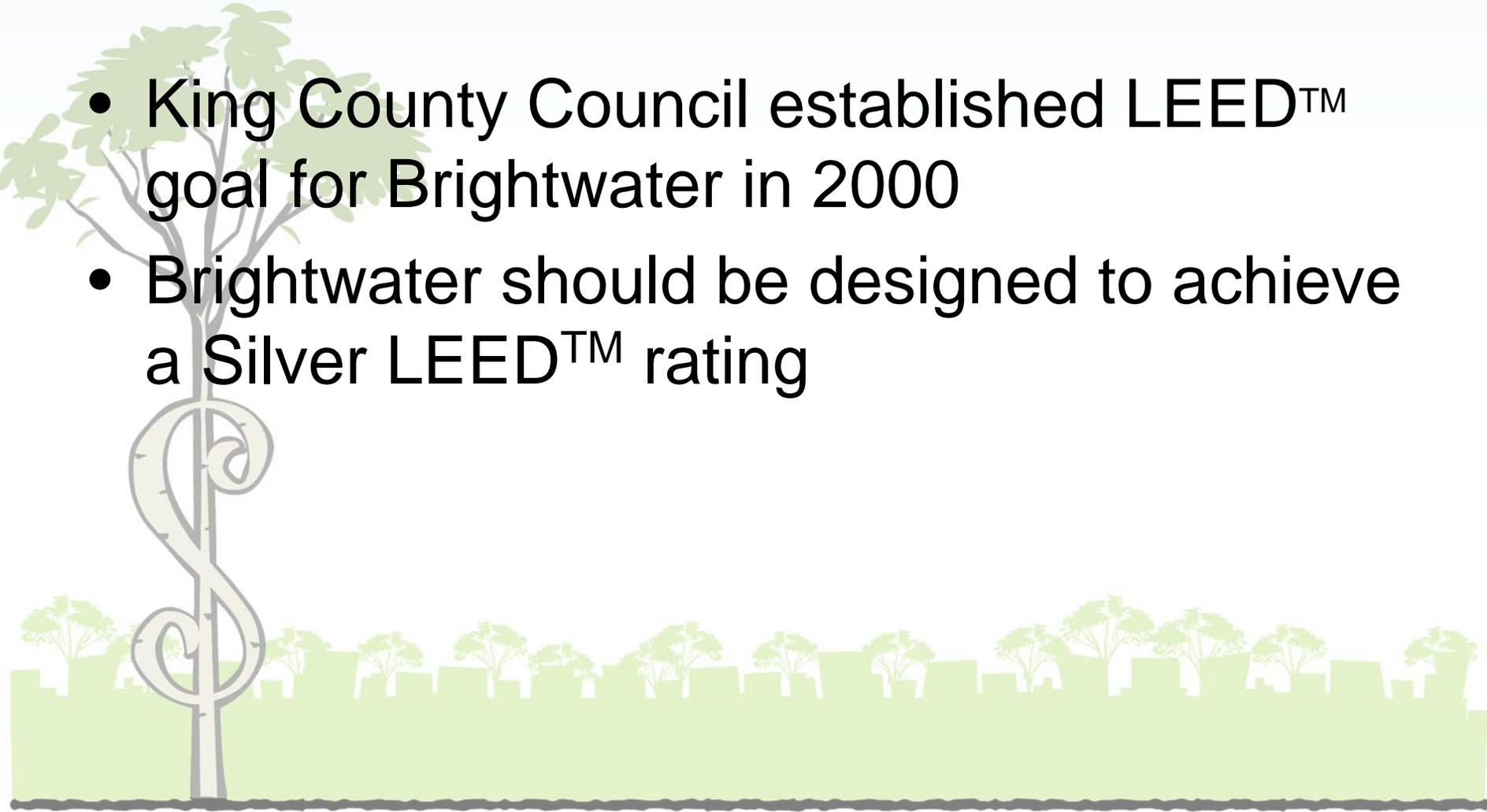


Sustainable Design Approach



King County Commitment

- King County Council established LEED™ goal for Brightwater in 2000
- Brightwater should be designed to achieve a Silver LEED™ rating

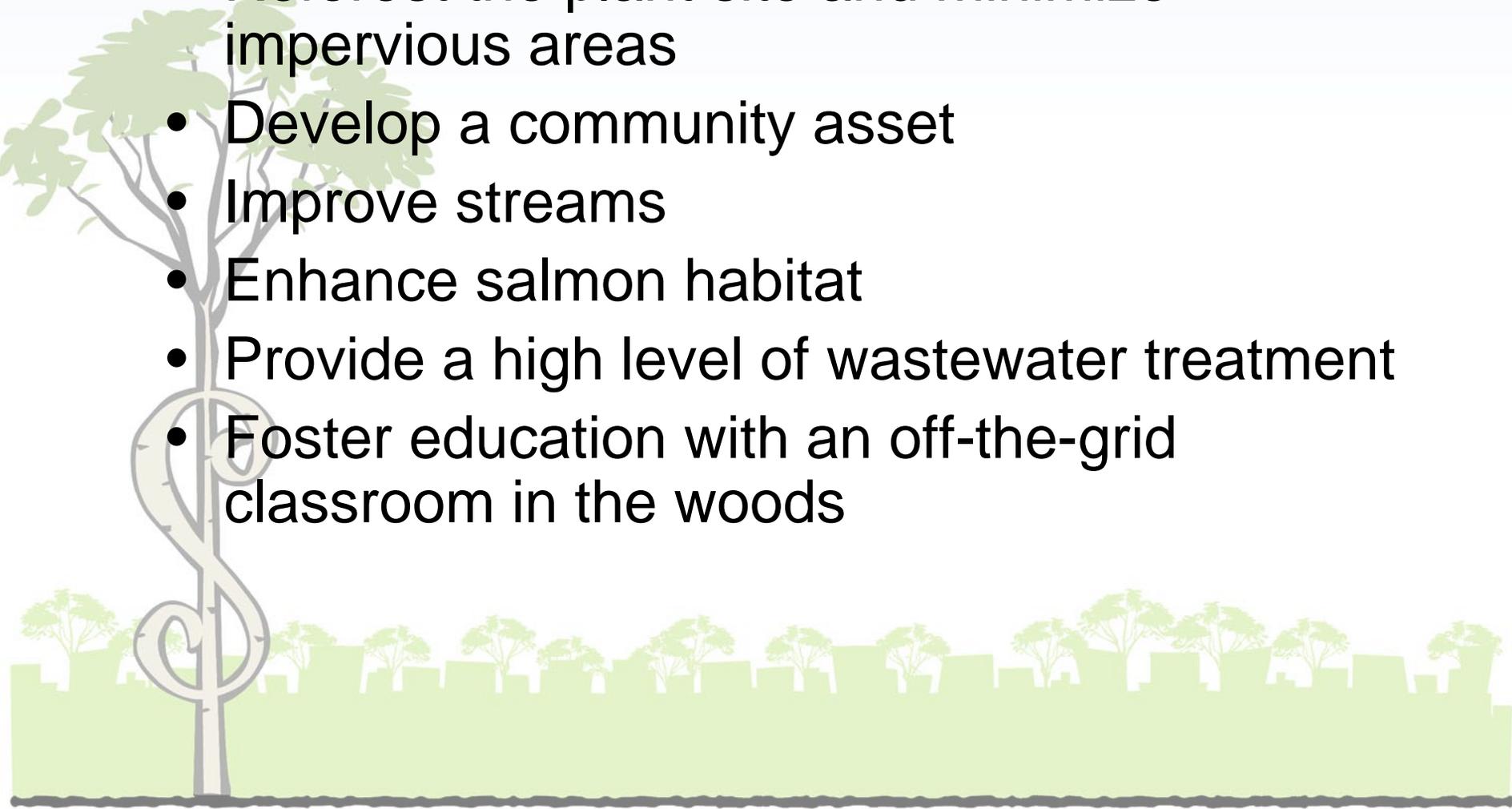


Brightwater Approach

- Incorporate sustainable design into treatment system where possible
- Use existing LEED™ rating system on single project elements where applicable
- Engage the design team
 - Ecocharrettes
 - Assigning LEED “leads”
 - Follow the design process milestones
- Remain flexible to changes in project

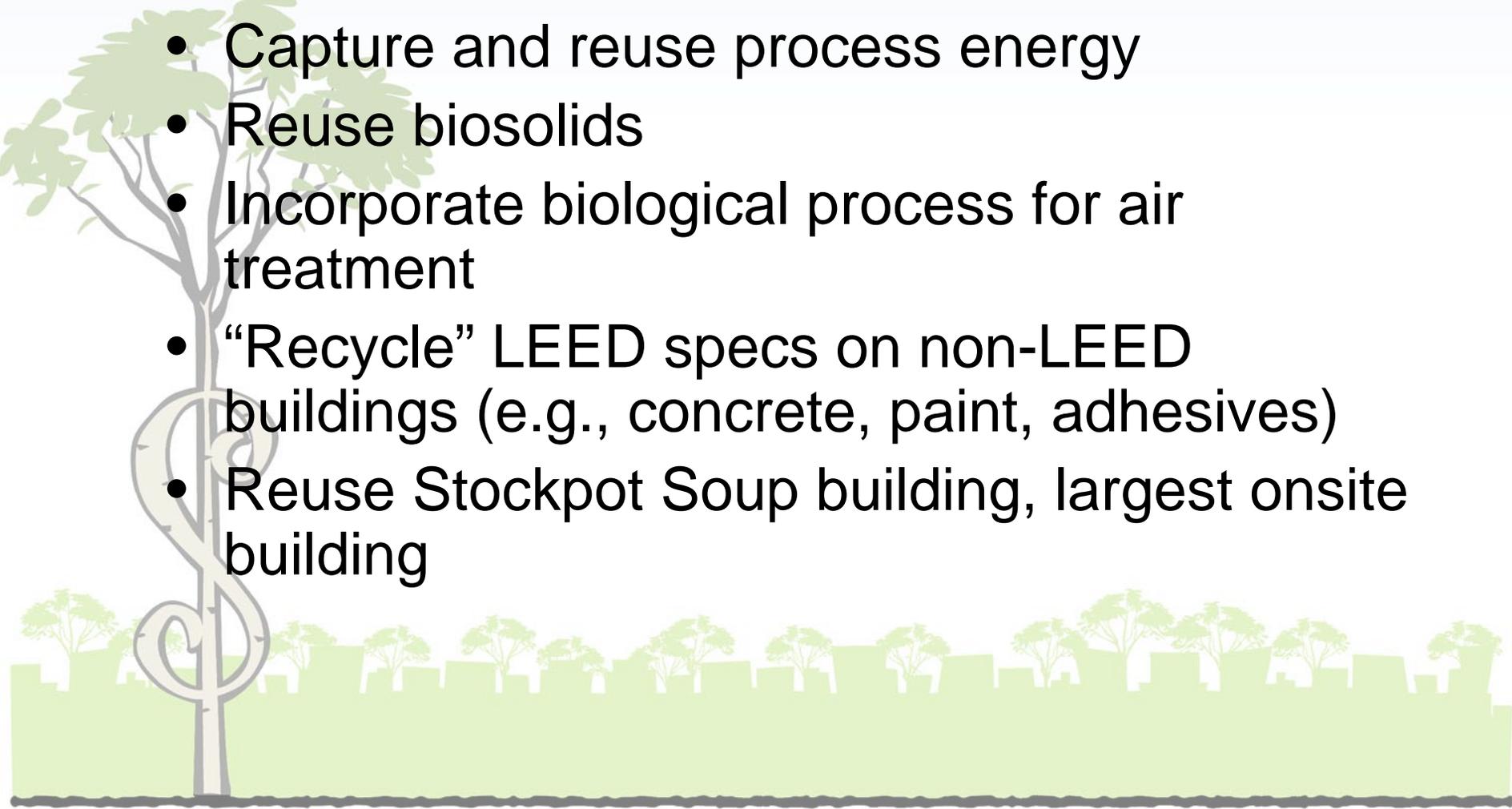
Summary of Sustainable Elements

- Reforest the plant site and minimize impervious areas
- Develop a community asset
- Improve streams
- Enhance salmon habitat
- Provide a high level of wastewater treatment
- Foster education with an off-the-grid classroom in the woods



Summary of Sustainable Elements

- Reuse water where possible, on-site and off-site
- Capture and reuse process energy
- Reuse biosolids
- Incorporate biological process for air treatment
- “Recycle” LEED specs on non-LEED buildings (e.g., concrete, paint, adhesives)
- Reuse Stockpot Soup building, largest onsite building



LEED™ Buildings



Summary of LEED Buildings

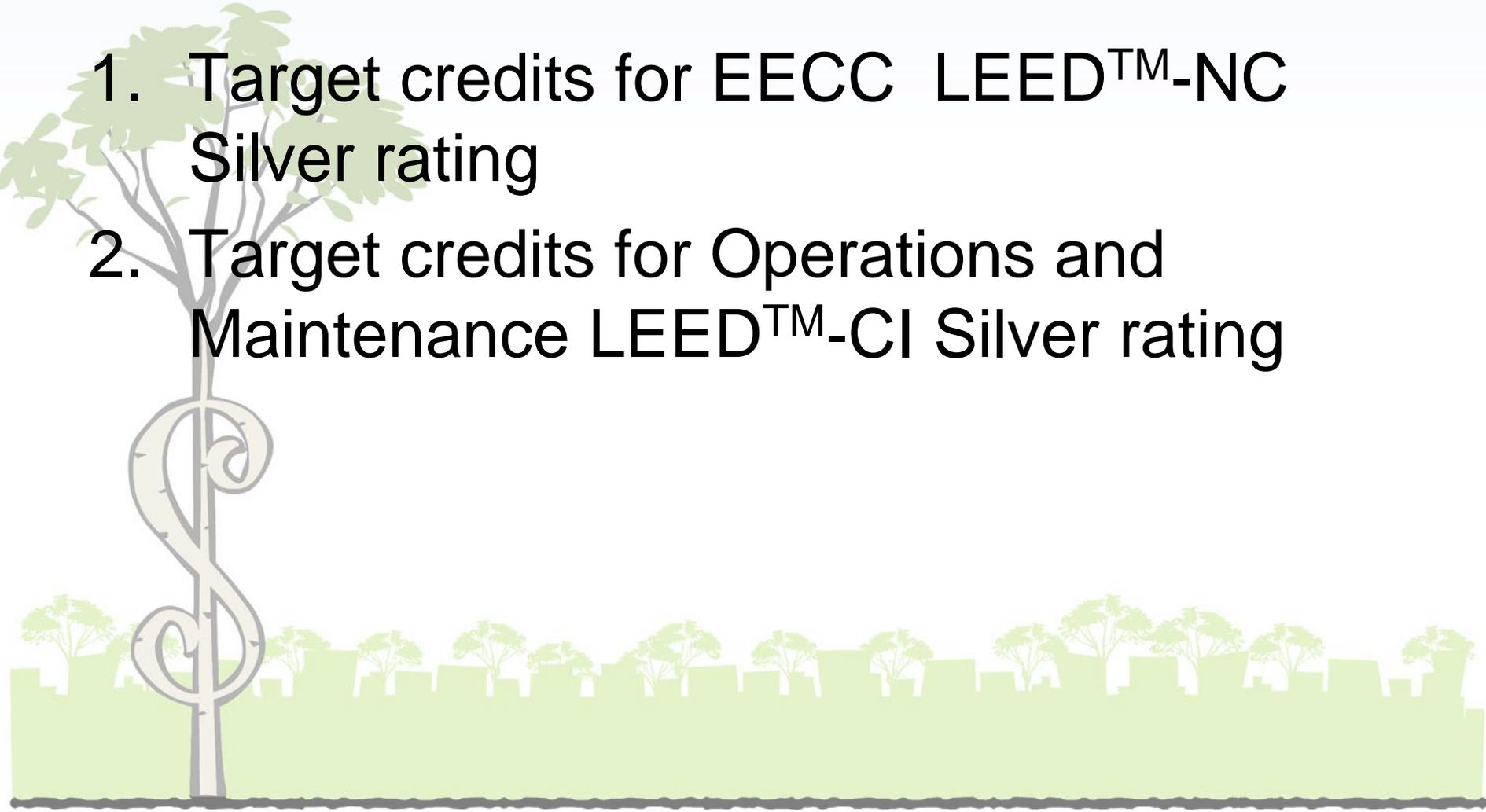
1. Two LEED™ Silver buildings - EECC and Operations/Maintenance building
2. Field pavilion designed with sustainable components for possible LEED™ certification
 - Solids Building designed with LEED™ components, but will not be certified
 - Energy/Digestion Buildings – same approach as Solids Bldg

Initial LEED Challenges

- New territory – no LEED™ industrial rating system available for guidance
- Commercial LEED™ system does not easily accommodate industrial facilities
- Brightwater is a campus with a large site and several structures
- Large and diffuse design team working on different project aspects

Handout – Summary of Brightwater LEED™ Approach

1. Target credits for EECC LEED™-NC
Silver rating
2. Target credits for Operations and
Maintenance LEED™-CI Silver rating



Example Easy vs. Hard Credits

- “Easy” credits:

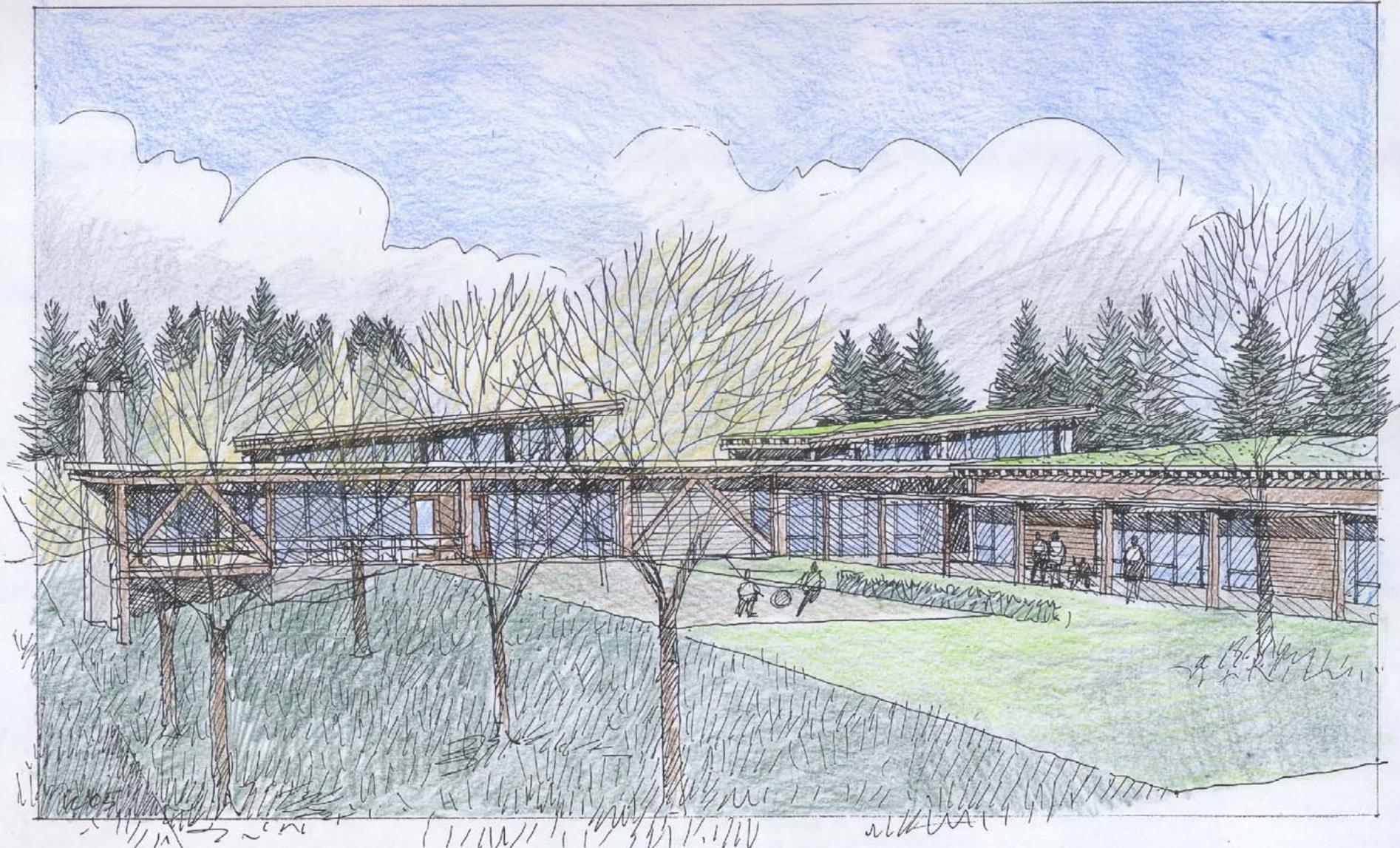
- Water use reduction
- CO₂ monitoring
- Bike racks and changing rooms
- Recycled content
- Regional materials (manufacture)
- Certified wood
- Low VOC carpet, paint and adhesives
- Thermal comfort
- Daylight and views

- “Hard” credits

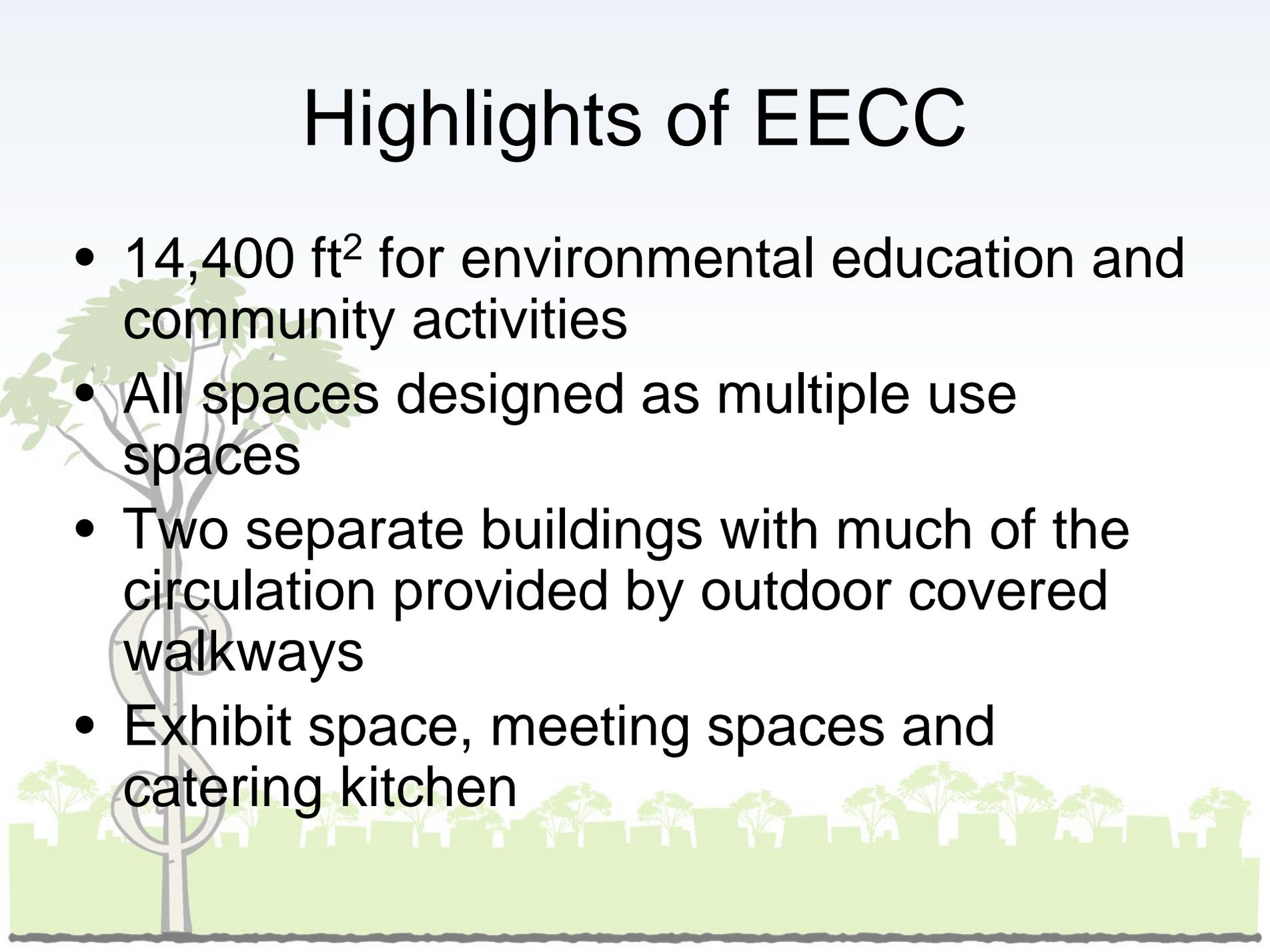
- Energy performance
- Control systems
- Measurement and verification
- Resource reuse
- Additional commissioning
- Regional materials (harvest)



Environmental Education and Community Center (EECC)



Highlights of EECC

- 14,400 ft² for environmental education and community activities
 - All spaces designed as multiple use spaces
 - Two separate buildings with much of the circulation provided by outdoor covered walkways
 - Exhibit space, meeting spaces and catering kitchen
- 

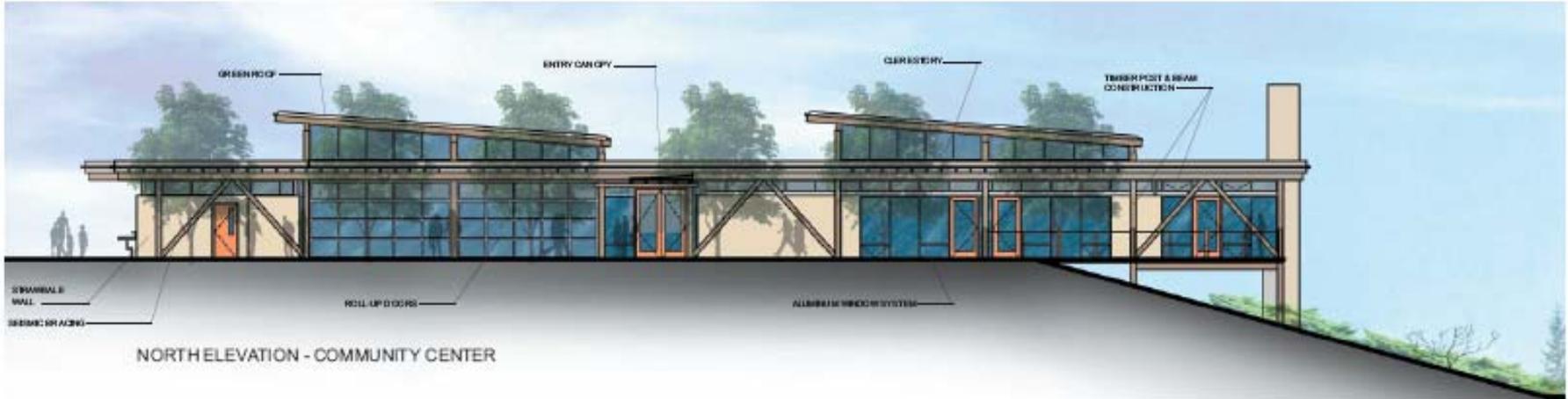
EECC Plan View



Overall Site Plan View



EECC Elevations



Potential EECC Gold Rating

- List of potential additional credits if decision is made to go for LEED™ gold
 - Increased water use reduction (to 30%)
 - Increased energy optimization (to 35%)
 - Electric Operation of Operable windows and window shading
 - Additional thermal monitoring
 - Partial green roof
 - Strawbale infill construction
 - Certified wood
 - Rain garden
 - Fly ash in concrete
 - 75% construction waste recycling

Highlights of Field House

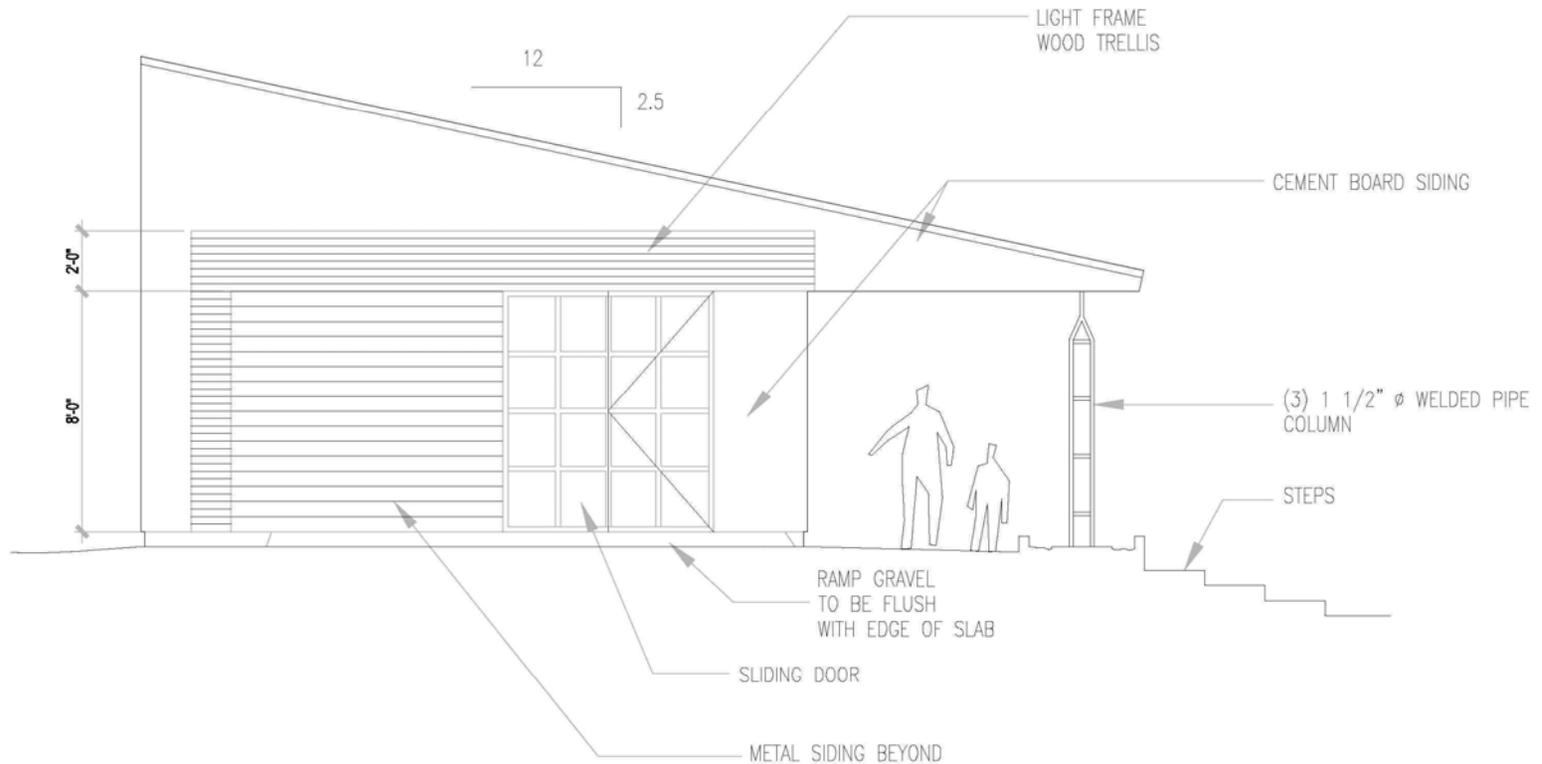
- “Off-the-grid” classroom in the woods
1500 ft²
- Built by local trade students
- Straw-bale infill construction
- Photo-voltaic cells on the roof
- Rainwater catchment for test garden use
- Composting toilets
- Amphitheater and living fence
- Gathering place for teaching and events



Model of the Field House

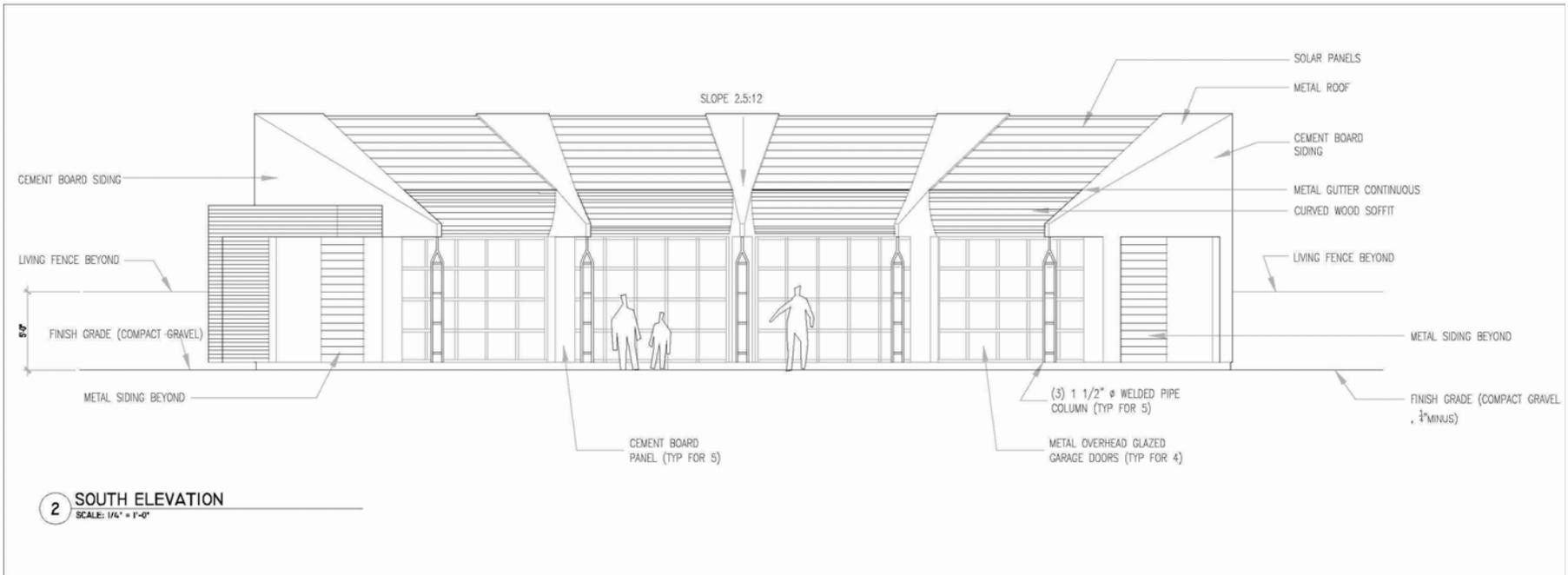


Field House Side View



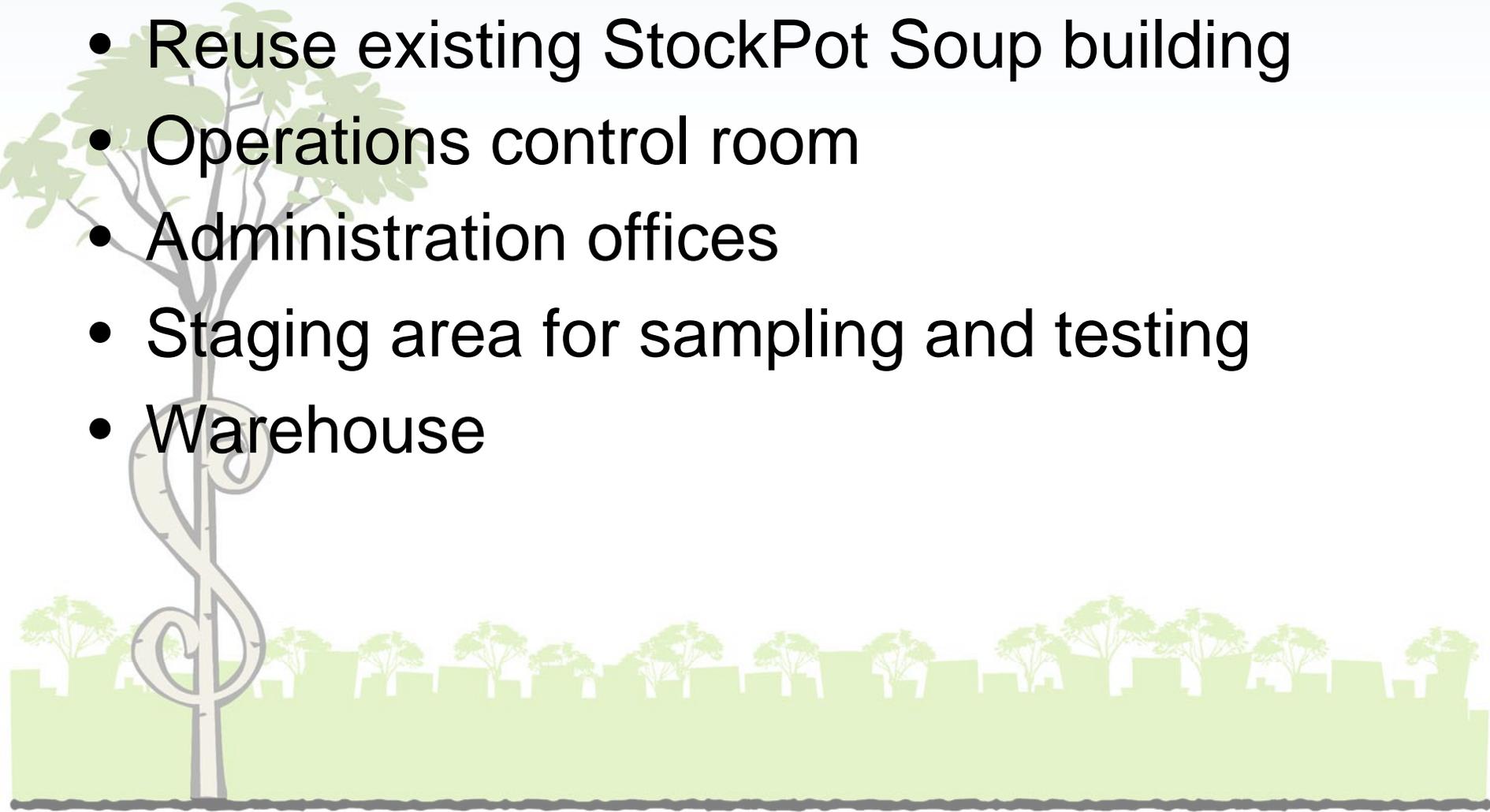
1 WEST ELEVATION
SCALE: 1/4" = 1'-0"

Field House Front View



Highlights of Operation and Maintenance Building

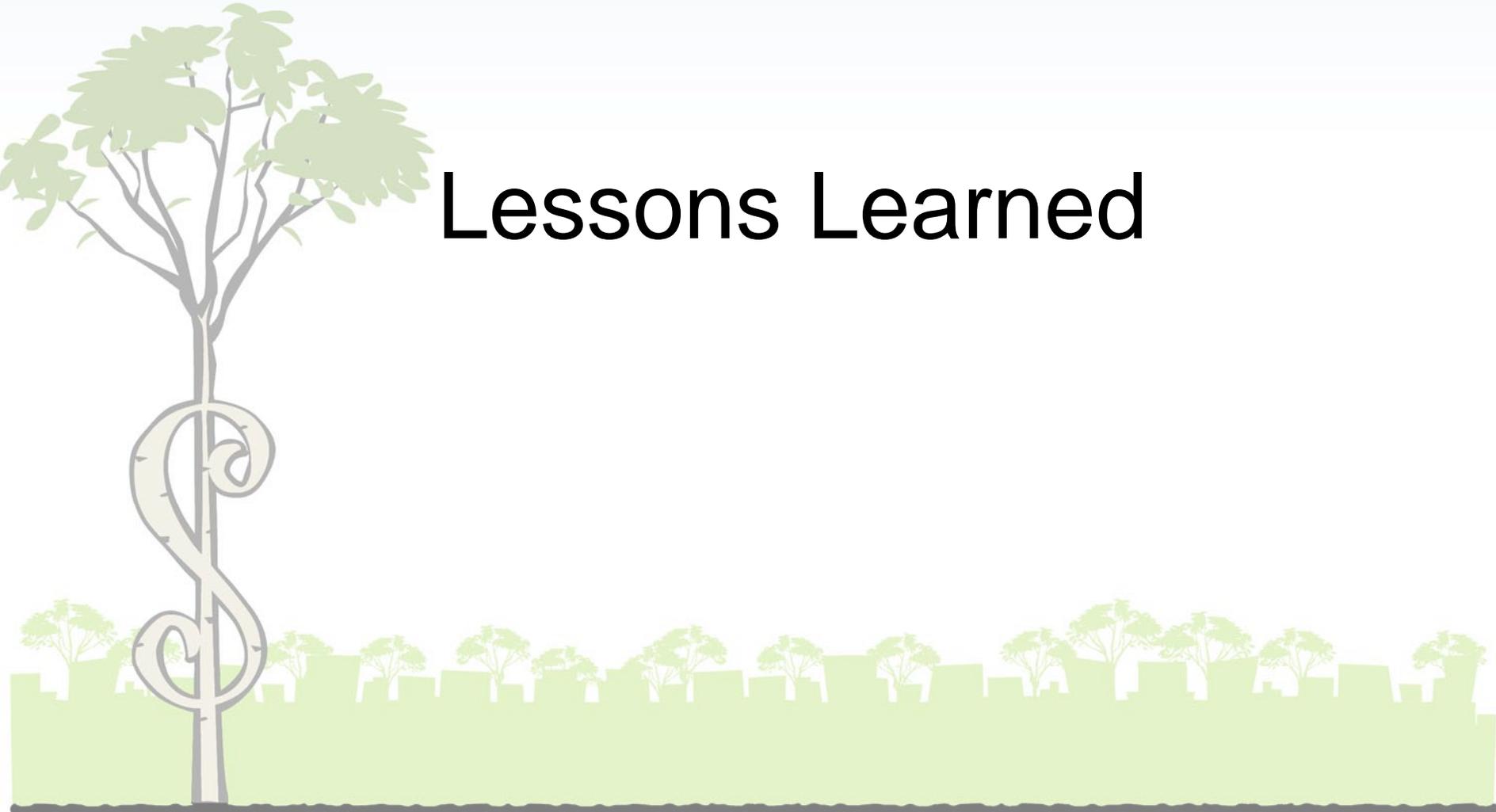
- Reuse existing StockPot Soup building
- Operations control room
- Administration offices
- Staging area for sampling and testing
- Warehouse



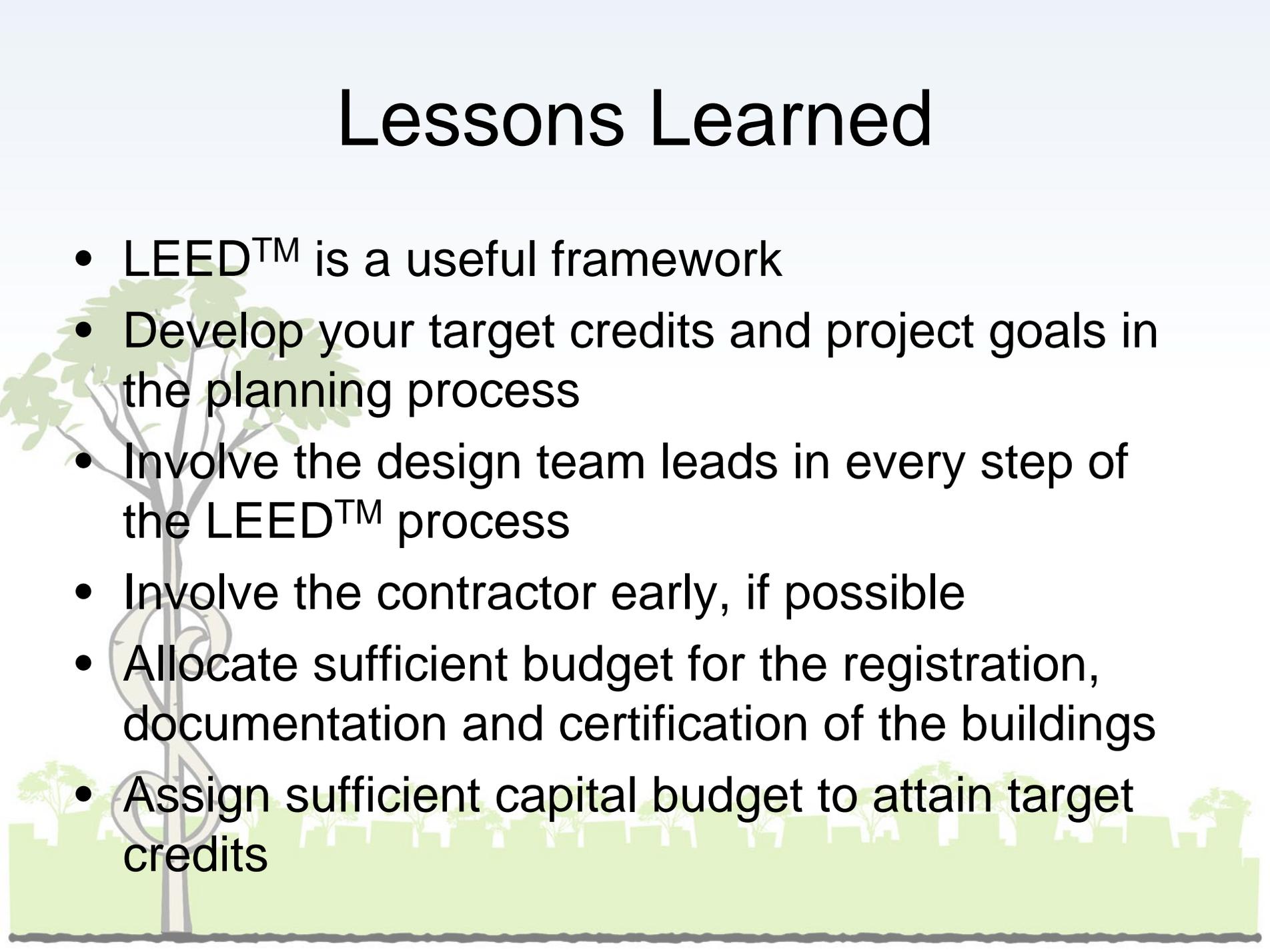
Picture of Existing Operation and Maintenance Building (StockPot Soup)



Lessons Learned



Lessons Learned

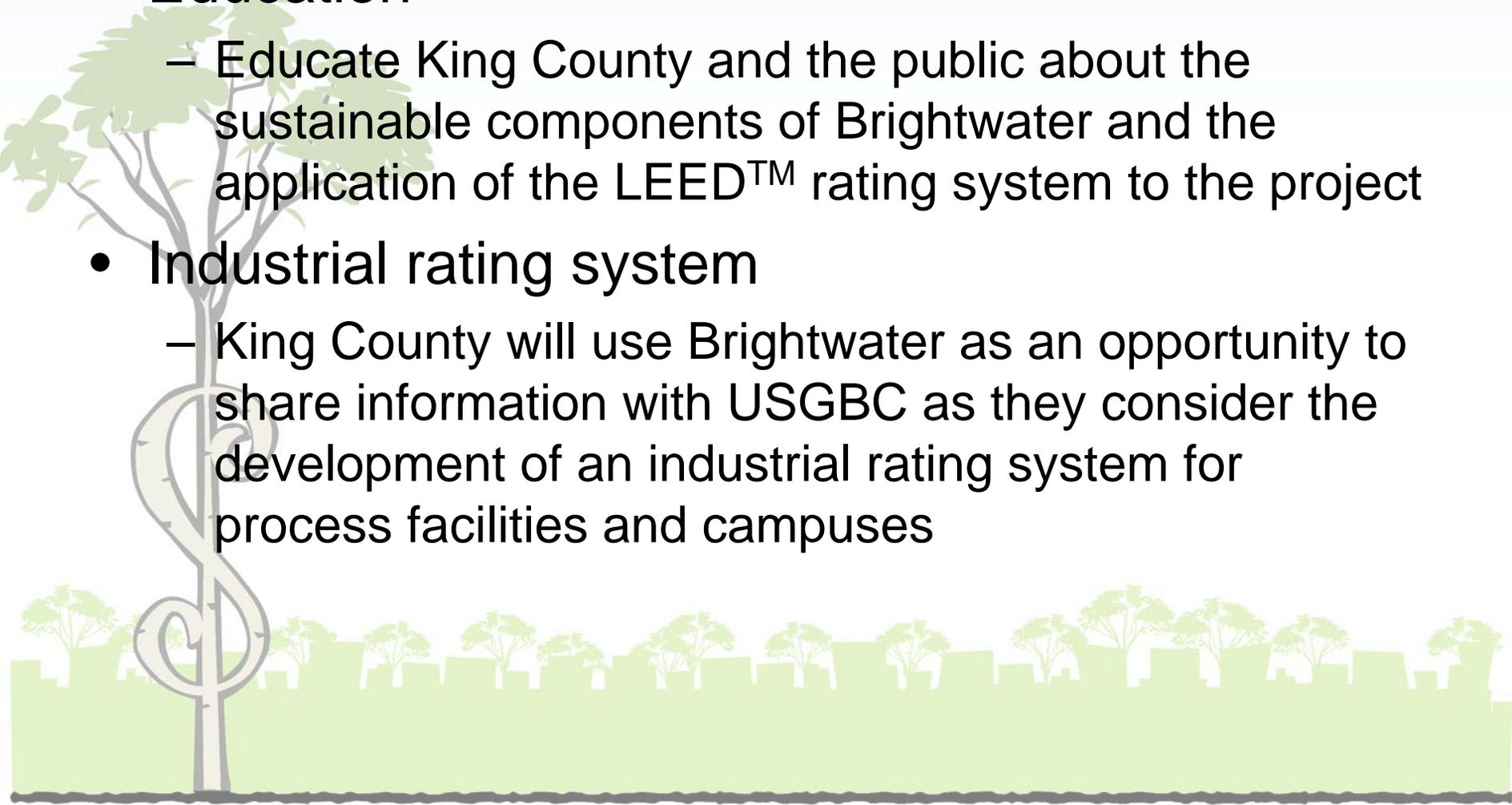
- LEED™ is a useful framework
 - Develop your target credits and project goals in the planning process
 - Involve the design team leads in every step of the LEED™ process
 - Involve the contractor early, if possible
 - Allocate sufficient budget for the registration, documentation and certification of the buildings
 - Assign sufficient capital budget to attain target credits
- 

Lessons Learned

- Involve operations and maintenance staff in developing list of target credits
- Be aware of educational value of your completed project can deliver
- Don't be afraid to push the envelope if your project does not meet the "standard" project description or a standard LEED™ rating system

Next Steps

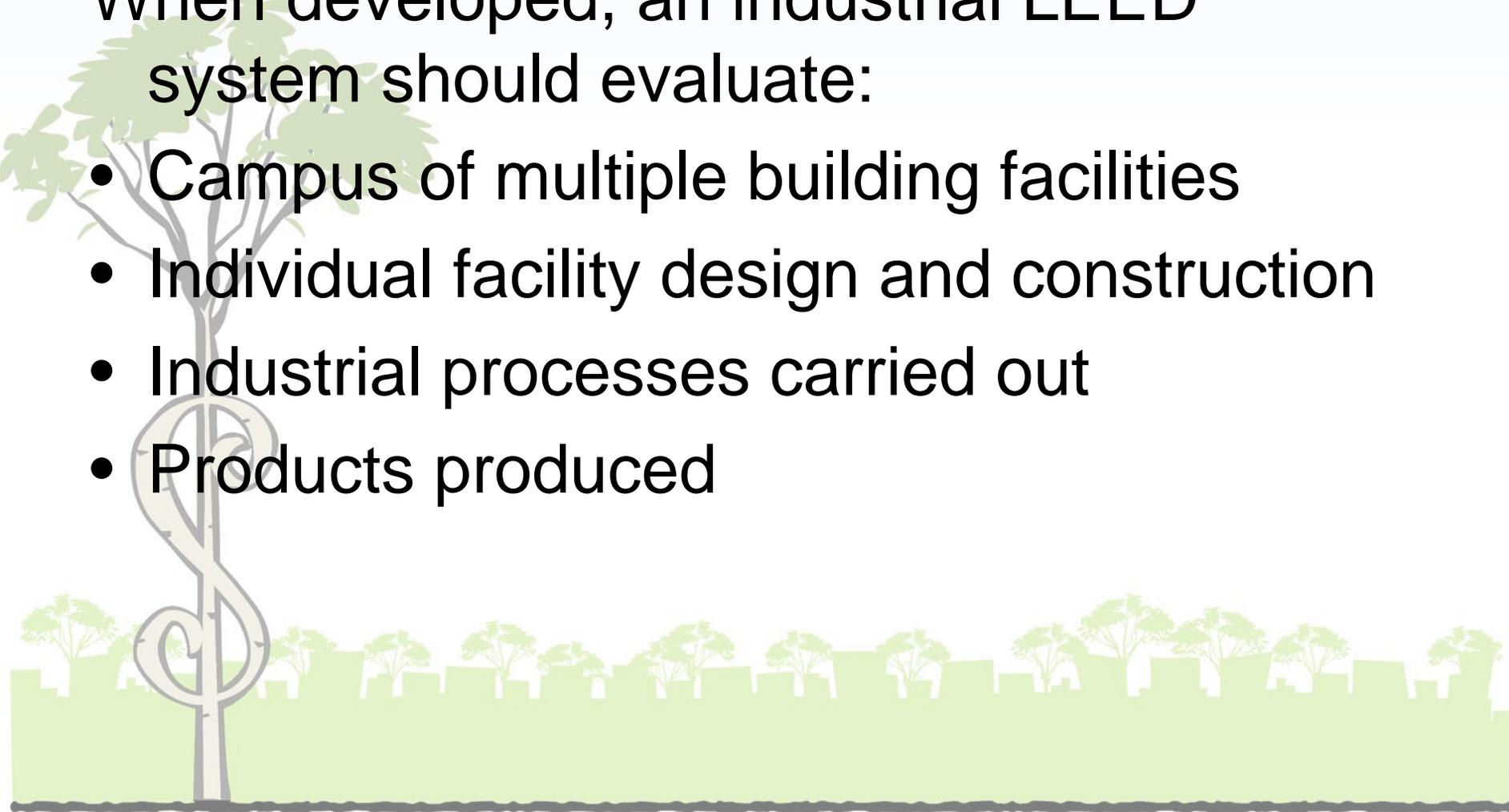
- Education
 - Educate King County and the public about the sustainable components of Brightwater and the application of the LEED™ rating system to the project
- Industrial rating system
 - King County will use Brightwater as an opportunity to share information with USGBC as they consider the development of an industrial rating system for process facilities and campuses



Industrial Rating System

When developed, an industrial LEED™ system should evaluate:

- Campus of multiple building facilities
- Individual facility design and construction
- Industrial processes carried out
- Products produced



Questions/Comments

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