Tribal Green Building Toolkit

2015

Humankind has not woven the web of life.
We are but one thread within it.
Whatever we do to the web, we do to ourselves.
All things are bound together.
All things connect.

– Chief Seattle, 1854

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KEY TERMS & ACRONYMS

Key Terms

Building Code:	A legal tool for the purpose of establishing minimum requirements to regulate the siting, design, construction, renovation and maintenance of buildings, their components, systems and related infrastructure.
Charrette:	An intensive planning session where citizens, designers, and others collaborate in a vision for development.
Green Building:	Construction and design practices that conserve natural resources, protect public health, and minimize the environmental impacts of the built environment, including more resource-efficient models of construction, renovation, operation, maintenance, and demolition.
Place-based Design Strategies:	Design strategies that take into account the local ecology, natural resources, climate, history and human communities with the intent to create designs that both accommodate and strive to enhance these.
Sustainable Land Use Policies:	Policies that encourage the use of land assets in a way that benefit the local economy, protect and restore natural areas, and support tribal culture.
Tribal Overlay:	A regulatory tool that is created by tribes to both amend and augment conventional codes for use in tribal contexts, and to add guidelines or requirements customized for a tribe's specific cultural or location-based needs.

Abbreviations and Acronyms

ASHRAE:	American Society of Heating, Refrigerating, and Air Conditioning Engineers
BMP:	Best Management Practice
C&D:	Construction and Demolition
EPA:	Environmental Protection Agency
E&SC:	Erosion and Sediment Control
GCF	Grid-Cohort Framework
HERS:	Home Energy Rating System Program
HUD	Department of Housing and Urban Development
HVAC:	Heating, Ventilation, and Air Conditioning
ICC	International Code Council
IECC:	International Energy Conservation Code

IgCC:	International Green Construction Code
LEED:	Leadership in Energy & Environmental Design
LID:	Low-Impact Development
MW:	Megawatt
MWh:	Megawatt-hour
NAHASDA:	Native American Housing Assistance and Self-Determination Act
NAHB:	National Association of Home Builders
PUD:	Planned Unit Development
RMI:	Rocky Mountain Institute
VOC:	Volatile Organic Compound

Santa Ynez Valley, California

SECTION 1: INTRODUCTION

Toolkit Purpose

Green building, also known as sustainable design, can assist tribal communities to reduce the impact of construction on the environment while protecting the health, livelihood and culture of tribal residents. Unsustainable building practices can have unintended social and economic consequences, including degraded local air quality, loss of open space and health impacts due to decreased physical activity and lack of access to healthy food.

This *Tribal Green Building Toolkit* (*Toolkit*) is designed to help tribal officials, community members, planners, developers and architects develop and adopt building codes to support green building practices. Both tribes without building codes and with existing building codes can use this Toolkit. The *Toolkit* includes:

- Strategies and resources for **assessing**, **prioritizing**, **developing,** and **implementing** green building codes;
- Guidance for **updating existing codes or developing new codes.**

The Importance of Green Building to Tribes

Native Americans are the first green architects and builders of the Americas. Traditional Native American building designs and practices are sustainable. Native American designs are often based on cultural values informed by many things including an intimate knowledge of place, its climate and resources and technology. Traditionally, tribes built structures from local resources and without written codes. These structures were safe, healthy and energy and water efficient.

Building codes in general have definite benefits when properly developed and implemented. Categories of benefits include:

- Health and Safety
- Environmental Sustainability
- Tribal Culture and Community Development
- Tribal Sovereignty/Self-Sufficiency
- Affordability/Economic Efficiency

Despite tribes' early and long history of sustainable building practices, modern tribal buildings often do not incorporate many green building practices. Utilizing green building codes can be an opportunity to revitalize sustainable cultural practices by integrating traditional knowledge and values into tribal building codes. By implementing green building practices, tribes can help maintain the natural resources that have historically sustained them.

What Can Green Building Codes Help my Tribe Accomplish?

Integrate cultural/traditional elements and the local ecology into building and community design

•

Reduce natural resource and climate impacts

•

Make housing more affordable

•

Minimize non-renewable energy consumption

•

Use environmentally preferred products

•

Protect and conserve water resources

•

Enhance indoor and outdoor air quality

•

Improve operation and maintenance practices

•

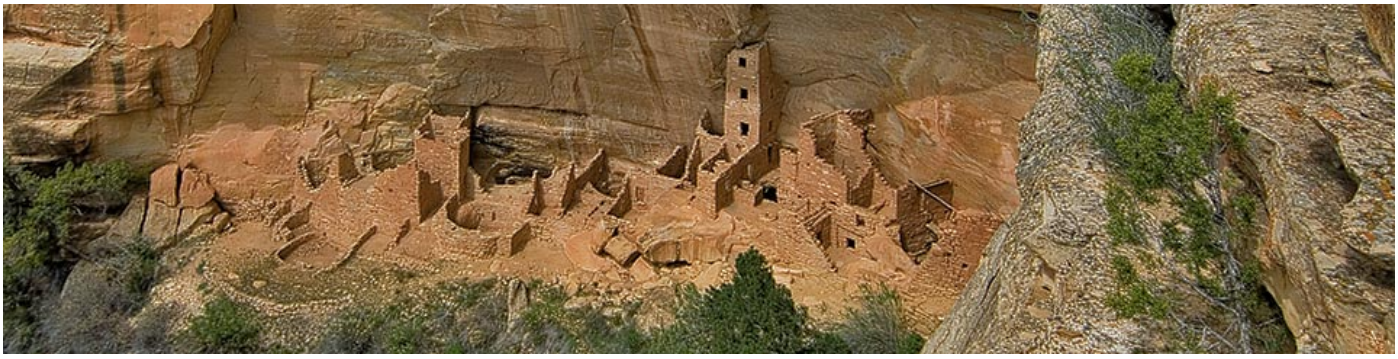
Improve connectivity of communities

•

Protect and create opportunities for production of local food and goods

•

Promote human health and cultural revitalization



Mesa Verde National Park: Pueblo cliff dwellings were lived in for over 700 years, from A.D. 600 to 1300.

The Importance of Building Codes to Tribal Sovereignty

Tribal building codes are, first and foremost, defined by the Tribe. As sovereign nations, tribes have broad opportunities to redefine or refine the purpose, scope, goals and design of their built environment to guide and manage construction on tribal lands. Building codes exist to protect the health and safety of people using a structure. In addition to this, some tribes are integrating their cultural values into their building codes. Building codes can cover every aspect of design, construction, and renovation of structures — from specifying building appearance to regulating sewage disposal. Some existing tribal green building codes address conventional safety and green concerns while recognizing cultural values, traditions and responsibilities to future generations. This comprehensive approach is creating safe and healthy buildings on tribal lands.

The Lack of Building Codes Can Have Big Impacts

For example, in Haiti, a country without building codes, 230,000 people died in an earthquake; the Loma Prieta earthquake in northern California of similar scale killed less than 75 people, largely because building codes resulted in structures that suffered very limited building damage from the earthquake.

Where no tribal building codes exist, tribes may have reduced control or be subject to the application of outdated building codes that do not support their cultural values or sustainable and healthy building practices. To overcome this, opportunities that support sustainable tribal housing are evolving. For example, the Native American Housing Assistance and Self Determination Act (NAHASDA) passed by Congress in 1996 provides tribes the flexibility to adopt and use their own building codes in NAHASDA-funded programs.

However, since NAHASDA was adopted, few resources have been available to assist tribes to develop or adopt building codes. One purpose of this Toolkit is to reduce this resource gap.

Currently the majority of tribes have not adopted building codes and, consequently, many tribal homes continue to be built to default building codes that lack energy conservation or other green building requirements. Furthermore, state and local government building and land use codes that often include energy conservation and other green building requirements do not apply on tribal lands unless a tribe adopts them.

To learn more about a tribe adapting and adopting an existing code, see the case study on the Big Sandy Rancheria Band of Western Mono Indians.

The Importance of Affordable Housing to Tribes

Housing affordability is a common problem for tribal households, and green building codes and practices can directly reduce utility and maintenance costs and can also reduce health care and transportation costs.

In 2006-2010, nearly 4 out of 10 tribal households spent more than 30% of their income on housing costs and almost 2 out of 10 spent more than 50% of their income on housing.

Tribal housing problems relate to quantity, quality, and price of housing. In the United States, there were about 2.1 million housing units in tribal areas in 2010. Of these, 65,000 or 8.1% of all tribal households and as high as 16% in Arizona/New Mexico and 22% in Alaska were overcrowded, compared to the national average of 3.1% (2006-2010).

Almost 3% of tribal households lacked complete plumbing facilities in 2006-2010, more than five times the share for all U.S. households. A similar share of tribal households lacked complete kitchen facilities, three and a half times as high as the national average.

Source: *HUD, Continuity and Change: Demographic, Socioeconomic, and Housing Conditions of American Indians and Alaska Natives, January 2014, http://www.huduser.org/portal//publications/pdf/housing_conditions.pdf*

EPA Green Building Labeling Programs

If a tribe is interested in quickly adopting proven green building practices, requiring builders to meet **EPA green building labeling and certification programs** – ENERGY STAR, WaterSense, Indoor airPLUS and Burn Wise – can improve indoor air quality and conserve energy and water. These programs cover both buildings and labeled products.

ENERGY STAR Products and ENERGY STAR for Homes

Requiring the installation of labeled appliances, lighting and fixtures is a simple way to conserve energy and water and save money on utility bills.

Products
http://www.energystar.gov/products/certified-products
Appliances - Building Products - Battery Chargers – Electronics - Heating & Cooling
Lighting & Fans - Office Equipment - Water Heaters

For Homes
https://www.energystar.gov/index.cfm?c=new_homes.hm_index
Thermal Enclosure System - Heating and Cooling - Water Management
Energy Efficient Lighting and Appliances - Independent inspections and testing

EPA-Certified Wood Burning Appliances

http://www.epa.gov/burnwise/appliances.html
Wood Stoves - Pellet Stoves - Fireplace Retrofits - Cleaner Fireplaces – Hydronic Heaters – Masonry Heaters

Indoor Air Plus Features

http://www.epa.gov/indoorairplus/
Radon Control - Moisture Control - Pest Management - Heating Ventilating and Air Conditioning (HVAC) - Combustion Venting - Building Materials - Homeowner Education

WaterSense Products

http://www.epa.gov/watersense/products/
Toilets - Bathroom sink faucets - Urinals - New homes - Showerheads - Weather–based irrigation controllers - Commercial pre–rinse spray valves

Key Reasons to Implement Green Building Codes and Land Use Policies

Community Priority Area	Outcomes from Green Building Codes and Sustainable Land Use Policies
Public Health & Safety	• Provide a comprehensive set of building safety and fire prevention requirements • Reduce asthma, cancer and other illnesses • Prevent radon in buildings – a cancer-causing, radioactive gas • Restrict the use of toxic building materials • Prevent mold that can lead to poor indoor air quality and poor health • Promote physical activity through increased ceremonial and recreational spaces • Cleaner-burning heating, such as EPA-certified stoves and electric heaters • Assure adequate ventilation for occupants year round
Environmental Quality	• Protect local habitat • Conserve resources (energy, water, and materials) • Reduce the negative impact of building and construction on the natural environment and climate
Economy, Affordability & Financial Sustainability	• Increase income within the community by using local labor and resources • Reduce or eliminate utility bills and the use of high cost fuels (e.g., propane) • Reduce long-term maintenance needs and expenses • Meet funding and insurance requirements of financial institutions • Reduce renovation/rehabilitation costs • Reduce illness and associated health care costs
Tribal Sovereignty & Self-Sufficiency	• Define performance measures appropriate to a tribe's needs, culture and local climate • Complement the tribe's knowledge of the environment and human health • Emphasize sustainable and cultural uses of natural and local resources • Set evaluation and monitoring systems that reflect: o What tribes want from their housing and other buildings o How they collect and use information
Tribal Culture & Community Development	• Strengthen community social ties and connect people to the natural environment • Promote building designs that incorporate traditional knowledge and facilitate spiritual and cultural practices • Support sustainable design innovation • Celebrate and value cultural art and design • Protect cultural and sacred lands and structures

Buena Vista Rancheria of Me-Wuk Indians of California

SECTION 2: OVERVIEW OF THE TRIBAL GREEN BUILDING CODES TOOLKIT

Guide to Using this Toolkit

This Toolkit is intended to support a tribe's decision-making process in determining whether to adopt, adapt or develop green building codes. Completing the **Assessment** portion of the *Toolkit* (Sections 3 through 8) will assist a tribe in outlining code development priorities. Questions to consider when establishing priorities include:

- What are the overall priorities for the tribe in advancing green building construction and development?
- Do new codes need to be created?
- Do existing codes need to be updated?
- Does the code/standard implementation process need improvement?
- Are there resource, budgetary or staffing considerations?

Once the Assessment is completed and code priority areas are identified, refer to Section 9 — **A Plan to Update, Adapt or Adopt Codes, or Develop New Codes**.

Assessment Tool

The Assessment Tool (made up of the checklists in this document) is designed to help the user understand building code needs and priorities. The categories were chosen based on tribal input and the potential to improve the environmental, social and economic impacts of the built environment.

How the Assessment Tool Works

The Assessment Tool is divided into the following six categories:

- Land Use
- Materials and Resource Conservation
- Human Health: Radon, Mold and other Hazardous Pollutants
- Energy Efficiency and Renewable Energy
- Water Access, Management and Sanitation
- Resilience and Adaptability

Each category is divided into subcategories. For example, within Materials and Resource Conservation, there are subcategories for:

- Environmentally Preferable Materials,
- Building Preservation and Reuse,
- Durability, Repairability and Adaptability,
- Materials Reuse and Recycling and
- Green Manufactured Housing.

Specific Question and Potential Tools and Techniques

Each Assessment section is broken up into a series of tables that include three columns.

Column 1 includes assessment questions for tribes with and without existing codes, and also provides tools and techniques to aid in achieving a greener code.

- **Specific Questions:** Provides greater detail so tribes can assess codes and ordinances.
- **Tools and Techniques:** Provides examples of related sustainable design and green building tools and techniques.

Column 2 is where tribes with existing codes answer to assess their existing codes.

Column 3 is where tribes that do not have codes answer to help evaluate priorities for their future codes. Tribes with codes can also use Column 3 for this purpose.

For Columns 2 and 3:

- Selections under the **GREEN** headings indicate that the tribe's code/ordinance is, or will be encouraging sustainable design.
- Selections under the **YELLOW** headings indicate that there are opportunities to improve the code/ordinance.
- Selections under the **RED** headings indicate that there are opportunities to improve the code/ordinance and that barrier(s) may need to be identified and overcome before these improvements can be made.
- Selections under the **Not Applicable** headings indicate that the assessment question does not apply to goals or objectives of the tribe's building codes/ordinances.

Column 1	Column 2	Column 3
Questions, Potential Tools and Techniques	**For Tribe WITH Building Codes**	**For Tribe WITHOUT Building Codes**

Do the adopted or planned policies or requirements support public health through land use?
 	
Potential Tools and Techniques:
 	
• *Complete Streets policies*
• *Park and open space requirements*
• *Pedestrian and bicycle friendly development requirements*
• *Encouragement of mixed use*
• *Transit oriented development policies*
• *Health impact assessments*
  o *Walkability*
  o *Injury prevention*
  o *Mental and physical health*
  o *Disease prevention*
	Green
	☐ Required by code/ordinance
	☐ Incentivized
	
	Yellow
	☐ Expressly allowed
	☐ Code/ordinance silent, but typically allowed
	
	Red
	☐ Code/ordinance silent, but not typically approved
	☐ Expressly prohibited
	
	☐ **Not Applicable**
		Green
		☐ Will be required or incentivized by code/ordinance
		
		Yellow
		☐ Will be expressly allowed in code/ordinance
		
		Red
		☐ Will be prohibited or discouraged
		
		☐ **Not Applicable**

Steps for Completing the Assessment

STEP 1: Read through the sustainable design question, objective and rationale.

STEP 2: Review the specific questions. **For a tribe with building codes**, identify segments of the tribal codes/ordinances that might address these questions. **For a tribe without building codes**, identify how the tribe plans to develop their code to address these questions.

STEP 3: Use the list of tools and techniques to help evaluate the tribe's codes/ordinances.

STEP 4: Answer the assessment questions by checking one **GREEN,** **YELLOW** or **RED** indicator per question.
Note: For tribes assessing existing codes and establishing priorities for future codes, check one **GREEN,** **YELLOW** or **RED** indicator under both columns.

STEP 5: Add additional questions, tools or techniques that the community would like to consider to the appropriate section. A **Blank Assessment Questions Form** is provided in Appendix B.

STEP 6: Total the number of green, yellow and red answers.

Looking at the totals across the different sections of the Assessment will help **a tribe with building codes** prioritize updates to building codes and policies, and will help to identify priorities for **a tribe without building codes**.

The Goal is to "Get to GREEN"

STEP 7: Use the **GREEN, YELLOW** and **RED** indicator results, to work on your priorities with community input.

Targeted Resource Guide links and Plan development information is provided in this document and on the Tribal Green Building Code Development Guidance Website http://epa.gov/region9/greenbuilding/codes/index.html.

Resource Guide

After each of the six categories, a Resource Guide contains links to resources about the topics and support the development of more sustainable codes/ordinances. The organization of the guide is as follows:

- Resources are categorized by topic area.
- Any resource listed under "Other Information" provides more general guidance.
- General green building resources are included at the end of the document in **Appendix A**.

Creating a Plan

Whether the tribe is updating existing codes, developing new codes, or adopting or adapting existing codes from another tribal, local or state government, a Plan will help guide the process. This Toolkit outlines a framework for developing a Plan that was based on input received from **EPA's Tribal Green Building Codes Workgroup** and tribal communities that received direct technical assistance towards the development of their tribe's green building codes:

Kayenta Township, Navajo Nation – First tribal community to adopt the International Green Construction Code

Pinoleville Pomo Nation – Developed HUD-funded, straw bale housing with strong community input and developed a draft performance-based green code

Spokane Tribe – Used a Community Visioning process to support the development of green building codes

Sault Tribe of Chippewa Indians – Developing cold climate codes to support Master Plan development

Big Sandy Rancheria – Developed and adopted culturally relevant green performance-based code

Steps to update, adapt, adopt or develop building codes may include:

STEP 1: Complete the Toolkit Assessments and Conduct Initial Research

STEP 2: Review and Refine Priorities – Community Visioning

STEP 3: Assess Strengths, Weaknesses, Opportunities and Issues

STEP 4: Choose Approach and Types of Code(s)

STEP 5: Finalize Code for Tribal Government Approval, Adoption and Implementation

STEP 6: Create Code Implementation and Compliance System

STEP 7: Evaluate and Update the Code as Needed

This framework is just one of many possible pathways to implement changes in a tribe's building process.

Who Should Use the Toolkit

The Toolkit was specifically developed for use by tribal government officials, but it can also be used by members of the development community, rural communities and other government and building professionals.

How the Toolkit Can Help

The user will be able to identify tribal green building priorities and evaluate different options to reach sustainability objectives.

The guidance in **Section 10: A Plan to Update, Adapt or Adopt Codes, or Develop New Codes** can help users design an approach to update a tribe's existing codes, or develop, adopt or adapt more sustainable codes. In doing so, tribes can involve and encourage tribal members, developers, contractors and design professionals to use sustainable design tools and techniques.

San Carlos Apache Tribe, Arizona

SECTION 3: ASSESSMENT – LAND USE

The relationship between the built and natural environments is important in all development contexts and particularly in tribal communities with their long histories of cultural connection to the natural environment.

Key Questions:

- What key community values and needs should be considered in development?
- Where do important cultural sites exist?
- Where do sensitive natural areas exist?
- What natural elements (wildlife habitat, water bodies and watersheds, open space, views, trees, solar access or shading, etc.) are important to preserve within the community?
- Which areas are most used by elders, children, those with physical disabilities and/or chronic health needs?
- Where do environmental hazards exist?

Key Terms:

- **Brownfield:** Abandoned or underused properties where there may be environmental contamination (e.g., presence of a hazardous substance, pollutant or contaminant).
- **Community Visioning:** A process of developing consensus about what future the community wants and then deciding what is necessary to achieve it.
- **Design Charrette:** An intensive planning session where citizens, designers and others collaborate in a vision for development.
- **Food Deserts:** Areas where fresh, healthy and affordable food options are unavailable.
- **Master Plan:** A comprehensive long range plan intended to guide growth and development of a community or region. It includes analysis, recommendations and proposals for the community's population, economy, housing, transportation, community facilities and land use. It is based on public input, surveys, planning initiatives, existing development, physical characteristics and social and economic conditions.
- **Permaculture:** A branch of ecological design and construction that develops sustainable architecture, regenerative and self-maintained habitat and agricultural systems modeled from natural ecosystems.
- **Tribal overlay:** A regulatory tool created by tribes to both amend and augment conventional codes for use in tribal contexts and add guidelines or requirements that are customized for a tribe's specific cultural and location-based needs.

3.1. Community Considerations

New development and renovation or restoration projects can often have significant impacts in communities. Tribes can work to minimize the negative impacts and cultivate the positive impacts of these projects by planning ahead.

Key Strategies:

- Create community sustainability and vision planning
- Promote healthy, active and well-connected communities
- Plan for community safety
- Plan for community resilience and climate adaptation
- Use place-based design
- Promote the production and harvest of local and traditional foods and goods
- Enhance the natural beauty and aesthetic appeal of development through site design

3.2. Site Development in Relation to Natural, Culturally Significant, and Historic Areas

By considering site location and development methods in relation to natural, culturally significant and historic areas, tribes can avoid or reduce the impacts on these important spaces.

Key Strategies:

- Conservation of historic and culturally important areas, lifestyles, and practices through:
  - Siting considerations
  - Designing for culturally important activities and traditions that require specific spaces

- Create balance between the natural and built environments through:
  - Compact versus low-density development
  - Wildlife corridors
  - Wildland interfaces
  - Aquatic buffers

3.3. Site Development and Environmental Accountability

Construction site development can lead to many environmental issues, such as soil erosion, water pollution, light and noise pollution, and airborne dust. Materials used at construction sites, including petroleum, herbicides and solvents, can enter the waterways if they are not properly controlled.

Key Strategies:

- Construction phase pollution control
- Stormwater and runoff management
  - Landscaping
  - Physical barriers
  - Impervious surface reduction (for example roads, sidewalks, driveways and parking lots that stop rainwater from reaching the ground)
- Light pollution reduction by directing light only at areas that need lighting for public safety

Native, drought tolerant plants can be used for landscaping.

Existing Codes, Standards and Other Regulatory Tools for Review

NOTE: *The Standards of Ethical Conduct do not permit the U.S. EPA to endorse any private sector website, product or service. The U.S. EPA does not exercise any editorial control over the information you may find on these websites.*

The following resources are examples of regulatory tools for land use, which can be adopted, adapted or used as models for code and ordinance design.

- International Green Construction Code (IgCC)
  http://publicecodes.cyberregs.com/
- LEED for Homes, LEED for Neighborhood Development
  http://www.usgbc.org
- Enterprise Green Communities Criteria
  http://www.enterprisecommunity.com/solutions-and-innovation/enterprise-green-communities/criteria
- Evergreen Sustainable Development Standard
  http://www.commerce.wa.gov/Programs/housing/TrustFund/Pages/EvergreenSustainableDevelopment.aspx
- ICC 700-2012: 2012 National Green Building Standard (ICC 700)
  http://www.homeinnovation.com/services/certification/green_homes
- International Living Future Institute's Living Building Challenge™, version 2.1
  https://ilbi.org/lbc/standard
- Multiple Examples found in Rocky Mountain Land Use Sustainable Community Development Framework
  http://www.law.du.edu/index.php/rmlui/rmlui-practice/code-framework/model-code
- Salmon-Safe Residential Development Standard
  http://www.salmonsafe.org/getcertified/residential-development

The issue of housing patterns may be a priority to include in the visioning process of some tribes based on the possible negative aspects of tribes shifting to cluster housing in places where low-density housing was traditional.

The table below broadly indicates which land use topics are addressed by these tools. Tribal priorities not adequately addressed by existing tools could be included in a tribal overlay.

Land Use Examples	Intl. Green Constr. Code (IgCC)	LEED for Homes V.4	Enterprise Green Comm. Criteria	Evergreen Sust. Dev. Standard	Living Building Challenge V. 3.0	ICC 700: National Green Building Standard	Rocky Mountain Land Use	Salmon-Safe Residential Dev. Standard
Aquatic Buffers	■*	■	■	■	■	■	■	■
Cultural Sensitivity					■			
Healthy, Connected Communities		■	■	■	■	■	■	
Gardens, Local Foods			■	■	■	■	■	

** Covered by IgCC if established by jurisdiction.*

Case Study: Sault Ste. Marie Tribe of Chippewa Indians

The Sault Tribe of Chippewa Indians is a 44,000-strong federally recognized Indian tribe that is an economic, social and cultural force in its community in the eastern Upper Peninsula of Michigan.

The Sault Tribe has undergone a multi-year effort to create a sustainable development plan and green development code for their 300 acre Odenaang Development. The site is designed to accommodate approximately 170 homes when fully developed.

The Sault Tribe Elders approved the name selected for the site. Odenaang (oh-day-nung) means "a place of many hearts."

The goals for the Odenaang Development, which is unique in its suburban/urban focus, include higher density, a range of housing, walkable, mixed use, inclusion of community facilities, as well as respect for the environment.

Beginning with a basic land use ordinance for this specific piece of property, the Tribe is:

- Evolving its land use ordinance to create a sustainable land use and building code for tribal lands, and
- Developing a model for cold climate Great Lakes region tribes.

The Housing Authority reports directly to the Tribal Council which supports the code development work. The development of an implementation strategy was identified early as an important part of the process.

U.S. EPA contractors supported the Tribe by introducing the example of the Rocky Mountain Land Use Institute's (RMLUI) Sustainable Community Development Framework and helping guide its adaptation for both land use and building codes. Of particular interest to the Tribe are the Framework's achievement levels, which supports varying levels of effort or dedication to each goal. This presents a continuum of choice to develop code appropriate to tribal community priorities.

The Tribe is creating a green development form based code using the RMLUI Framework as a structure and guide. The Tribe has also been awarded a HUD Sustainable Construction in Indian Country grant to assist in this goal.

Proposed Land Use Plan for Odenaang

Tribal Involvement: Tribal Council, Housing Authority, Odenaang Development Team and Private Planning Consultant

Non-Tribal Involvement: U.S. EPA Region 9, U.S. EPA Office of Solid Waste and Emergency Response and Office of Sustainable Communities, Development Center for Appropriate Technology, GreenWeaver Inc.

Code Incentive Examples

General	Targeted – Land Use
• Expedited permitting process • Expedited easement approval process • Permit fee waivers or reductions • Reduced inspections	• Allow higher density variance • Provide variance in building height restrictions • Allow shared driveways • Incentives (payments, tax breaks) for developing in priority areas • Floodplain, steep slope and/or mountain ridge protection incentives • Redevelopment incentives • Retrofitting incentives • Green street design incentives • Solar siting incentives

Questions to Assess Land Use

3.1. Community Considerations

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Are there requirements for a community visioning or planning process (e.g., a sustainable community plan with periodic updates)? *Potential Tools and Techniques:* • *Community visioning process* • *Master planning process* • *Design charrette*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Does a requirement exist for use of integrated design and the charrette process? *Potential Tools and Techniques:* • *Integrated design* • *Design charrette*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes

Do the adopted or planned policies or requirements support public health through land use?
 	
Potential Tools and Techniques:
• *Complete Streets policies*
• *Park and open space requirements*
• *Pedestrian and bicycle friendly development requirements*
• *Encouragement of mixed use*
• *Transit-oriented development policies*
• *Health impact assessments*
  o *Walkability*
  o *Injury prevention*
  o *Mental and physical health*
  o *Disease prevention*
• *Zoning approaches*
	Green
	☐ Required by code/ordinance
	☐ Incentivized
	Yellow
	☐ Expressly allowed
	☐ Code/ordinance silent, but typically allowed
	Red
	☐ Code/ordinance silent, but not typically approved
	☐ Expressly prohibited
	☐ **Not Applicable**
		Green
		☐ Will be required or incentivized by code/ordinance
		Yellow
		☐ Will be expressly allowed in code/ordinance
		Red
		☐ Will be prohibited or discouraged
		☐ **Not Applicable**

Is there a standard for natural resource preservation or green space creation to provide connected natural environments and recreation opportunities? *Potential Tools and Techniques:* • *Open space ordinances* • *Maximum grading allowance* • *Flexible setbacks* • *Impervious surface limits* • *Impact fee reductions* • *Building height variance* • *Zoning approaches such as transfer development rights*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Are conservation developments and/or cluster designs allowed in order to protect and connect natural environments? *Potential Tools and Techniques:* • *Conservation development criteria or ordinances* • *Cluster development criteria or ordinances* • *Zoning approaches* • *Incentives such as: variance in building height restriction, shared driveways, expedited permit review or reduced fees.*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Is there a standard for connecting a project to open spaces and adjacent development by providing various connections from the project to sidewalks or pathways in surrounding neighborhoods and natural areas? *Potential Tools and Techniques:* • *Cluster development criteria or ordinances* • *Zoning approaches*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Do policies or requirements support community safety? *Potential Tools and Techniques:* • *Pedestrian and bicycle friendly development requirements* • *Outdoor lighting requirements that maintain safety without creating light pollution* • *Encouragement of mixed-use development* • *Use of community spaces* • *Policies that encourage use of vacant and vacated properties*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do building designs or land use codes or ordinances support culturally important lifestyles or practices? *Potential Tools and Techniques:* • *Community visioning* • *Integrated design* • *Design charrettes* • *Tribal overlay*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do codes or ordinances support the usage and/or revitalization of native language(s)? *Potential Tools and Techniques:* • *Community visioning* • *Integrated design* • *Design charrettes* • *Tribal overlay*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Are place-based design strategies required? *Potential Tools and Techniques:* • *Community visioning* • *Integrated design* • *Design charrettes* • *Tribal overlay*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
In planning for a sustainable community, is production of food and goods considered and/or incentivized? Is there support for access to healthy foods? *Potential Tools and Techniques:* • *Zoning approaches for preservation of farmland* • *Permaculture* • *Encourage backyard and community gardens and farmers' markets* • *Encourage edible landscaping* • *Encourage mixed-use development* • *Policies and strategies to provide healthier food options and eliminate food deserts* • *Tribal overlay*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Do codes/ordinances support small- or large-scale local food production? *Potential Tools and Techniques:* • *Zoning approaches for preservation of farmland* • *Permaculture* • *Encourage community gardens and farmers' markets* • *Encourage edible landscaping* • *Encourage mixed-use development* • *Tribal overlay*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do codes/ordinances prioritize or support the protection of prime agricultural land? *Potential Tools and Techniques:* • *Transect studies* • *Smart growth principles* • *Zoning code* • *Master plan* • *Tribal overlay*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Do codes or ordinances encourage access to natural beauty in building and development projects? Is skyline and viewshed protection considered in relationship to public health and livability? *Potential Tools and Techniques:* • *Community visioning* • *Tribal overlay* • *Skyline ordinances* • *Viewshed ordinances* • *Form-based codes* • *Zoning approaches* • *Landscape requirements*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do codes/ordinances include requirements related to public nuisances such as emissions, noise, odors and vectors that can affect public health and livability? *Potential Tools and Techniques:* • *Buffer ordinances* • *Buffer design requirements* • *Zoning* • *Master plan* • *Tribal overlay* • *Environmental quality and monitoring requirements*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Section 3.1 Totals:	Green:	Yellow:	Red:	Not Applicable:

3.2. Site Development in Relation to Natural, Culturally Significant and Historic Areas

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Do codes/ordinances permit or prioritize the preservation of historic and sacred tribal sites? *Potential Tools and Techniques:* • *Zoning* • *Master plan* • *Tribal overlay* • *Community visioning* • *Integrated design* • *Design charrettes*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Are historic and culturally important areas, lifestyles and practices supported by policy requirements? *Potential Tools and Techniques:* • *Zoning* • *Master plan* • *Tribal overlay* • *Community visioning* • *Integrated design* • *Design charrettes*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Is the preservation of fishing, hunting, harvesting and sacred areas prioritized with codes/ordinances? *Potential Tools and Techniques:* • *Zoning* • *Master plan* • *Tribal overlay* • *Environmental quality and monitoring requirements*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Are there buffers, protection and sustainable use requirements of sensitive habitats such as wetlands, old growth forest, native prairie, primary dunes and coastal areas? *Potential Tools and Techniques:* • *Buffer ordinances* • *Buffer design requirements* • *Zoning* • *Master plan* • *Tribal overlay* • *Environmental quality and monitoring requirements*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Are there requirements that provide for buffers to protect water quality and habitat in streams and rivers? *Potential Tools and Techniques:* • *Buffer ordinances* • *Buffer design requirements (width, vegetation, maintenance, etc.)* • *Stormwater credits (reduced stormwater fees for property owners who reduce stormwater runoff or improve the quality of the stormwater runoff from their property)*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do the codes or ordinances for the river and stream buffer include lakes, wetlands and coastal waters to protect water quality and habitats? *Potential Tools and Techniques:* • *Buffer ordinances* • *Buffer design requirements (width, vegetation, maintenance, etc.)* • *Stormwater credits*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Are there replacement or restoration requirements for buffer disturbances when it is absolutely necessary to disturb the vegetated buffer? *Potential Tools and Techniques:* • *Buffer ordinances* • *Buffer design requirements* • *Restoration guidelines*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Are there varying density requirements for different zones or types of development? *Potential Tools and Techniques:* • *Transect studies* • *Smart growth principles* • *Zoning code* • *Master plan* • *Tribal overlay*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Is the reuse of existing sites or the rehabilitation and reuse of brownfields encouraged or allowed? *Potential Tools and Techniques:* • *Transect studies* • *Smart growth principles* • *Zoning code* • *Master plan* • *Tribal overlay*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do zoning maps, requirements or ordinances protect wildlife corridors in planning and development? *Potential Tools and Techniques:* • *Mapping* • *Transect studies* • *Smart growth principles* • *Zoning code* • *Master plan* • *Tribal overlay*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Is passive solar orientation (e.g., south side has portion with unobstructed view of the sun and most windows facing south) in development plans and in siting individual buildings encouraged or required? *Potential Tools and Techniques:* • *Energy codes* • *Tribal overlay*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Is there statutory authority for landowners to install a solar energy system on their property, and after the system is installed, to protect their access to sunlight so it remains operational? *Potential Tools and Techniques:* • *Zoning codes* • *Energy codes* • *Tribal overlay*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Are there floodplain protection requirements to protect or restore the floodplain? *Potential Tools and Techniques:* • *Floodplain protection ordinance* • *Floodplain hazard mitigation and stream restoration* • *Floodplain zoning incentives*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Do codes or ordinances require steep slope or mountain ridge protection to protect slopes from uses that may endanger the community? *Potential Tools and Techniques:* • *Steep slope or mountain ridge protection ordinances* • *Steep slope or mountain ridge protection incentives* • *Stormwater credits*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Section 3.2 Totals:	Green:	Yellow:	Red:	Not Applicable:

3.3. Site Development and Environmental Accountability

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	Tribe WITHOUT Building Codes
To prevent migration of pollutants to waterways, are there requirements for: • Petroleum containment on the construction site? • Concrete washout containment on the construction site? • Solvents handling? • Herbicides, pesticides, fungicides handling? • Construction debris handling? *Potential Tools and Techniques:* • *Good housekeeping requirements* • *Handling, containment and disposal specifications for:* o *Petroleum* o *Concrete washout* o *Solvents*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	Tribe WITHOUT Building Codes
o *Herbicide, pesticide, and fungicide* o *Construction debris*		
Are there requirements for dust management on the construction site to prevent offsite migration of dust and other pollutants? *Potential Tools and Techniques:* • *Dust management specifications* o *Vegetative cover, mulch* o *Windbreaks* o *Construction scheduling to minimize disrupted area*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Are clean construction practices encouraged or required by codes or ordinances? *Potential Tools and Techniques:* • *Verified diesel retrofit technologies* • *Local government construction contract specification requirements (e.g., vehicle emissions, dust control, idle reduction policies)*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Are there requirements for the construction equipment to be fitted with clean diesel equipment or alternative fuels to reduce air pollution or greenhouse gas emissions? *Potential Tools and Techniques:* • *Clean diesel specifications in municipal projects* • *Clean construction initiatives*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	Tribe WITHOUT Building Codes
Are there post-construction control codes, ordinances, or requirements? *Potential Tools and Techniques:* • *Post-construction stormwater management ordinances* • *Post-construction Best Management Practice specifications (e.g., green roofs, rain gardens, wet ponds)* • *Redevelopment incentives* • *Retrofitting incentives*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Are reduced street or driveway widths, reduced sidewalks (one side only) on residential or other low-use streets allowed to reduce the amount of impervious pavement? *Potential Tools and Techniques:* • *Green street ordinances* • *Context sensitive designs* • *Utilities consolidated on one side of street* • *Stormwater or landscape credits*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Are permeable pavements or pavers accepted on residential or other low use streets to provide for stormwater infiltration? *Potential Tools and Techniques:* • *Reduced minimums for paved parking and sidewalk area* • *Permeable pavement specifications* • *Stormwater credits (a reduction in stormwater fees for property owners who reduce stormwater runoff or improve the quality of the runoff from their property)*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	Tribe WITHOUT Building Codes
Are modified curb or gutter systems such as swale only, reverse curbs or curb cuts with rain gardens, etc., allowed to provide for stormwater infiltration and evaporation? *Potential Tools and Techniques:* • *Modified curb and gutter designs* • *Stormwater credits*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Are modified cul-de-sac designs allowed to provide for reduced impervious pavement? *Potential Tools and Techniques:* • *Modified cul-de-sac designs* • *Permeable pavement information* • *Stormwater credits*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Are there incentives for redevelopment to reduce the need for new streets? *Potential Tools and Techniques:* • *Green street design incentives*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Are there requirements for tree preservation or replacement to provide habitat for wildlife, provide cooling effect for pavement and rooftops, reduce	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	Tribe WITHOUT Building Codes
stormwater runoff and provide for cleaner air? *Potential Tools and Techniques:* • *Tree ordinances* • *Tree removal permits* • *Street tree designs* • *Tree credits* • *Replacement ratios* • *Stormwater credits*	☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Are there erosion and sediment control (E&SC) requirements for land disturbing activities? *Potential Tools and Techniques:* • *E&SC ordinance meeting EPA's numeric effluent limitation guidelines* • *E&SC best management practices (BMPs) based on EPA's numeric effluent limitation guidelines* • *E&SC BMP manuals* • *Third party inspection requirements*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Are there clearing and grading requirements that limit the amount of exposed soil on the construction site to reduce the potential for erosion and sedimentation? *Potential Tools and Techniques:* • *Clearing and grading ordinance* • *Construction phasing requirements that immediately cover exposed soil on the construction site*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	Tribe WITHOUT Building Codes
Are there incentives for developers that are high performers in erosion and sediment control (E&SC) to encourage successful E&SC site management? *Potential Tools and Techniques:* • *E&SC incentives (e.g., streamlined permitting, fewer inspections, etc.)* • *Surety or bonding requirements*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do the codes or ordinances require reduction in sky-glow and light trespass? *Potential Tools and Techniques:* • *Dark or night skies ordinances* • *Outdoor lighting codes/ordinances; illumination cone maximums, automatic timing devices, low reflectance surface requirements or spotlight limitations* • *Light levels or SmartCodes* • *Guidelines for lighting regulations*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Section 3.3 Totals:	Green:	Yellow:	Red:	Not Applicable:

Combine your totals for all subsections and Tribal Priority Totals from Appendix B:

Section 3 Totals:	Green:	Yellow:	Red:	Not Applicable:

Resources: Land Use

NOTE: The Standards of Ethical Conduct do not permit the U.S. EPA to endorse any private sector website, product, or service. The U.S. EPA does not exercise any editorial control over the information you may find on non-EPA websites.

Community Considerations

- **EPA Green Communities Smart Strategies for a Sustainable Future** – An environmental planning framework that includes tools, case studies, and resources. http://www.epa.gov/greenkit/
- **EPA Public Participation Guide: Charrettes** – Provides information on the charrette process and resources. http://www.epa.gov/oia/public-participation-guide/Tools/Input/charrette.html
- **Sustainable Native Communities Collaborative** –Supports culturally and environmentally sustainable affordable housing appropriate for American Indian communities through technical assistance and research of best practices. http://www.sustainablenativecommunities.org/fieldnews/
- **Enterprise Green Communities -** Green Charrette Toolkit – http://www.enterprisecommunity.com/solutions-and-innovation/enterprise-green-communities/resources/charrette-toolkit
- **Local Government Commission Resources for Community Safety** – http://www.lgc.org/safety
- **Partners for Livable Communities** – Goals, resources and technical assistance for the Culture Builds Community Program. http://livable.org/program-areas/culture-builds-communities/overview
- **Rocky Mountain Land Use Sustainable Community Development Framework** – A sustainable community development code framework using a multi-disciplinary, contextually oriented approach that encompasses environmental, economic, and social equity. http://www.law.du.edu/index.php/rmlui/rmlui-practice/code-framework/model-code

Aquatic Buffer Information

- **EPA Guide on Aquatic Buffer Ordinances** – Aquatic buffer model ordinance language, example ordinances, and supporting documentation. http://www.epa.gov/owow/nps/ordinance/buffers.htm
- **The Stormwater Manager's Resource Center** – Links to model ordinances and approaches to stream buffers and buffer preservation. http://www.stormwatercenter.net/
- **Carl Vinson Institute of Government, University of Georgia** – Guidance for local governments on developing scientifically based riparian buffers. http://www.rivercenter.uga.edu/publications/pdf/riparian_buffer_guidebook.pdf
- **North Carolina State University Riparian Buffers: What are They and How do They Work?** – General information on riparian buffer systems. http://www.soil.ncsu.edu/publications/BMPs/buffers.html
- **Virginia Cooperative Extension Services: Understanding the Science Behind Riparian Forest Buffers: Planning, Establishment, and Maintenance** – Guidelines for planning, establishment, and maintenance of riparian buffers. http://www.pubs.ext.vt.edu/420/420-155/420-155.html

Floodplain Protection Information

- **Federal Emergency Management Agency (FEMA) Floodplain Management Requirements** – Information and model ordinances for the National Flood Insurance Program. http://www.fema.gov/plan/prevent/floodplain/index.shtm
- **FEMA Floodplain Management Tools** – Strategies and tools to maintain or restore floodplain resources. http://training.fema.gov/EMIWeb/edu/docs/fmpcp/Chapter%209%20-%20Strategies%20and%20Tools%20to%20Maintain%20or%20Restore.pdf
- **No Adverse Impact Floodplain Management Tool, Association of State Floodplain Managers** –Tool to prevent the worsening of flooding and other negative impacts on the community. http://www.floods.org/index.asp?menuID=460
- **Virginia Department of Conservation and Recreation Floodplain Management Regulations** – Example floodplain management regulation. http://www.dcr.virginia.gov/dam_safety_and_floodplains/fpregs.shtml
- **Urban Drainage and Flood Control District: Urban Drainage Criteria Manual Volume 3** – Provides guidance for the selection and design of stormwater quality best management practices and guidelines that could be adopted into code. http://www.udfcd.org/downloads/down_critmanual.htm
- **Association of State Floodplain Managers, State and Local Resources** – An organization for professionals involved in floodplain management, flood hazard mitigation, flood preparedness, and flood warning and recovery. http://www.floods.org/

Infill and Redevelopment Information

- **EPA Essential Smart Growth Fixes for Urban and Suburban Zoning Codes** – Addresses the most common barriers local governments face in implementing smart growth fixes. http://www.epa.gov/smartgrowth/essential_fixes.htm
- **EPA Protecting Water Resources with Higher-Density Development** – Explores the impacts of high- and low-density development on water resources. Modeled scenario findings indicate that lower-density development may not always be the preferred strategy for protecting water resources. http://www.epa.gov/smartgrowth/water_density.htm
- **Smart Growth Toolkit** – Toolkit to help communities untangle policies and procedures that get in the way of implementing smart growth strategies. http://www.sgli.org/toolkit/smart-growth-toolkit/
- **U.S. Green Building Council LEED-ND** – integrates principles of smart growth, urbanism and green building into the first national system for neighborhood design. http://www.usgbc.org/leed#rating
- **Portland OR, Metro Regional Government Urban Growth Boundary** – Oregon law requiring each city or metropolitan area in the state to have a urban growth boundary that separates urban land from rural land. http://www.metro-region.org/index.cfm/go/by.web/id/277
- **Lexington-Fayette County, KY, Purchase of Development Rights Program** – The first Agricultural Conservation Easement program by a local government. www.lexingtonky.gov/index.aspx?page=497
- **American Farmland Trust** – **Information on** Agricultural Farmland Easements. http://www.farmland.org/

Open Space Information

- **EPA Guide and Model Ordinance for Open Space Protection** – Alternative site planning technique that concentrates dwelling units in a compact area to reserve undeveloped space elsewhere on the site. http://www.epa.gov/owow/nps/ordinance/openspace.htm
- **EPA Smart Growth and Open Space Conservation** – Numerous tools and technical resources to help communities become more proactive in conservation planning. http://epa.gov/smartgrowth/openspace.htm
- **St. Louis County, MO, Planning and Zoning Strategies for Water Quality Protection** – Planned Unit Development (PUD) performance criteria, overlay zoning, conservation subdivision ordinance, infill redevelopment, floodplain ordinance, conservation easements and tree preservation information. http://www.cityofbn.com/downloads/PZManualFinalDraft.pdf

- **Open Space Residential Design** – Provides model open space design ordinances, case studies and information. http://greenneighborhoods.org/index.html
- **Chicago's Open Space Impact Fee** – Information on using open space impact fees as a condition of building permit approval for new residential development. http://www.cityofchicago.org/city/en/depts/dcd/supp_info/open_space_impactfee.html
- **Context Sensitive Design** – A collaborative, interdisciplinary approach that involves stakeholders in transportation facility design that fits its setting. www.contextsensitivesolutions.org/

Steep Slope Protection Information

- **Town of Somers, New York** – Example slope protection ordinance language. http://landuse.law.pace.edu/landuse/documents/laws/reg2/SomersNYSteepSlopesPro.doc
- **Western North Carolina's Land of Sky Regional Council** – National Association of County Planners guidance on mountain ridge and steep slope protection. http://landofsky.org/planning/p_mountain_ridge_steep_slope.htm
- **Mountain Ridge and Steep Slope Protection** – Report describing the problems associated with development in steep mountainous areas. http://www.countyplanning.org/mountain-ridge-and-steep-slope-protection-strategics-431/
- **Center for Environmental Excellence** – American Association of State Highway and Transportation Officials guide for roadside steep slope management. http://environment.transportation.org/environmental_issues/construct_maint_prac/compendium/manual/10_13.aspx

Tree Protection and Ordinances Information

- **Center for Urban Forest Research, U.S. Forest Service** – Provides research information on the benefits of urban trees. http://www.fs.fed.us/psw/programs/cufr/
- **City Trees: Sustainability Guidelines and Best Practices** – Guidelines on a comprehensive approach to locating, planting, and caring for trees by integrating complimentary best practices. http://www.cleanwatermn.org/Documents/MS4%20toolkit%20files/Post%20construction%20stormwater%20management/Brochures%20&%20manuals/Forests/City%20trees%20manual.pdf
- **American Forests Guide to Setting Urban Tree Canopy Goals** – Provides general urban tree canopy goal guidelines based on geographic and climate conditions and land use categories. http://www.americanforests.org/?s=Urban+Tree+Canopy+Goals&x=0&y=0
- **Center for Watershed Protection Urban Watershed Forestry Manual Part 3** – Provides detailed guidance on urban tree planting applicable at both the development site and the watershed scale. http://www.cwp.org/categoryblog/98-forestry.html
- **Trees for Green Streets** – Describes the role of street trees in managing stormwater and includes detailed color drawings of the trees that best perform this function in the Portland area. http://www.metro-region.org/index.cfm/go/by.web/id=26337
- **Portland, OR, Tree Preservation on Your Land Division Site** – Tree preservation information guide. http://www.sustainableportland.org/shared/cfm/image.cfm?id=72545
- **Chapel Hill Tree Protection Ordinance** – Example local government tree protection ordinance including a tree canopy measurement template and canopy measurement. http://www.townofchapelhill.org/index.aspx?page=879
- **Portland, OR, Stormwater Fee** – Portland's Clean River Rewards Program gives a discount on stormwater management fees for sites with trees over 15 feet tall. https://www.portlandoregon.gov/bes/41976

Green Streets Information

- **EPA Green Infrastructure Web Page** – Provides basic information on green infrastructure along with tools, case studies, contacts and more. http://water.epa.gov/infrastructure/greeninfrastructure

- **EPA Managing Wet Weather with Green Infrastructure: Municipal Handbook** – Provides information on design, local examples, implementation hurdles and lessons learned. http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_green_streets.pdf
- **EPA Wetlands, Oceans, and Watersheds Green Street Initiatives Around the United States** – Provides examples and resources on different green street initiatives throughout the U.S. http://www.epa.gov/owow/podcasts/greenstreetsusa.html
- **EPA Green Streets** – Outlines green street initiatives throughout the U.S. www.epa.gov/owow/podcasts/greenstreetsusa.html
- **Portland, OR, Zoning Ordinance** – Eliminates minimum parking requirements in the central city district and for sites located within 500 feet of a high-capacity transit station. http://www.portlandonline.com/shared/cfm/image.cfm?id=53320
- **Low Impact Development (LID) Center Green Streets** – Highlights significant Green Highways and Green Streets programs and provides guidance for communities and institutions developing green infrastructure strategies. http://www.lowimpactdevelopment.org/greenstreets/

Permeable Pavements Information

- **EPA Green Infrastructure Web Page** – Provides basic information on green infrastructure along with tools, case studies, contacts and more. http://water.epa.gov/infrastructure/greeninfrastructure
- **EPA Porous Asphalt Pavement**: Provides information on design and effectiveness and links to additional resources. http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=135&minmeasure=5
- **North Carolina State University** – Permeable pavement research. http://www.bae.ncsu.edu/info/permeable-pavement/
- **University of Central Florida** – Permeable pavement research. http://www.stormwater.ucf.edu/research_publications.asp

Erosion & Sediment Control (E&SC) Information

- **National Pollutant Discharge Elimination System (NPDES) Construction Site Stormwater Runoff Control Best Management Practices** – Resources for construction site stormwater runoff control. http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=min_measure&min_measure_id=4
- **EPA Model Ordinances to Protect Local Resources: E&SC** – Includes a model ordinance as well as ordinances drafted in various jurisdictions and supporting materials. http://www.epa.gov/owow/NPS/ordinance/
- **Center for Watershed Protection Information on E&SC** – Resources related to stormwater management. http://www.cwp.org/your-watershed-101/stormwater-management.html
- **The Stormwater Manager's Resource Center** – Model E&SC ordinances. http://www.stormwatercenter.net/

Clean Diesel and Air Emissions Information

- **EPA Clean Construction USA** – Fact Sheet on the National Clean Diesel Campaign (NCDC), an innovative program designed to promote the reduction of diesel emissions from construction equipment and vehicles. http://www.epa.gov/cleandiesel/documents/420f05012.pdf
- **EPA Green Remediation: Incorporating Sustainable Environmental Practices into Remediation of Contaminated Sites** – Information on sustainable technologies for the remediation of contaminated sites. http://www.cluin.org/download/remed/Green-Remediation-Primer.pdf

Stormwater Best Management Practice Information

- **EPA National Pollutant Discharge Elimination System (NPDES) National Menu of Stormwater Best Management Practices for Post-Construction** – Presents innovative practices to treat, store, and infiltrate runoff on-site before it

affects water bodies downstream. http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=min_measure&min_measure_id=5

- **EPA Using Smart Growth Techniques as Stormwater Best Management Practices** – Helps communities that have adopted smart growth policies and plans recognize the water benefits and use those policies for stormwater planning and compliance. http://www.epa.gov/smartgrowth/stormwater.htm
- **EPA Green Infrastructure Web Page** – Provides basic information on green infrastructure along with tools, case studies and contacts. http://water.epa.gov/infrastructure/greeninfrastructure
- **EPA Polluted Runoff (Nonpoint Source Pollution) Low Impact Development (LID)** – Contains LID fact sheets and reports, manuals and other resources. http://www.epa.gov/nps/lid/
- **EPA Managing Wet Weather with Green Infrastructure Handbook Series** – Handbooks on Water Quality Scorecard, Funding Options, Retrofit Policies [for stormwater programs], Green Streets, Rainwater Harvesting and Incentive Mechanisms. http://www.dep.wv.gov/WWE/Programs/stormwater/MS4/guidance/handbooks/Pages/default.aspx
- **EPA Stormwater Discharges from Construction Activities** – Stormwater program requiring construction site operator clearing, grading and excavating activities that disturb one acre or more, including smaller sites in a larger common plan, to obtain stormwater discharge permit. http://cfpub.epa.gov/npdes/stormwater/const.cfm
- **Center for Watershed Protection (CWP) Stormwater Management** – Resources including post-construction stormwater guidance, state stormwater manuals and best practice articles. http://www.cwp.org/your-watershed-101/stormwater-management.html
- **The Stormwater Manager's Resource Center** – Links to fact sheets on land planning, land conservation, aquatic buffers, better site design, stormwater management practices, stream restoration practices, non-stormwater discharges and model ordinances for aquatic resources. http://www.stormwatercenter.net/
- **Georgia Stormwater Management Manual Volume 2: Technical Handbook** – A technical engineering handbook for implementing stormwater management measures for new development and redevelopment. http://www.georgiastormwater.com/
- **Center for Watershed Protection Better Site Design (BSD) Resources** – Techniques, codes recommendations and incentives to promote low-impact development, environmentally-sensitive design and green infrastructure. http://www.cwp.org/documents/cat_view/77-better-site-design-publications.html
- **Center for Watershed Protection Restoration and Watershed Stewardship** – Presents material on stream repair, riparian and upland pervious area restoration, residential stewardship and municipal housekeeping. http://www.cwp.org/Resource_Library/Restoration_and_Watershed_Stewardship/index.htm
- **Natural Resources Defense Council Rooftops to Rivers** – Green strategies and case studies for controlling stormwater and combined sewer overflows**.** http://www.nrdc.org/water/pollution/rooftops/rooftops.pdf and http://www.nrdc.org/water/pollution/rooftopsii/files/rooftopstoriversII.pdf

Green and Cool Roof Information

- **EPA Reducing Urban Heat Islands: Compendium of Strategies, Green Roofs Chapter** – Covers green roof types, benefits and costs of green roofs and green roof initiatives. http://www.epa.gov/hiri/resources/pdf/GreenRoofsCompendium.pdf
- **Green Roofs for Healthy Cities** – Non-profit, green roof industry association. http://www.greenroofs.org/
- **Cool Roofs Rating Council** – Non-profit organization that maintains a third-party rating system for radiative properties of roof surfacing materials. http://www.coolroofs.org/
- **Green Roof Legislation, Policy, and Tax Incentives** – Tracks green roof policy at the local, state, and national level. http://myplantconnection.com/green-roofs-legislation.php
- **Portland, OR, City Eco-Roof Resolution** – Example policy requiring all new city-owned facilities to include an eco-roof with 70% coverage and high reflectance or ENERGY STAR material when that is impractical. http://www.portlandonline.com/shared/cfm/image.cfm?id=112682

Rain Gardens Information

- **EPA Green Infrastructure Web Page** – Information on green infrastructure along with tools, case studies and contacts. http://water.epa.gov/infrastructure/greeninfrastructure
- **North Carolina State University** – Rain garden bioretention information and research. http://www.bae.ncsu.edu/topic/bioretention/overview.html

Light Pollution Reduction Information

- **International Dark-Sky Association** – Information on preserving the nighttime environment through quality outdoor lighting. http://www.darksky.org
- **Outdoor Lighting Code Handbook** – Discusses issues relative to outdoor lighting code effectiveness, implementation and enforcement. "Pattern code" included, to be modified for each community's needs. http://www.darkskysociety.org/handouts/idacodehandbook.pdf
- **Simple Guidelines for Lighting Regulations** – Lighting regulation guidelines for small communities, urban neighborhoods and subdivisions. http://docs.darksky.org/Codes/SimpleGuidelines.pdf
- **Light Levels Lighting Design Module and SmartCode Module** – Sustainable Urbanism Lighting Design Module and SmartCode. http://www.transect.org and http://transect.org/docs/LightLevels.pdf
- **Illuminating Engineering Society of North America (IES)** – Technical society on illumination providing information on good lighting practice to members, the lighting community and consumers. http://www.ies.org

General Sustainable Site Design Information

- **EPA Smart Growth Guidelines for Sustainable Design and Development** – Resource for communities seeking to locate, design, and develop housing — particularly affordable housing. http://www2.epa.gov/smart-growth/smart-growth-guidelines-sustainable-design-and-development
- **EPA Essential Smart Growth Fixes for Urban and Suburban Zoning Codes** – Addresses the most common barriers local governments face in implementing smart growth fixes. http://www.epa.gov/smartgrowth/essential_fixes.htm
- **EPA - Green Infrastructure/Low Impact Development** – Tools and resources on low-impact development approaches to site design. http://www.epa.gov/owow/NPS/lid/
- **EPA Green Infrastructure Web Page** – Provides basic information on green infrastructure along with tools, case studies and contacts. http://water.epa.gov/infrastructure/greeninfrastructure
- **EPA Polluted Runoff (Nonpoint Source Pollution) Low Impact Development** – An approach to land development (or re-development) that works with nature to manage stormwater as close to its source as possible. http://www.epa.gov/nps/lid/
- **EPA Managing Wet Weather with Green Infrastructure Handbook Series** – Handbooks on the water quality scorecard, funding options, retrofit policies for stormwater programs, green streets, rainwater harvesting and incentive mechanisms. http://water.epa.gov/infrastructure/greeninfrastructure/gi_policy.cfm#municipalhandbook
- **EPA Sustainable Redevelopment of Brownfields Program** – A comprehensive website on brownfields that includes projects, initiatives, tools, tax incentives and other resources on brownfield remediation and redevelopment. http://www.epa.gov/brownfields/
- **EPA Tribal-Focused Environmental Risk and Sustainability Tool (T-FERST)** – Online decision support tool designed to serve as a research framework to provide tribes with easy access to the best available human health and ecological science. http://www.epa.gov/heasd/research/tferst.html
- **EPA Eco-Health Relationship Browser** – Helps communities better account for and protect the benefits. http://enviroatlas.epa.gov/enviroatlas/Tools/EcoHealth_RelationshipBrowser/introduction.html
- **Environmental Law Institute, Brownfields Center** – Information on brownfields cleanup and redevelopment, with a focus on the concerns and needs of community groups. http://www.brownfieldscenter.org/big/about.shtml
- **Form-Based Codes Institute** – Code resources and training courses supporting urban development. http://formbasedcodes.org/
- **Center for Applied Transect Studies** – Open source SmartCode and manuals. http://www.transect.org/codes.html

- **Complete Streets Policy Workbook** – Information on Complete Streets policies and guidelines. http://www.smartgrowthamerica.org/guides/complete-streets-local-policy-workbook/
- **The Stormwater Manager's Resource Center** – Model stormwater ordinance selector plus links to fact sheets on land planning and conservation, aquatic buffers, better site design, stormwater management practices, stream restoration practices, non-stormwater discharges and pollution prevention. http://www.stormwatercenter.net/
- **Georgia Stormwater Management Manual Volume 2: Technical Handbook** – A technical engineering handbook for implementing stormwater management measures for new development and redevelopment. http://www.georgiastormwater.com/
- **Center for Watershed Protection Better Site Design (BSD) Resources** – Code development, local incentives and techniques to minimize the negative impacts of new development on water. http://www.cwp.org/Resource_Library/Better_Site_Design/index.htm
- **The Green Buildings Guide: Tools for Local Governments to Promote Site Sustainability** – Section 2 provides information on regulatory and policy tools to increase private sector green building. http://wcel.org/resources/publication/green-buildings-guide-tools-local-governments-promote-site-sustainability-0
- **Sustainable Sites Initiative Guidelines and Performance Benchmarks 2009** – Provides benchmarks, provides case studies and tools on using sustainable outcomes instead of prescriptive approaches to encourage innovation and provide flexibility. http://www.sustainablesites.org/report/Guidelines%20and%20Performance%20Benchmarks_2009.pdf
- **Prince George County Low Impact Development Manual: Low-impact Development Design Strategies** – Information on a local government's low-impact development experience. http://www.epa.gov/owow/nps/lid/lidnatl.pdf
- **Low Impact Development Center** – Low-impact development design techniques and resources. http://www.lowimpactdevelopment.org/about.htm
- **Green Building Guide: Design Techniques, Construction Practices & Materials for Affordable Housing** – Comprehensive guidance for green building projects including site-related aspects. http://www.rcac.org/assets/greenbuild/grn-bldg-guide_4-20-09.pdf

Smith River Rancheria, California

SECTION 4: ASSESSMENT – MATERIALS AND RESOURCE CONSERVATION

Tribal communities can reduce construction costs and environmental impacts through the selection of green materials and resource conservation. The main components of this section relate to the preservation and reuse of existing structures and materials, and environmentally preferable materials selection.

Key Questions:

- What culturally significant or historic buildings exist that may need to be protected, upgraded or replaced?
- Are there areas that could be developed more densely?
- Which building materials promote healthy indoor air quality?
- What building materials are considered "local" to your area or were used in the past that can be used to create durable, energy efficient, healthy buildings?

Key Terms:

- **Adaptability:** The ability to change or adjust to different or varying conditions, such as fluctuating climate conditions.
- **Construction and Demolition (C&D) Materials:** Materials generated during the construction, renovation, and demolition of buildings, roads and bridges. C&D materials often contain bulky, heavy materials.
- **Durability:** The ability of materials or building systems to withstand weather, wear, pressure or damage, and stay in strong, serviceable condition over time.
- **Infill:** Building in vacant or undeveloped spaces within an already developed area of land.
- **Manufactured Housing:** Prefabricated homes that are constructed at a factory or similar industrial setting, and then assembled at the building site.
- **Permeable:** Allowing liquids or gases to pass through.
- **Repairability:** The ability of materials or building systems to be repaired, rather than needing to be replaced if damaged.
- **Life Cycle Cost:** The sum of present values of investment costs, capital costs, installation costs, energy costs, operating costs, maintenance costs and disposal costs over the lifetime of the project, product or measure.

4.1. Environmentally Responsible Materials - Local, Natural, Recyclable

Selecting local, natural and/or recyclable building materials can reduce construction costs and environmental impacts that result from the extraction, processing, and transportation of raw materials. Material selection can also affect human health and indoor air quality though emissions and direct contact during production, installation and use.

Key Strategies:

- Local and natural building materials:
  - Construction materials such as earth (adobe, clay plasters, compressed earth block, cob, etc.), fiber (jute, sisal, flax, kanaf, bamboo, wool, etc.), wood, stone, or straw
  - Certified sustainable or green products
- Recycled content and recyclable products
- Low- or no-emitting materials (over the life of the product)
- Energy and water efficient systems and materials

Tribes can use a table to assess the suitability of local and natural materials for their construction projects. Overlaying the simple utility of a material with local availability or whether it reflects tribal traditions may be helpful. The table below is an example of how tribes can assess potential uses for local and natural materials for specific purposes. The availability of local and natural building materials will vary by location.

EXAMPLE: Local and Natural Building Materials Table

NOTE: Local materials availability and appropriate uses will vary by location

	Indoor Uses	Outdoor Uses	Permeable	Reusable	Locally Available
Clay plasters	◉		◉		
Limestone		■	■		
Stone	■	■		■	
Wood	◉	◉		■	
Straw	◉	◉	■		
Fiber	■		■	■	

KEY: ◉ Local material used by the tribe (past or present) ■ Local material currently available to the tribe

Designs should consider the durability of the materials and protect materials that are vulnerable to weather. Design strategies to protect materials include increased roof overhangs, orientation to prevailing weather, rain screens, and more durable finish materials. Materials that offer great durability but have significant environmental impacts or higher levels of toxicity should be used with care if they are used.

The Apsaalooke Crow Tribe used Crow resources and tribal member labor to build compressed earth block homes. *Photo: Apsaalooke Housing Authority*

The Pinoleville Pomo Nation built straw bale housing and provided training tribal members and other local tribes' members. *Photo: Timonie Hood*

4.2. Building Preservation and Reuse of Structures on Developed Land

Repairing a building rather than tearing it down avoids human exposures to toxics, conserves natural resources, reduces energy consumption and prevents pollution from the extraction, manufacturing and transportation of new building materials. Building reuse also reduces the amount of solid waste that is generated.

Key Strategies:

- Preservation of historic or culturally significant tribal buildings
- Redevelopment of previously developed lands (including restoration of damaged lands)
- Reuse of building shell
- Infill in areas with existing infrastructure

4.3. Durability, Repairability and Adaptability

For the long-term sustainability of a building, it is important to choose materials that are durable, appropriate for many different uses, can be easily repaired, and can be adapted for future use. Buildings with these types of materials will last longer and be less expensive to maintain. In addition, these types of materials can be reused or recycled.

Key Strategies:

- Construct well-designed buildings that reflect community culture and values
- Design for durability, including accounting for differences in durability of natural materials.
- Design for ease of maintenance and repair (for example, don't put a material that will need to be replaced in 20 years behind a brick veneer that will last a hundred years or more)
- Design simple structural systems using standard dimensions to facilitate straightforward repair, replacement, adaptation and reuse
- Design connections that are visually and physically accessible (bolts, screws, nails, etc.) and minimize chemical connections such as sealers and glues
- Select building materials that are durable and easily repaired
- Select building materials that are appropriate or adaptable for use in many locations, types of buildings, and environmental conditions
- Select materials that create an energy efficient building appropriate to the local climate
- Separate mechanical, electrical and plumbing systems for ease of access for maintenance and repair
- Provide information for building owner and occupants to facilitate appropriate and regular building maintenance

4.4. Materials Reuse and Recycling

Reusing building materials creates many economic, environmental, health and social benefits that include reduced construction costs, consumption of new resources, waste and pollution. Managing construction and demolition (C&D) materials also reduces costs, conserves energy and protects the environment.

The Bernheim Arboretum Research and Visitors' Center used reclaimed materials, mechanical connections and reconfigurable modules to reduce waste and greenhouse gas emissions. *Photo: Lifecycle Building Challenge via William McDonough + Partners*

Key Strategies:

- Establish a building materials reuse store or area
- Reuse materials in the different building phases:
  - Construction
  - Renovation
  - Demolition
- Set materials reuse and/or recycling requirements or goals (generally percentage of material weight)
- Design buildings to support deconstruction and reuse

4.5. Green Manufactured Housing

Manufactured housing is common in many tribal communities. Because these homes are typically manufactured out of the tribe's jurisdiction, challenges can arise in controlling how they are constructed. Tribes can consider implementing codes or green manufactured housing specifications to manage manufactured housing consistent with the tribe's green building and cultural priorities.

Manufactured housing can be moved across state lines and, therefore, is built to a federal standard typically referred to as the "HUD-code." In contrast, modular housing built offsite and assembled on site is generally built to existing state or local government building codes. The HUD-code minimum is typically less energy efficient and has

fewer durability requirements than modular building codes. Both HUD-code manufactured housing and modular housing can be required to meet stronger energy efficiency and green building requirements.

Key Strategies:

- Establish green standards for manufactured housing, including:
  - Set up and operation of home(s) in accordance with manufacturer's installation and operation manual. (**Note:** Many states and local governments have standard set-up requirements, and HUD has default set-up standards if the tribe or state does not have one.)
  - Energy efficiency
  - Water efficiency
  - Durability
  - Cultural and community considerations
  - Ventilation and indoor air quality
  - Environmental impact standards
- Increased production of manufactured/modular housing by tribes, rather than external producers
- Manufactured home community set-up codes planning (NFPA-501A)
- Proper solar orientation for the installation of manufactured housing
- Design installation commissioning (i.e., ensuring proper installation and systems work as designed)
- Occupant education on operations and maintenance

The Hoopa Valley Tribes' Modular Building Enterprise in-plant factory home building mission encompasses three interconnected goals: affordable housing, job creation and job training. *Photos: Hoopa Modular Building Enterprise*

Case Study: Ohkay Owingeh Tribe

The Ohkay Owingeh Tribe developed the Owe'neh Bupingeh Preservation Plan to rehabilitate housing and infrastructure within the historic village center of Ohkay Owingeh, New Mexico, using traditional building materials. Several hundred homes once surrounded the village center, but only 60 remain, many of which were abandoned due to deterioration. The project incorporated new technologies to preserve and stabilize ancient adobe homes, with an education and research component informed by cultural leaders and homeowners.

The multi-year, affordable housing and rehabilitation project within the historic core at Ohkay Owingeh balanced preservation, housing quality, and green design. The Tribe's comprehensive preservation plan has guided practical housing improvements according to cultural values, including the rehabilitation of 25 homes using traditional earthen construction methods and the renovation of infrastructure. A native-owned construction contractor hired and trained tribal members.

Ohkay Owingeh Village. *Photo: Kate Russell*

The project is rooted in the preservation philosophy of Ohkay Owingeh tribal leaders, which values the life of the Pueblo. Preservation technology specialists in adobe construction repaired and reconstructed damaged vigas (round timber beams) in order to save as much of the existing material as possible. This was an important cultural factor, as many of the vigas were "gifted" from one family to another.

The project has successfully provided families with culturally-appropriate, quality affordable housing and has generated tribal discussions of larger cultural preservation issues. The plan has been heralded as a model planning effort for Native American communities in historic settings.

Tribal Involvement: Ohkay Owingeh Housing Authority, Cultural Advisory Team, Tribal Council, Chamiza Foundation, Avanyu General Contracting, Inc., community members, cultural leaders, construction crew members.

Non-Tribal Involvement: HUD Office of Native American Programs, Concept Consulting Group, National Park Service, New Mexico Mortgage Finance Authority, New Mexico Historic Preservation Division, McCune Charitable Foundation, National Trust for Historic Preservation, Atkin Olshin Schade Architects.

Case Study: Nez Perce Zero Energy Manufactured Home

A Zero Energy Manufactured Home (ZEMH) was built in 2002 on the Nez Perce Fish Hatchery in Cherry Lane, Idaho, to advance research on green manufactured housing. The project funded by The Bonneville Power Authority (BPA) provides on-site housing to hatchery facilities staff. The research compared two 1600 square foot double section manufactured homes, built by the same manufacturer, using an identical floor plan.

One home was built to Energy Star and one home built approaching "Zero Energy" long term sustainability goal. The ZE home was most energy efficient HUD-code manufactured home in the country at the time it was built.

BPA worked with the Nez Perce tribe, Washington State University Energy Program and the Department of Energy's Building America Industrialized Housing Partnership, collaboratively to design, monitor and analyze these homes.

Industry partners provided energy efficient building components, including Energy Star windows, appliances, ceiling fans and lighting; spray foam wall, floor and roof insulation; tighter ductwork and thermal envelope with air to air heat exchanger for occupant controlled mechanical ventilation and air source heat pump. Renewable energy systems included: sun-tempered solar design, a solar photovoltaic electrical system and solar hot water thermal system.

Fish provide us with both physical and spiritual sustenance. Other cultures seem unable to recognize how those two concepts go hand in hand. Instead, they see them as separate, traditional beliefs on one side, science on the other. For Indian people those concepts have never been separate. Our fate and the fate of the fish are linked.

— Jaime Pinkham,* Salmon and His People *(Landeen and Pinkham, 1999).

Zero Energy Manufactured Home, Nez Perce Fish Hatchery in Idaho. *Photo: Washington State University Energy Program*

The ZEMH daily average total energy use, with solar panels and solar hot water systems, was 29.4 kWh/day. The solar photovoltaic system generates an average of 9.9 kWh/day. This provides roughly one third of the home's total energy use and most of the home's energy in the summer.

Measured net energy use of the ZEMH was 12% lower than the control Energy Star home, not normalized for occupant behavior, and the ZEMH required 44% less space heating energy than the Energy Star Home.

The project highlights the importance of occupant choices and behavior on the performance of energy efficient housing. Based on the preliminary monitoring data and occupant surveys, the behavior patterns of the ZEMH occupants were not themselves "energy efficient." The high energy use behavior of the ZEMH occupants actually shortened the payback for the innovative technologies of the ZEMH.

Tribal Involvement: Nez Perce Tribe

Non-Tribal Involvement: Bonneville Power Authority, Washington State University Energy Program, Department of Energy's Building America Industrialized Housing Partnership, Kit HomeBuilders West, Northwest Energy Efficient Manufactured Home Program.

Code Incentive Examples

General	Targeted – Materials Reuse and Conservation
• Expedited permitting process • Expedited easement approval process • Permit fee waivers or reductions • Reduced inspections	• Redevelopment incentives • Retrofitting incentives • Mixed use and/or density variances • Construction and demolition waste reduction incentive

Questions to Assess Materials and Resource Conservation

4.1. Environmentally Responsible Materials Selection

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Is there a building procurement policy that promotes using environmentally responsible materials that: • Are energy and water conserving; • Have minimal emissions in manufacturing and/or in usage; • Require/allow healthful maintenance (do not require harmful sealants/coatings, are mold/mildew resistant, etc.); • Are of low toxicity. *Potential Tools and Techniques:* • *Certified WaterSense products* • *Certified wood product requirements* • *Indoor air emissions requirements* • *USDA BioPreferred products*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Is there a building procurement policy that promotes using environmentally preferable materials (in manufacturing, and operations and maintenance) that: • Are based on a renewable source, durable, affordable; • Contain recycled content; • Are energy efficient; • Are readily reusable and/or recyclable *Potential Tools and Techniques:* • *ENERGY STAR Certified Products* • *ENERGY STAR Advanced Lighting Package* • *EPA Comprehensive Procurement Guidelines (CPG) for recycled content products* • *USDA BioPreferred products* • *Green building program or ordinance with minimum postconsumer recycled content requirements* • *Certified wood product requirements*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Do current or planned regulations or policies include provisions for the use of Environmentally Preferable Materials for building components or assemblies? • Foundations – such as rammed earth, earth bags, stone; • Floors – such as earth, concrete, wood, stone; • Exterior Walls – such as rammed earth, adobe, compressed earth block, cob, straw bale, advanced framing with wood, stone; • Roof framing and decking – such as wood sheathing, framing, timbers or trusses; • Roofing – such as recycled content, local, salvaged *Potential Tools and Techniques:* • *Green building program or ordinance with environmentally preferable purchasing requirements* • *EPA Comprehensive Procurement Guidelines (CPG) for recycled content products* • *Certified wood product requirements* • *USDA BioPreferred products*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Do current or planned regulations or policies include provisions for the use of Environmentally Preferable Materials for the following building components or assemblies? • *Insulation;* • *Exterior finish materials;* • *Interior finish materials;* • *Walls, windows and doors;* • *Paints, sealants, adhesives;* • *Landscape materials;* • *Paving/hardscape;* *Potential Tools and Techniques:* • *Green building program or ordinance with environmentally preferable purchasing minimum postconsumer recycled content requirements* • *Comprehensive Procurement Guidelines (CPG) for recycled content construction and landscaping products* • *Certified wood product requirements* • *USDA BioPreferred products* • *ENERGY STAR Certified windows and doors* • *Low or no VOC paints and sealants* • *Use of compost and natural mulch for landscaping* • *Minimize paving or use porous pavements/paving stones.*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Do policies support or encourage the use of culturally appropriate, traditional or historic building materials, methods or designs? *Potential Tools and Techniques:* • *Cultural or Historic Building ordinance or policy* • *Tribal overlay*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do policies support or encourage the use of tribal, local, natural, and/or non-industrial building materials, methods or designs? *Potential Tools and Techniques:* • *Policy preference for tribally sourced or produced building materials* • *Policy preference for building materials produced within a 500 mile radius, when possible* • *USDA BioPreferred products*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do historic preservation ordinances allow for reused or recycled building materials during renovation projects? *Potential Tools and Techniques:* • *Historic preservation ordinance* • *Adaptive reuse, sustainable design or historic building policy*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
For new construction, are policies in place or planned to address proper precautions for handling of treated lumber and disposal of waste? *Potential Tools and Techniques:* • *EPA Treated Lumber website*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Section 4.1 Totals:	Green:	Yellow:	Red:	Not Applicable:

4.2. Building Preservation and Reuse

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Are there incentives or requirements for building rehabilitation and redevelopment projects in codes, policies or ordinances? *Potential Tools and Techniques:* • *Redevelopment incentives* • *Retrofitting incentives* • *Post-construction stormwater credits (a reduction in stormwater fees for property owners who reduce stormwater runoff or improve the quality of their stormwater runoff)*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Is the redevelopment and reuse of buildings and previously developed land encouraged or allowed? *Potential Tools and Techniques:* • *Rehabilitation ordinance for older buildings*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
• *Pedestrian-oriented or transit-oriented development* • *Mixed-use or density allowances* • *Adaptive reuse ordinance* • *Voluntary clean-up programs*	**Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Are there allowances for green renovations or technologies that retain the historic character of registered historic properties or resources? *Potential Tools and Techniques:* • *Historic preservation ordinance* • *Adaptive reuse, sustainable design or historic buildings policy*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Section 4.2 Totals:	Green:	Yellow:	Red:	Not Applicable:

4.3. Durability, Repairability and Adaptability

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Do current or planned codes or policies support best practices for design and construction for material efficiency, durability, repairability and adaptability? *Potential Tools and Techniques:* • *Advanced framing techniques* • *Development of building deconstruction/adaptation plan* • *Use of exposed connectors (bolts, screws, nails, etc.) and minimize use of chemical adhesives and sealants* • *Separation of mechanical, electrical and plumbing systems*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Do current or planned provisions require a building maintenance manual be provided to building owners or users? Maintenance manual could include the following: • Guidance for HVAC, appliances, lighting equipment, and other components including renewable energy systems • Location of water-system turnoffs • Paving materials and landscaping • Green cleaning products and schedule(s) • Pest control • An occupancy turnover plan that includes all materials frequently replaced and education for residents about proper use and maintenance of building systems *Potential Tools and Techniques:* • *Maintenance manuals* • *Occupancy turnover plan*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do policies or requirements consider designing for building durability? *Potential Tools and Techniques:* • *Policies supporting the procurement of repairable, durable building materials and systems* • *Lifecycle cost accounting*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Section 4.3 Totals:	Green:	Yellow:	Red:	Not Applicable:

4.4. Materials and Reuse Conservation

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Do codes or ordinances specify a diversion (from landfilling and incineration) rate for C&D or renovation materials and require credible reuse and recycling operations? *Credible operations include reuse and recyclers in compliance with laws and regulations, government licensing, and/or third-party, independent certification.* *Potential Tools and Techniques:* • *C&D ordinances requiring minimum recycling rate, excluding land clearing materials* • *List of credible reuse and recycling facilities* • *Materials Management Plan requirement* • *Deconstruction requirements in demolition or deconstruction permits* • *Additional time period in permit to allow for salvaging and deconstruction* • *Building permits include C&D materials diversion deposit or bond* • *Renovation ordinance requiring recycling when a project exceeds a certain value or size*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Is there a requirement for a Materials Management Plan covering both construction materials and building operations (indoor and outdoor collection of materials for reuse, recycling, composting and disposal)? *Potential Tools and Techniques:* • *Materials Management Plan requirement tied to specified reuse, recycling and composting requirements (generally percentages)*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Do the requirements for the construction project allow for the reuse, recycling and/or composting of C&D materials (e.g., concrete, drywall, clean wood, etc.)? *Potential Tools and Techniques:* • *Policy for on-site grinding and reuse of materials (e.g., concrete, clean wood, etc.)* • *Number of C&D boxes allowed on-site* • *Allowances for stockpiling C&D materials on-site* • *Requirement for contractor personnel training or certification in C&D management* • *Materials Management Plan*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Are there provisions in place that encourage materials reuse? *Potential Tools and Techniques:* • *Green building program or ordinance with minimum reuse requirements for new construction*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Are there codes or ordinances requiring specific area(s) and bins for building occupants to collect or sort recyclable materials and materials that require special handling for disposal? *Potential Tools and Techniques:* • *Requirement that buildings be designed or constructed to accommodate reuse, recycling and composting by building occupants* • *Space allocation guidance or ordinance for accessible reuse, recycling, composting and waste collection.* • *Requirement to provide storage of discarded thermostats, florescent bulbs, light ballasts, batteries, treated lumber and other items which may require special disposal as special or hazardous waste.*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Section 4.4 Totals:	Green:	Yellow:	Red:	Not Applicable:

4.5. Green Manufactured Housing

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Are there requirements or guidelines in place for manufactured housing to meet higher standards for energy use, durability and indoor environmental quality? *Potential Tools and Techniques:* • *ENERGY STAR Manufactured Housing Certification* • *EPA Indoor airPLUS certification* • *Northwest Energy Efficient Manufactured Housing Program*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do manufactured homes in your community use fuel that is healthier for the indoor and outdoor environment? *Potential Tools and Techniques:* • *Renewable energy (solar, wind, hydropower)* • *Geothermal heat pump* • *All electric preferable to propane or wood* • *If wood is used, procure EPA certified wood stove*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Are there requirements in place or guidelines for locally, tribally or regionally produced manufactured housing? *Potential Tools and Techniques:* • *Tribal overlay* • *Tribal procurement policy*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Are there requirements or guidelines requiring for proper installation, operation and maintenance of manufactured homes? *Potential Tools and Techniques:* • *ENERGY STAR Manufactured Housing Certification* • *Installation commissioning* • *Manuals for operations and maintenance* • *Training for residents on operations and maintenance*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Are there requirements in place or guidelines for manufactured housing to meet specific cultural, traditional or community standards? *Potential Tools and Techniques:* • *Tribal overlay* • *Tribal procurement policy*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Section 4.5 Totals:	Green:	Yellow:	Red:	Not Applicable:

Combine your totals for all subsections and Tribal Priority Totals from Appendix B:

Section 4 Totals:	Green:	Yellow:	Red:	Not Applicable:

Resources for Materials and Resource Conservation

NOTE: *The Standards of Ethical Conduct do not permit the U.S. EPA to endorse any private sector website, product or service. The U.S. EPA does not exercise any editorial control over the information you may find on non-EPA websites.*

Durability

- **HUD Guide: Durability by Design: A Guide for Residential Builders and Designers** – Guidance document with checklists for designers, builders and homeowners. http://www.huduser.org/portal/publications/durability_by_design.pdf
- **Durability: A Key Component of Green Building** – Article reprinted from Environmental Building News http://www.greenbiz.com/news/2005/12/18/durability-key-component-green-building

Building Reuse Information

- **EPA Lifecycle Construction Resource Guide** – Introduces lifecycle construction and discusses issues of deconstruction, materials reuse, design for deconstruction and lifecycle construction resources. http://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P1009HH1.txt
- **National Trust for Historic Preservation** – The National Trust for Historic Preservation provides leadership, education, advocacy and resources to save America's diverse historic places and revitalize our communities. www.preservationnation.org/
- **City of Los Angeles: Adaptive Reuse Handbook, Second Ed.** – The Adaptive Reuse Ordinance, first passed in 1999, incentivizes reuse of buildings. Includes the Los Angeles Conservancy's "Incentives for Preserving Historic Buildings." http://www.downtownla.com/pdfs/econ_residential/Adaptive-Reuse-Book-LA.pdf
- **Leadership in Energy and Environmental Design (LEED) for Core & Shell Green Building Rating System** – Covers base building elements such as structure, envelope and the heating, ventilating and air conditioning system. http://www.usgbc.org/leed/rating-systems/core-shell

Materials Design for Adaptation and Reuse Information

- **U.S. EPA/American Institute of Architects Lifecycle Building Challenge** – Online competition cataloging design and built practices to support design for adaptability, deconstruction and reuse. http://www.lifecyclebuilding.org
  - **Resources:** http://lifecyclebuilding.org/resources.php
  - **Rating Systems Language:** http://lifecyclebuilding.org/rating-systems.php
- **Building Materials Reuse Association** – Facilitates building deconstruction and the recycling/reuse of building materials. www.bmra.org/
- **CalRecycle** – Database of sources for recycled and salvaged building materials. http://www.calrecycle.ca.gov/Reuse/Links/Building.htm
- **Design for Reuse Primer** – Case studies on the reuse of building materials and building design to support reuse and adaptation. http://www.publicarchitecture.org/reuse/pdf/Primer-Online.pdf
- **Habitat for Humanity Restores** – Nonprofit home improvement stores and donation centers that sell new and gently used furniture, home accessories, building materials and appliances to the public at a discount prices. http://www.habitat.org/restores
- **Old to New: Design Guide, Salvaged Building Materials in New Construction** – Provides architects with practical information to encourage the use of salvaged building materials in typical new construction projects. http://www.rdhbe.com/database/files/sb4c3df2819dd71%281%29.pdf

Materials Management and Recycling Information

- **EPA Construction and Demolition (C&D) Materials** – Information on construction and demolition materials management. http://www.epa.gov/cdmaterials
- **GSA Construction Waste Management Database** – National database of C&D recycling service providers that can be searched by material type and zip code. http://www.wbdg.org/tools/cwm.php

- **CalRecycle C&D Debris Recycling** – Information on ordinances, specifications and the C&D recyclers database to find facilities that collect specific materials. http://www.calrecycle.ca.gov/ConDemo
- **WasteCap Resource Solutions: Construction & Demolition Specification: Construction Waste Management (CWM) Plan Materials** – Construction and demolition materials specifications and training. http://www.wastecap.org/resources/construction-demolition/
- **The Associated General Contractors of America Recycling Toolkit** – Resources for contractors to recycle or to use C&D materials in construction. Includes specifications and information on C&D recycler databases. http://www.agc.org/cs/recycling_toolkit
- **Construction Materials Recycling Association (CMRA)** – Organization promoting the environmentally sound recycling of C&D materials including concrete, asphalt, asphalt shingles, gypsum wallboard, wood and metals. http://www.cdrecycling.org/
  - Concrete: www.concreterecycling.org
  - Drywall: www.drywallrecycling.org
  - Shingles: www.shinglerecycling.org

Materials Selection

- **Pharos Project** – An online tool providing in-depth, transparent information about what is in building products with comparative scores on environmental and health impacts. http://www.pharosproject.net/
- **Declare** – A building products labeling system to certify products to meet the requirements of the Living Building Challenge. http://www.declareproducts.com
- **GreenSpec** – Green building product specifications and a listing of green building products with detailed product assessments. http://greenspec.buildinggreen.com/
- **Perkins + Will Transparency Lists** – Information from the architecture firm Perkins + Will providing information about environmental and human health impacts of materials, including a list of materials that have been found harmful to human health and/or the environment, asthma triggers and flame retardants. http://transparency.perkinswill.com/default.cshtml?url=/
- **Living Building Challenge Red List of Materials** – A list of materials, chemicals and elements known to pose serious risks to human health and the greater ecosystem that cannot be used in Living Building Projects. http://declareproducts.com/content/declare-and-living-building-challenge
- **Health Product Declarations** – A free, standard format for reporting product content and associated health information for building products and materials overseen by the non-profit Health Product Declaration Collaborative. http://hpdcollaborative.org

See Resources Sections 6 and 7 for energy efficient and water conserving materials

Certified Products Information

- **EPA Buy-Recycled / Comprehensive Procurement Guidelines (CPG) Program** – Provides guidelines on EPA-designated recycled content construction products used by federal facilities and on federally-funded projects. These guidelines can also be on non-federal projects.
  - **Construction Products** – http://www.epa.gov/epawaste/conserve/tools/cpg/products/construction.htm
  - **Landscaping Products** – http://www.epa.gov/epawaste/conserve/tools/cpg/products/landscaping.htm
- **EPA Using Recycled Industrial Materials in Buildings** – Informational sheet discussing the use of recycled industrial materials in buildings as an alternative to virgin materials and building products. http://www.**epa**.gov/osw/conserve/imr/pdfs/recy-bldg.pdf
- **BIFMA/E3 Sustainability Standard for Furniture** – Consensus-based method to evaluate the sustainable attributes of furniture products across the product lifespan. http://www.bifma.org/standards/
- **Cradle to Cradle Certification** – Criteria certifies Basic, Silver, Gold or Platinum levels for environmentally intelligent design. http://www.c2ccertified.com/

- **GREENGUARD Certification for Low-Emitting Products** – GREENGUARD Environmental Institute establishes performance-based standards to define goods with low chemical and particle emissions for use indoors, primarily building materials, interior furnishings, furniture, cleaning and maintenance products and electronic equipment. http://www.greenguard.org/
- **Forest Stewardship Council (FSC)** – A certification system that provides internationally recognized standard-setting, trademark assurance and accreditation services to companies, organizations, and communities interested in responsible forestry. http://www.fsc.org/
- **Sustainable Forestry Initiative (SFI)** – Certification program based on principles and measures that promote sustainable forest management and consider all forest values. http://www.sfiprogram.org/
- **Science Certification Systems (SCS) Certified Products Database** – Search for certified green building products by category, manufacturer, certification program or conformance. http://www.scscertified.com/products/
- **International Code Council's (ICC) Evaluation Services** – Provides interpretations and acceptance of new products that occur in the marketplace. www.icc-es.org/
- **NSF/ANSI 140 Sustainability Assessment for Carpet** – Consensus-based standard to evaluate and certify sustainability of carpet products across their entire product life cycle. http://www.nsf.org/services/by-industry/sustainability-environment/sustainability-standards-protocols/carpet
- **NSF/ANSI 226 Sustainability Assessment for Commercial Furnishings Fabric** – Consensus-based standard to evaluate and certify sustainability of commercial furnishings fabric products across their entire product life cycle. http://www.nsf.org/services/by-industry/sustainability-environment/sustainability-standards-protocols/furnishings-fabric
- **NSF/ANSI 342 Sustainability Assessment for Wall Coverings** – Consensus-based standard by which to evaluate and certify sustainability of wall coverings products across their entire product life cycle. http://www.nsf.org/services/by-industry/sustainability-environment/sustainability-standards-protocols/wallcoverings
- **SCS Recycled and Material Content** – SCS provides material content certification assessment services to manufacturers offering products made from recycled or biodegradable materials as well as Certified Biodegradable, No Added Formaldehyde and No Added Urea Formaldehyde products. http://www.scscertified.com/products/
- **Alameda County, CA, Waste Management Authority Green Building Materials Resource Guide** – Building materials directory. http://www.stopwaste.org/docs/Resource_Guide.pdf
- **California Integrated Waste Management Board** – Database for searching Recycled Content Building Products by product type. http://www.calrecycle.ca.gov/RCP/Product.asp?VW=CAT&CATID=257
- **UL 100 Sustainability Requirements for Gypsum Board and Panels** – Consensus-based standard to evaluate and certify sustainability of gypsum board and panels across their entire product life cycle. http://www.ul.com/global/eng/pages/solutions/standards/accessstandards/catalogofstandards/standard/?id=100_1

Straw Bale Wall Information

- **Straw Bale Construction Appendix for 2015 International Residential Code** – http://www.ecobuildnetwork.org/images/PDFfiles/strawbale_code_support/IRC_StrawbaleConstructionAppendix_Approved_10.4.13r3.pdf
- **Earthen Plastered Wall Passes ASTM E-119** – 1-hour fire resistance test of a non-load bearing straw bale wall. http://www.dcat.net/about_dcat/current/Non-Bearing_Clay_Wall.pdf
- **Cement Stucco Wall Passes ASTM E-119-05** – 2-hour fire resistance test of a non-load bearing wheat straw bale wall. http://www.dcat.net/about_dcat/current/Cement_Stucco_Wall.pdf
- **City of Boulder, CO Ordinance 5891** – Concerns alternative building materials, including adobe and straw bale construction and recycled lumber. http://www.dcat.net/about_dcat/current/Boulder_Straw_Bale_Code.pdf
- **Ecological Building Network Straw Bale Construction Code** – Supporting documents and research information on straw bale construction code issues. http://www.ecobuildnetwork.org/projects/straw-bale-code-supporting-documents

Earthen Building Information

- **Ecological Building Network Earthen Building Resources** – Covers resources on adobe, cob, sprayed earth, bags/tubes/tires, plaster and other earthen building resources. http://www.ecobuildnetwork.org/library/building-materials/earth
- **ASTM Standard Guide for Design of Earthen Wall Building Systems ASTM E2392/E2392M -** http://www.astm.org/Standards/E2392.htm
- **Sustainable Sources: Earth Materials** – Information and guidelines on building with stone, brick, soils, caliche and soil block and rammed earth. http://earth.sustainablesources.com
- **State of New Mexico 2009 Earthen Building Materials Code** – http://www.nmcpr.state.nm.us/nmac/parts/title14/14.007.0004.htm
- **The Earthbuilders' Guild** – Information on preserving and promoting the age old building methods of adobe, rammed earth and compressed earth block construction. http://www.theearthbuildersguild.com
- **Earthbuilding** – Links to global organizations working on earthen building. http://www.earthbuilding.info/gb/07_links/07-2_links_resources.htm

American Society for Testing and Materials Committee Standards – Recycled Industrial Materials

- **ASTM Committee C01 Cement** – Develops specifications, test methods, recommended practices, and terminology for hydraulic cements including portland, natural, pozzolanic, masonry, slag cements and modifications and combinations during manufacture of the cements; investigates the properties of hydraulic cements and promotes the improvement and uniform testing these materials. http://www.astm.org/COMMIT/COMMITTEE/C01.htm
- **ASTM Committee C09 Concrete and Concrete Aggregates** – Has jurisdiction over 160 standards published in the Annual Book of ASTM Standards, Volume 04.02. These standards, together with the standards developed by ASTM Committee C01 on Cement and committees of the American Concrete Institute, are essential to the construction of civil infrastructure. http://www.astm.org/COMMIT/COMMITTEE/C09.htm
- **ASTM Committee C11 Gypsum and Related Building Materials and Systems** – Develops specifications, test methods and applications in the gypsum and related product industries. http://www.astm.org/COMMIT/COMMITTEE/C11.htm?L+C11store
- **ASTM Committee D04 Road and Paving Materials** – Has jurisdiction over 200 standards, published in the Annual Book of ASTM Standards, Volume 4. These standards are essential to the construction and maintenance of highways and other transportation construction. http://www.astm.org/COMMIT/COMMITTEE/D04.htm
- **ASTM Committee C12 Mortars and Grouts for Unit Masonry** – Has jurisdiction over 15 standards, published in the Annual Book of ASTM Standards, Volume 04.05. These standards are essential to the industry of mortar used with masonry units, including burned clay, shale, sand-lime, concrete and stone. http://www.astm.org/COMMIT/COMMITTEE/C12.htm
- **ASTM Committee E50 Environmental Assessment, Risk Management and Corrective Action** – Has jurisdiction over 35 standards published in the Annual Book of ASTM Standards, Volume 11.04. These standards are essential to corrective action, pollution prevention and beneficial use. http://www.astm.org/COMMIT/COMMITTEE/E50.htm
- **ASTM Committee D34 Waste Management** – Has jurisdiction over 125 standards published in the Annual Book of ASTM Standards, Volume 11.04. These standards are essential to all aspects addressing the generation, storage, transportation, treatment, recovery and disposal of wastes generated from industrial, commercial, residential and institutional sources. http://www.astm.org/COMMIT/COMMITTEE/D34.htm

Hazardous Materials: Asbestos, Mercury, Lead Based Paint, Polychlorinated Biphenyls (PCBs) and Treated Lumber Information

- **EPA Asbestos Information** – Asbestos is a mineral fiber that was used in a variety of building construction materials for insulation and as a fire-retardant (roofing shingles, ceiling and floor tiles, paper products and asbestos cement products). When asbestos-containing materials are damaged or disturbed by repair, remodeling or demolition

activities, microscopic fibers can be inhaled into the lungs, where they can cause significant health problems. EPA rules and regulations on asbestos. http://www.epa.gov/opptintr/web/asbestos/index.html

- **EPA Recommended Management and Disposal Options for Mercury-Containing Products** – Mercury can be found in many residential building materials, including: airflow/fan limit controls, appliances, barometers, gas flow or gas pressure regulators, heating and cooling systems, Honeywell heat generators/mercury seal generators, lamps and lightbulbs, latex paint, pesticides, plumbing, security systems, thermostats and tilt switches. Mercury-containing products should be carefully managed as hazardous waste and removed prior to building deconstruction or demolition. http://www.epa.gov/mercury/mgmt_options.html#t1c1
- **EPA Before You Tear It Down, Get the Mercury Out** – Recommended management practices for pre-demolition removal of mercury-containing devices from residential buildings. http://www.epa.gov/mercury/pdfs/EPA-905-F-11-008.pdf
- **EPA Lead Based Paint Renovation, Repair and Painting Program** – Requires firms performing renovation, repair, and painting projects that disturb lead-based paint in homes, child care facilities and pre-schools built before 1978 have their firm certified by EPA (or an EPA authorized state), use certified renovators who are trained by EPA-approved training providers and follow lead-safe work practices. http://www2.epa.gov/lead/renovation-repair-and-painting-program
- **EPA PCBs in Caulk in Older Buildings Information** – Caulk containing potentially harmful polychlorinated biphenyls (PCBs) was used in many buildings, including schools, in the 1950s through the 1970s. Provides information on minimizing exposure, testing and recommendations for renovation contractors. http://www.epa.gov/pcbsincaulk/
- **EPA Treated Wood Information** – Provides information on treated lumber risks, regulation and alternatives. http://www2.epa.gov/region8/treated-wood

Air Quality Performance Information

- **EPA Indoor airPLUS** – Helps builders meet the growing consumer preference for homes with improved indoor air quality. Construction specifications focus on seven areas, including the careful selection of and installation of moisture control systems; heating, ventilating and air-conditioning systems; combustion-venting systems; radon resistant construction and low-emitting building materials. http://epa.gov/indoorairplus/index.html
- **EPA Building Air Quality: A Guide for Building Owners and Facility Managers** – Provides practical suggestions on preventing, identifying and resolving indoor air quality problems in public and commercial buildings. http://www.epa.gov/iaq/largebldgs/pdf_files/iaq.pdf
- **EPA Healthy Indoor Environmental Protocols for Home Energy Upgrades** – Guidance to protect indoor air quality while installing home energy upgrades. http://www.epa.gov/iaq/homes/retrofits.html
- **EPA The Inside Story: A Guide to Indoor Air Quality** – A booklet on reducing the risk from existing sources of indoor air pollution and to prevent new problems from occurring. http://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=000003M1.txt
- **Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) Indoor Air Quality Guidelines for Occupied Buildings Under Construction** – Trade association that publishes voluntary technical standards and manuals that address many areas of the sheet metal industry. Requires membership. http://www.smacna.org/
- **American Society of Heating and Air-Conditioning Engineers (ASHRAE)** – ASHRAE advances heat, ventilation, air conditioning and refrigeration research, standards writing, publishing and continuing education. http://www.ashrae.org
- **Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)** – Voluntary technical standards and manuals on ventilation systems. http://www.smacna.org/
- **The American Nonsmokers' Rights Foundation** – Contains a database of U.S. tobacco control laws and ordinances. www.no-smoke.org
- **EPA Certified Wood Stoves** – Certified wood stove information and product list to promote improved safety and efficiency. http://www.epa.gov/burnwise/woodstoves.html

Reuse, Recycling, Compost and Disposal Space Allocation

- **CalRecycle Recycling Space Allocation Guide and Ordinances** – Provides guidance on recycling collection site allocation. http://www.calrecycle.ca.gov/lgcentral/Library/LocalDocs/Policy.htm

Green Manufactured Housing Information

- **EPA Indoor airPLUS Certification** – Information, construction specifications and technical resources to protect indoor air quality that can be applied to manufactured housing. http://www.epa.gov/indoorairplus/index.html
- **HUD Manufactured Home Consumer Guide** – Information on manufactured housing, relocation and financing. http://portal.hud.gov/hudportal/HUD?src=/program_offices/housing/ramh/mhs/prod01
- **Manufactured Home Code** – Manufactured Home Construction and Safety Standards (HUD Code) covers manufactured homes and the homes display a red certification label on the exterior of each transportable section. http://portal.hud.gov/hudportal/HUD?src=/hudprograms/mhcss
- **HUD Manufactured Home Installation Regulations** – HUD manufactured home installation regulations. http://portal.hud.gov/hudportal/HUD?src=/program_offices/housing/rmra/mhs/mhip
- **HUD Manufactured Home Consumer Complaints** – Provides State Administrative Agency and HUD contacts for consumer manufactured housing complaints. http://www.hud.gov/complaints/manhousing.cfm
- **ENERGY STAR Qualified Manufactured Homes** – Guidance on producing and installing ENERGY STAR Manufactured Homes for production plants, retailers, installers and contractors. http://www.energystar.gov/index.cfm?c=bldrs_lenders_raters.pt_builder_manufactured
- **Eco-Rated Green Engineered Home Certification Program** – An energy and environmental efficient certification program designed for engineered factory built homes developed by the Northwest Energy Efficient Manufactured Home Program. http://eco-rated.com/Site_2/eco-rated.html
- **Northwest Energy Efficient Manufactured Housing Program** – Residential energy efficiency program focusing on manufactured housing in the Northwest that has certified over 200,000 homes. NEEM/ENERGY STAR homes are certified by the State Energy Offices where they are manufactured in Idaho, Washington, Oregon or California. http://northwestenergyworks.com/NEEM.html
- **Bonneville Power Administration Weatherization Specifications** – Best practices apply to existing residential (retrofit) weatherization for electrically heated single family and manufactured homes. http://www.bpa.gov/energy/n/residential/Weatherization/FINAL_BPA_Wx_Specs.pdf
- **Department of Energy Energy-Efficient Manufactured Homes** – Information on manufactured home energy efficiency and renewable energy design, remodel and retrofit opportunities. http://energy.gov/energysaver/articles/energy-efficient-manufactured-homes
- **Zero Energy Manufactured Homes Information** – The Zero-Energy Manufactured Home program demonstrates, evaluates and promotes innovative energy-saving technologies for use in HUD-code housing. http://www.ba-pirc.org/pubs/pdf/HomeEnergy07.pdf

The Potawot Health Village in Arcata, California, features a 20-acre Conservation Easement, native plants and a wellness garden.
Photo: United Indian Health Services

SECTION 5: ASSESSMENT – HUMAN HEALTH: RADON, MOLD AND OTHER HAZARDOUS POLLUTANTS

Harmful pollutants inside our homes and buildings can damage occupant health. The indoor environment is where community members may spend 50 – 90% of their time. Indoor environmental hazards can cause both immediate and long-term health problems for occupants.

Though the indoor environment may seem like a refuge from outdoor air pollution, research has shown that air within homes and buildings can be more polluted than the outdoor air in even the largest and most industrialized cities. Lead-based paint, asbestos and cleaning supplies can also pollute buildings. Hazardous materials and emissions can enter people's bodies in many ways: breathing, touching, eating or drinking.

Building codes can help prevent environmental health problems for all occupants, especially the most vulnerable members of the community – children, pregnant women, elders and those with preexisting health conditions.

Children, while developing in the womb or growing up into young adults are especially vulnerable to the harmful effects of environmental toxics because:

- Children often crawl and play close to the ground, making them more likely to contact dirt and dust, which can include environmental hazards
- Children often put their hands, toys and other items into their mouths
- Children eat, breathe and drink more relative to their body mass than adults do
- Children's natural defenses are less developed

Key Terms:

- **Radon:** A cancer-causing, invisible, radioactive gas that comes from the natural breakdown of uranium in soil, rock and water. Radon is a human health concern in buildings because it causes lung cancer and is found in a wide range of areas.
- **Molds:** Molds are living organisms that belong to the kingdom Fungi. Molds produce spores that float in the air, land on damp surfaces, and grow. Inhaling or touching molds can cause hay fever-type symptoms such as sneezing, runny nose, red eyes, skin rashes and asthma attacks.

Key Questions:

- Is testing for radon - a radioactive gas that can seep into buildings - being conducted on homes and schools?
- Are buildings designed and maintained to reduce mold and moisture impacts?
- Are building materials free of toxic substances such as lead-based paint, formaldehyde and volatile organic compounds?

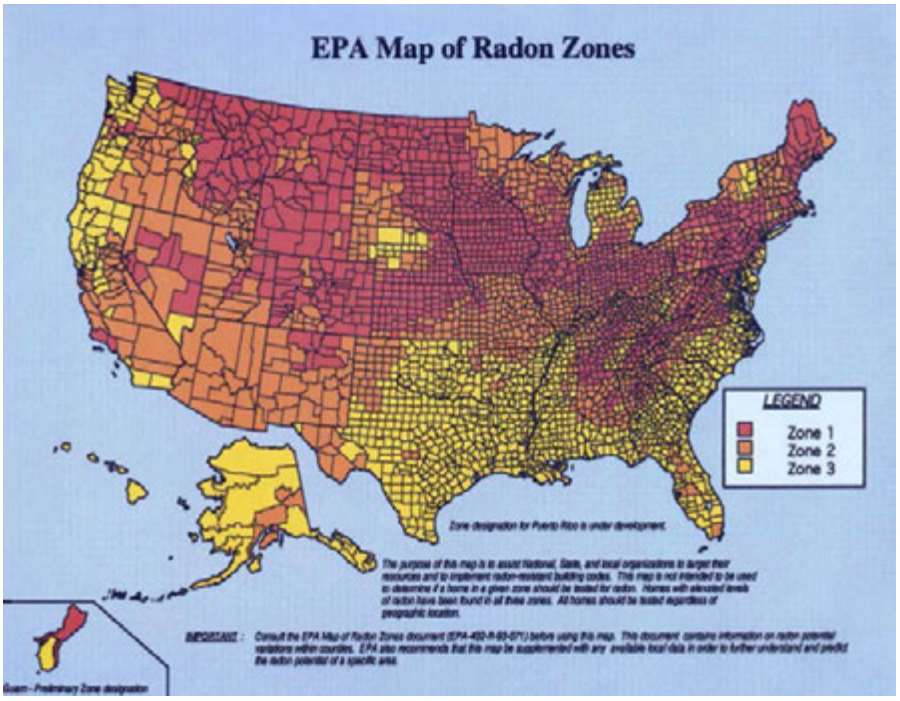
5.1. Radon Resistant Building

Radon is an invisible radioactive gas resulting from the breakdown of in-ground trace uranium, and is found in many homes and buildings throughout the U.S. The U.S. Surgeon General and EPA estimate exposure to radon causes more than 21,000 lung cancer deaths each year. Only smoking causes more lung cancer deaths.

> **Radon Risk is Significant on Tribal Lands.** Radon has been found in elevated levels in every state. No area of our country is risk-free. Nationwide, 1 in 15 homes test above the action level established by EPA of 4.0 picocuries per liter of air (pCi/L). Results on the Spokane Indian Reservation are even higher at almost 1 in 3 homes.
>
> *Source: Twa'le Abrahason-Swan of the Spokane Tribe of Indians, Air Quality Program. Written Testimony Submitted April 3, 2014, to the U.S. House of Representatives Appropriations Committee*

Radon can be reduced in buildings through cost effective radon resistant building practices. The Surgeon General and EPA recommend testing for radon and reducing radon in homes that have high levels. Homes with a radon level confirmed to be 4 pCi/L or higher should be fixed. Radon levels less than 4 pCi/L still pose a risk, and in many cases may be reduced.

Some radon reduction systems can reduce radon levels in homes by up to 99%. New home radon resistant building requirement costs are minimal, and more than 1.5 million homes have been built since 1990 using radon-resistant techniques. Most homes can be fixed for about the same cost as other common home repairs and maintaining a radon reduction system takes little effort.



According to the Center for Disease Control, American Indian/Alaska Natives have a higher prevalence of smoking than most other racial/ethnic groups in the United States, making cigarette smoking plus exposure to radon gas a serious problem to the health of Tribal populations.

This radon map and additional radon maps are available at: http://www.epa.gov/radon/zonemap.html

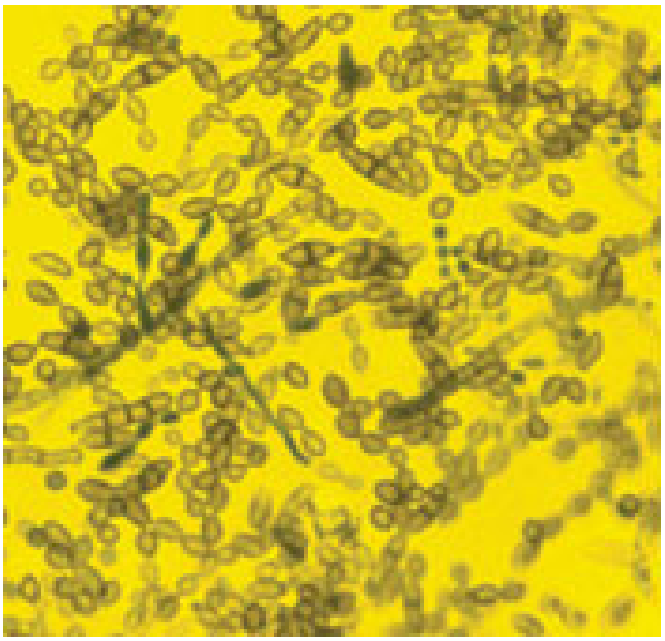
Key Strategies:

- Test for Radon – the U.S. Surgeon General and U.S. EPA recommend that all homes and schools test for radon.
- Provide residents with the U.S. EPA Citizen's Guide to Radon, encourage them to test for radon.
- If necessary, use certified contractors to fix homes with high radon levels.
- Require radon resistant new construction through building code requirements.

5.2. Mold

Molds are microscopic fungi that live and grow on organic (carbon-containing) material. They reproduce by releasing tiny spores into the air. Mold may begin growing indoors if mold spores come into contact with a moist surface, such as on drywall that has been exposed to a plumbing leak or around windows where moisture condenses.

All molds have the potential to affect health. Molds produce allergens, irritants and, in some cases, toxins that may cause serious health problems in humans. The types and severity of symptoms depend, in part, on the types of mold, the extent of exposure, the age of the individual and existing sensitivities or allergies. **EPA has detailed information on how to clean up mold and what to wear when cleaning moldy areas.** (EPA's Brief Guide to Mold, Moisture and Your Home: http://www.epa.gov/mold/moldguide.html)



Magnified mold spores.

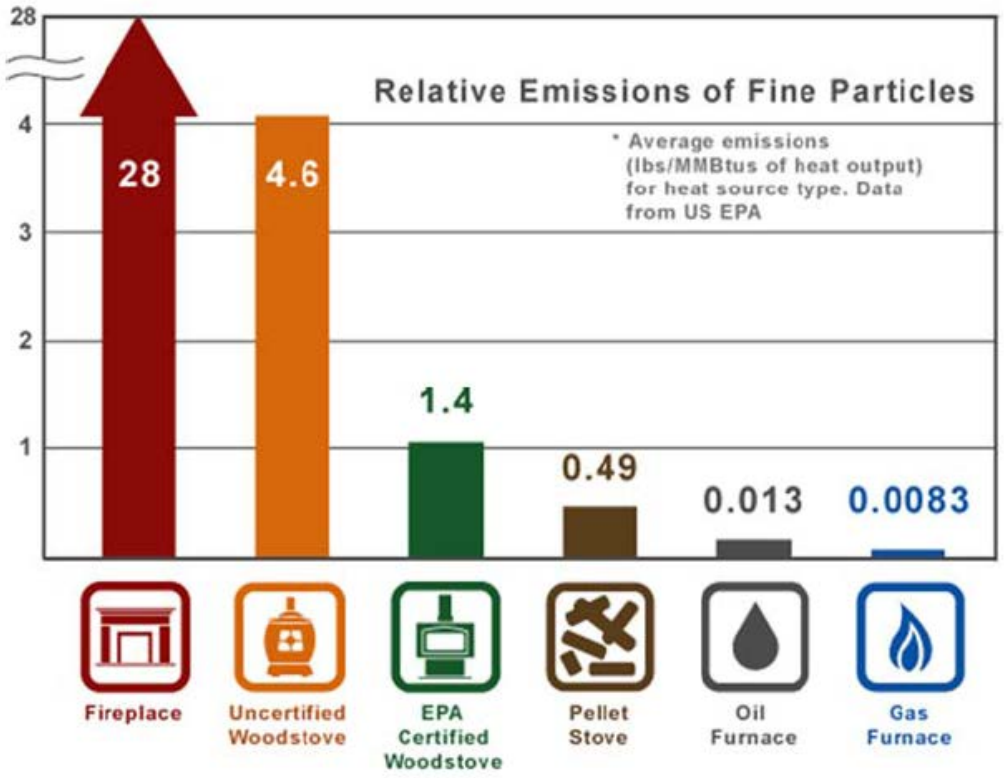
Hidden mold growing behind wallpaper.

Key Strategies:

- Avoid exposure to mold (see discussions: What to Wear When Cleaning Moldy Areas and Hidden Mold).
- Repair leaks and clean and repair roof gutters regularly.
- Make sure the ground slopes away from the building foundation, so that water does not enter or collect around the foundation.
- Keep air conditioning drip pans clean and the drain lines unobstructed and flowing properly.
- Vent appliances that produce moisture, such as clothes dryers, stoves, and kerosene heaters to the outside where possible. (Combustion appliances such as stoves and kerosene heaters produce water vapor and will increase the humidity unless vented to the outside.)
- Cover cold surfaces, such as cold water pipes, with insulation. Scrub mold off hard surfaces with detergent and water, and dry completely.
- Absorbent or porous materials, such as ceiling tiles and carpet, may have to be thrown away if they become moldy.
- It is important to dry water-damaged areas and items within 24-48 hours to prevent mold growth.

5.3 Particulate Matter, Vapor and Gases - Stoves, Heaters, Fireplaces, and Chimneys

In addition to environmental tobacco smoke, unvented kerosene and gas space heaters, woodstoves, fireplaces and gas stoves can cause indoor air pollution. The major pollutants released are carbon monoxide, nitrogen dioxide and particles. Unvented kerosene heaters may also generate acid aerosols.



Source: U.S. EPA, "Consumers: Energy Efficiency and Wood Burning Stoves and Fireplaces," http://epa.gov/burnwise/energyefficiency.html

Key Strategies:

- Never use a gas stove to heat your home
- Require properly sized cleaner-burning heating appliances such as: electric furnaces, natural gas or propane stoves or EPA-certified wood and pellet stoves
- While a space heater is in use, open a door from the room where the heater is located to the rest of the house and open a window slightly
- Install and use exhaust fans over gas cooking stoves and ranges and keep the burners properly adjusted
- Have central air handling systems, including furnaces, flues, and chimneys, inspected annually and promptly repair cracks or damaged parts
- Require smoke and carbon monoxide detectors

5.4 Non-Toxic and Low-Emitting Materials

Choosing non-toxic and low-emitting building materials, finishes and furnishings is a critical healthy home practice. For example, materials and products containing lead, asbestos and mercury should be avoided. Specific standards on low-emitting materials that can be referenced in procurement documents and verified by personnel overseeing the construction process are provided below in the Checklist and Resource sections.

Case Study: Spokane Tribe

The Spokane Tribe, located on more than 157,000 acres northwest of Spokane, Washington, was interested in adopting building codes to support the implementation of a HUD Sustainable Communities grants. Specific issues the Tribe wanted their codes to address included:

- Radionuclides and radon contamination of water and air
- Mold
- Energy efficiency
- Quality and durability of construction

An EPA contractor supported a two-day Building Codes Workshop with 18 government and community members. The Workshop included facilitated dialogue, education, goal setting and consensus building followed by strategic planning with the Tribe's HUD Community Challenge Grant Team. The process led to a draft codes package including a cultural code. The proposed codes package included:

- 2012 ICC Residential, Non-Residential and Green Codes (with amendments to better serve the Tribe)
- Evergreen Sustainable Development Standard (with amendments to better serve the Tribe)
- Radon Standard
- Greywater Code
- Tribal overlay of additional sustainability goals and cultural values
- Owner builder package highlighting minimum health and safety standards, voluntary code elements and educational resources.

Spokane Indian Housing Authority Community Pavillion, *Photo: Kari Hutchison*

Tribal Involvement: Representatives from the Tribe's HUD Community Challenge Grant Team, Planning Department, Housing Authority, Environmental Department, Health and Human Services, Emergency Services, Community Members.

Non-Tribal Involvement: U.S. EPA Region 9; HUD; Development Center for Appropriate Technology, GreenWeaver Inc.

Code Incentive Examples

General	Targeted – Healthy Building Techniques
• Expedited permitting process • Expedited easement approval process • Permit fee waivers or reductions • Reduced inspections	• Incentives tied to meeting standards for low-emitting materials, finishes and/or furnishings

Questions to Assess Healthy Building Techniques

5.1. Radon Resistant Building Techniques

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Do codes or policies require homes and schools to be tested for radon? *Potential Tools and Techniques:* • *National Radon Program Services Test Kit – Kansas State University* • *State Test Kit Programs* • *EPA Managing Radon in Schools Fact Sheet*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Are existing homes with radon levels of 4 pCi/L or more fixed by a qualified radon professional? *Potential Tools and Techniques:* • *EPA Consumer's Guide to Radon Reduction* • *Use State or National Radon Program contacts to find qualified radon professionals.*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do new homes or renovated homes require radon resistant building techniques? *Potential Tools and Techniques:* • *Radon Resistant Building Codes and Standards* o *EPA Indoor AirPLUS Radon Resistant Construction Requirements* o *State Radon Resistant New Construction Codes* o *ANSI-AARST standard of practice for Reducing Radon in New Construction of 1&2 Family Dwellings and Townhouses (CCAH-2013).*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Section 5.1 Totals:	Green:	Yellow:	Red:	Not Applicable:

5.2. Mold Resistant Building Techniques

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Do codes or policies address moisture control and mold prevention for new or renovated homes? *Potential Tools and Techniques:* • *Ensure adequate ventilation of homes, especially bathrooms, laundry rooms* • *Use appropriate building materials to reduce moisture and prevent leaks* • *Educate occupants on moisture control and thoroughly cleaning and drying water damaged areas and items within 24-48 hours to prevent mold*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do construction requirements mitigate moisture damage? *Potential Tools and Techniques:* • *EPA Indoor airPLUS* • *Ordinance requiring construction plans that include protecting absorptive materials from moisture damage during construction and installation*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Do new or renovated homes require mold resistant building techniques? *Potential Tools and Techniques:* • *EPA Indoor airPLUS* • *Air barriers and housewraps* • *Capillary breaks below concrete slabs and in crawlspaces* • *Building continuous drainage planes behind exterior cladding, properly flashed to foundation* • *Damp or water-proof foundation walls* • *Insulated basement and foundation walls* • *Window and door openings and roof or wall intersections fully flashed*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Section 5.2 Totals:	Green:	Yellow:	Red:	Not Applicable:

5.3. Particulate Matter, Vapor and Gas Reduction Techniques

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Do codes or policies require the installation of Carbon Monoxide (CO) and smoke detectors in homes? *Potential Tools and Techniques:* • *EPA Indoor airPLUS* • *Require installation and maintenance of CO detectors* • *Ensure proper ventilation of fuel-burning devices* • *Educate occupants*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Are smoking bans in place in public housing or commercial buildings to eliminate smoke from indoor air? *Potential Tools and Techniques:* • *Smoking bans inside buildings* • *Minimum setbacks of designated smoking areas from the building entrance*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do codes or policies minimize building occupants' exposure to particulate matter, VOCs and other pollutants from outdoor air pollution created by vehicles and industry? *Potential Tools and Techniques:* • *EPA Indoor airPLUS* • *Construct buildings away from sources of outdoor air pollution* • *Locate ventilation inputs away from parking lots* • *Adequately seal off garages* • *Use best available ventilation technology* • *Educate occupants on maintenance of ventilation filters*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Are there requirements for controlling indoor particulate matter? *Potential Tools and Techniques:* • *EPA Indoor airPLUS* • *Minimum particulate matter filter ratings required* • *Ensure entryway track-off systems* • *Use non-toxic building and maintenance materials, avoid flammable materials* • *Educate occupants on non-toxic maintenance options and integrated pest management*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Section 5.3 Totals:	Green:	Yellow:	Red:	Not Applicable:

5.4. Asbestos and Lead Free Building Techniques

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Do codes or policies inhibit the use of building materials that contain asbestos for new or renovated homes? *Potential Tools and Techniques:* • *EPA Indoor airPLUS* • *Use asbestos-free materials* • *Asbestos remediation* • *Educate occupants on how to safely handle materials with asbestos (insulation, lagging)*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do codes or policies inhibit the use of building materials that contain lead for new or renovated homes? *Potential Tools and Techniques:* • *EPA Indoor airPLUS* • *Use lead-free paint* • *Remediate existing lead paint* • *Educate occupants on how to safely handle chipped paint*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
For repair, renovation and/or demolition of existing buildings, are policies in place or planned to address proper precautions for testing, handling, and disposal of asbestos, lead-based paint, polychlorinated biphenyls (PCBs), mercury and treated lumber? *Potential Tools and Techniques:* • *EPA asbestos website* • *EPA lead based paint Renovation, Repair and Painting Program (Training and Contractor Certification)* • *EPA Recommended Management and Disposal Options for Mercury-Containing Products* • *EPA polychlorinated biphenyls (PCBs) in caulk website* • *EPA treated lumber website*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Section 5.4 Totals:	Green:	Yellow:	Red:	Not Applicable:

5.5. Low-Emitting Material Building Techniques

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Do codes or policies encourage the use of low-emitting materials for floor coverings? *Potential Tools and Techniques:* • *EPA Indoor airPLUS* • *Minimum floor covering emission requirements (as determined by standards, such as CA/DHS/EHLB/R-174)*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Do codes or policies encourage the use of low-emitting composite materials? *Potential Tools and Techniques:* • *EPA Indoor airPLUS* • *Minimum composite wood and agrifiber product emission requirements (as determined by standards, such as California Air Resource Board's regulation, Airborne Toxic Control Measure to Reduce Formaldehyde Emissions for Composite Wood Products or CA/DHS/EHLB/R-174)* • *Certified low-formaldehyde pressed wood materials used*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do codes or policies encourage the use of low-emitting materials for ceiling and wall systems? *Potential Tools and Techniques:* • *EPA Indoor airPLUS* • *Minimum ceiling and wall system emission requirements (as determined by standards, such as CA/DHS/EHLB/R-174).*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Are no or low-emitting (low VOC) materials required or encouraged for adhesives, sealants, paints, coatings, cleaners and aerosols? *Potential Tools and Techniques:* • *EPA Indoor AirPLUS* • *Low or no emitting adhesives, sealant, paints, and coatings emission requirements (as determined by standards, such as California 01350 (California Department of Homeland Security / Environmental Health Laboratory Branch-R-174), Green Seal Standard GS-11, South Coast Air Quality Management District (SCAQMD) Rule 1113, or Green Seal Standard GC-36)* • *Carpet, adhesives, and cushion qualify for Carpet and Rug Institute (CRI) Green Label Plus or Green Label testing program* • *Green Cleaning Products and Practices*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Are building designs that minimizes pest exposure encouraged? *Potential Tools and Techniques:* • *Foundation joints and penetrations sealed, including air-tight sump covers* • *Corrosion-proof rodent or bird screens installed at all openings that cannot be fully sealed (e.g., attic vents).*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Do codes or policies encourage the use of low-emitting materials for office furniture systems and seating? *Potential Tools and Techniques:* • *EPA Indoor airPLUS* • *Minimum office furniture system and seating emission requirements (as determined by standards, such as ANSI/Business and Institutional Furniture Manufacturer's Association (BIFMA) Standard M7.1).*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Section 5.5 Totals:	Green:	Yellow:	Red:	Not Applicable:

Combine your totals for all subsections and Tribal Priority Totals from Appendix B:

Section 5 Totals:	Green:	Yellow:	Red:	Not Applicable:

Resources: Healthy Building

NOTE: *The Standards of Ethical Conduct do not permit the U.S. EPA to endorse any private sector website, product or service. The U.S. EPA does not exercise any editorial control over the information you may find on non-EPA websites.*

Healthy Building (General)

- **Centers for Disease Control (CDC) Healthy Homes –** Healthy homes publications, tools and training promoting holistic approaches to healthy home siting, design, construction, renovation and maintenance. http://www.cdc.gov/healthyhomes/
- **CDC/HUD – National Healthy Housing Reference Manual –** A reference document for public health and housing professionals. http://www.cdc.gov/nceh/publications/books/housing/cha02.htm
- **National Center for Healthy Housing** - A nonprofit organization dedicated to establishing healthy, green and safe homes through research, education and policy efforts. http://www.nchh.org/
- **Healthy Building Network –** A nonprofit organization working to reduce hazardous chemicals in building products as a means of improving human health and the environment. http://www.healthybuilding.net

Indoor Air Quality (General)

- **EPA Indoor Air Quality Tribal Partners Program** – A wide range of Indoor Air Quality information and resources for tribes. http://www.epa.gov/iaqtribal/

- **Indoor Air Quality in Tribal Communities (IAQTC) –** The Institute for Tribal Environmental Professionals (ITEP) was created to act as a catalyst among tribal governments in support of environmental protection of Native American natural resources. http://www4.nau.edu/itep/iaqtc/
- **EPA Tribal Air Home –** Website designed to strengthen EPA and tribal air quality programs in Indian country. Resources include funding information, school air toxics information, contact information for EPA Tribal Air Coordinators and announcements. http://www.epa.gov/air/tribal/
- **EPA Indoor airPLUS –** Available construction specifications cover the selection of and installation of moisture control systems; heating, ventilating, and air-conditioning systems; combustion-venting systems; radon resistant construction and low-emitting building materials. http://epa.gov/indoorairplus/index.html
- **EPA Indoor Air Quality (IAQ) Website –** Resources, publications and EPA activities related to indoor air quality. http://www.epa.gov/iaq
- **An Introduction to Indoor Air Quality –** Links and general information about known indoor environmental pollutants, their sources and related health problems. http://www.epa.gov/iaq/ia-intro.html
- **The Inside Story: A Guide to Indoor Air Quality –** A comprehensive publication, coauthored by EPA and the Consumer Product Safety Commission, describing sources of air pollution in the home and office and specific measures for reducing radon, household chemicals, biological contaminants, carbon monoxide, formaldehyde, pesticides, asbestos and lead. http://www.epa.gov/iaq/pubs/insidestory.html
- **Residential Air Cleaners (Second Edition) –** This publication focuses on air cleaners for residential use. It should be particularly useful to residential housing design professionals, public health officials and indoor air quality professionals. http://www.epa.gov/iaq/pubs/residair.html
- **Healthy Buildings, Healthy People: A Vision for the 21st Century –** This document lays out a blueprint for agencies and individuals focusing on indoor environmental quality and related health impacts. http://www.epa.gov/iaq/pubs/hbhp.html
- **IAQ Building Education and Assessment Model (I-BEAM) –** Tool designed for use by building professionals and others interested in indoor air quality in commercial buildings. I-BEAM updates and expands EPA's Building Air Quality guidance (http://www.epa.gov/iaq/largebldgs/baq_page.htm) and provides comprehensive state-of-the-art guidance for managing IAQ in commercial buildings. http://www.epa.gov/iaq/largebldgs/i-beam/index.htm
- **ASHRAE Indoor Air Quality Guide: Best Practices for Design, Construction and Commissioning –** Resource created by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), EPA and partners to provide guidance on designing, constructing and operating buildings using best practices for indoor air quality. https://www.ashrae.org/resources--publications/bookstore/indoor-air-quality-guide
- **ASHRAE Indoor Air Quality Resources –** Contains American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAEs) indoor air quality resources, including indoor air quality trainings and publications. https://www.ashrae.org/resources--publications/bookstore/iaq-resources
- **ASHRAE Free Resources –** Lists all ASHRAE resources that are free to the public, including publications, software and resources for consumers. https://www.ashrae.org/resources--publications/free-resources#everyone
- **EPA AirData –** Many indoor air pollutants have outdoor sources such as near-roadway pollution, wildfires and pollen. Access location-specific monitored air quality data for the entire United States from EPA's Air Quality System Data Mart. http://www.epa.gov/airdata/
- **EPA National Emissions Inventory –** The National Emissions Inventory (NEI) is a comprehensive and detailed estimate of air emissions of both Criteria and Hazardous air pollutants from all air emissions sources. http://www.epa.gov/ttn/chief/net/2008inventory.html

Low-Emitting Materials and Products Information

- **EPA Significant New Alternatives Policy (SNAP) Program –** EPA's program to evaluate and regulate substitutes for the ozone-depleting chemicals that are being phased out under the Clean Air Act, including refrigerants, air conditioning, cleaning solvents and adhesives. http://www.epa.gov/ozone/snap/index.html
- **California Section 01350 – Low Emitting Materials Specifications –** Specifications covering environmental and public health considerations for building projects. It establishes goals and provides an overview of special environmental

requirements, such as guidelines for energy, materials, water efficiency, indoor air quality and nontoxic performance standards for cleaning and maintenance products. http://www.calrecycle.ca.gov/GreenBuilding/Specs/Section01350/

- **South Coast Air Quality Management District (SCAQMD) Rule 1113** – Architectural coatings rule. http://www.aqmd.gov/prdas/Coatings/rule_1113.htm
- **Green Seal** – Certifies environmentally preferable products including electric chillers, paints and coatings, windows and doors, floor finishes and strippers, institutional/industrial cleaners, etc. http://www.greenseal.org/
  - **Green Seal Standard GS-11** – Paints and coatings standardhttp://www.greenseal.org/GreenBusiness/Standards.aspx?vid=ViewStandardDetail&cid=0&sid=6
  - **Green Seal Standard GC-36** – Adhesives for commercial use standard. http://www.greenseal.org/GreenBusiness/Standards.aspx?vid=ViewStandardDetail&cid=0&sid=22
- **San Francisco Department of the Environment Green Cleaning** – Green cleaning product lists and multi-lingual videos and training materials on cleaning techniques. http://www.sfenvironment.org/article/business/custodial-green-cleaning
- **Carpet & Rug Institute (CRI) Recommended Indoor Air Quality (IAQ) Specifications** – Specification for carpet, floor covering adhesive and carpet cushion. http://www.carpet-rug.org/documents/technical_bulletins/ 9902_Carpet_and_IAQ.pdf
- **GREENGUARD Certification for Low-Emitting Products** – Performance based standards to define goods with low chemical and particle emissions for use indoors, primarily building materials, interior furnishings, furniture, cleaning and maintenance products, and electronic equipment – includes adhesives and sealants, wood-based and non-wood-based construction materials, insulation, paints, coatings and wall finishes. http://www.greenguard.org/
- **Green Label** – Advanced certification for carpet and adhesive products by the Carpet & Rug Institute that ensures carpets, cushions and adhesive products have low VOC emissions. http://www.carpet-rug.org/CRI-Testing-Programs/Green-Label-Plus.aspx
- **Scientific Certification Systems (SCS): Indoor Air Quality** – Offers three IAQ certification programs to improve the environmental performance of building products: Indoor Advantage, Indoor Advantage Gold, and FloorScore. Site includes IAQ standards, references and certified IAQ product information. http://www.scscertified.com/gbc/indoor_air_quality.php
- **BIFMA/E3 Sustainability Standard for Furniture** – Consensus-based method to evaluate the sustainable attributes of furniture products across the product lifespan. http://www.bifma.org/standards/
- **Carpet & Rug Institute (CRI)** – Green Label programs for carpets and adhesives. http://www.carpet-rug.org/

Radon Resistant Building

- **EPA Indoor airPLUS Construction Specifications** – **New Construction** – Specifications to support healthy indoor air quality, including radon resistant building techniques. http://www.epa.gov/indoorairplus/construction_specifications.html
- **EPA Radon Website** – Information and links on protecting people and families from radon. Exposure to radon in the home is responsible for an estimated 20,000 lung cancer deaths each year, and simple radon resistant building practices can save lives. http://epa.gov/radon/
- **Radon Leaders Website** – An online learning and action network that connects radon stakeholders through outreach materials, interactive blogs, forums and resources. http://www.radonleaders.org
- **EPA Where Can I Get a Radon Test Kit?** – Information on national and state Radon Test Kit providers. http://www.epa.gov/radon/radontest.html
- **National Radon Program Services (Kansas State University)** – Provides affordable short (3-4 days) and long (3-12 months) term radon test kits for homes in the United States. http://sosradon.org/test-kits
- **EPA Consumer's Guide to Radon Reduction** – Detailed guide and checklist on radon reduction techniques and working with contractors to reduce radon levels in your home. http://www.epa.gov/radon/pubs/consguid.html#overview
- **EPA Building Radon Out - Building Radon Out** – Step-by-step guide for builders on building healthier, radon-resistant homes. http://www.epa.gov/radon/pdfs/buildradonout.pdf

- **ANSI-AARST Standard: Reducing Radon in New Construction of 1 & 2 Family Dwellings and Townhouses** – Standard written in code language to reduce radon in new homes. Checklists and contractor resource links are also included. http://www.epa.gov/radon/rrnc/moreinfo.html
- **EPA Managing Radon in Schools** – EPA recommends testing all schools for radon. This fact sheet shares the *Indoor Air Quality Tools for School Approach* to successfully managing radon in schools. http://www.epa.gov/iaq/schools/pdfs/kit/managing_radon.pdf
- **Listing of States and Local Jurisdictions with Radon Resistant New Construction Codes** – http://www.epa.gov/radon/rrnc/code_listing.html

Mold

- **EPA Mold Website** – Includes on-line courses on mold basics and many mold resources and publications. http://www.epa.gov/mold/
- **EPA Moisture Control Guidance for Building Design, Construction and Maintenance** – This document provides building professionals with practical guidance to control moisture in buildings during design, construction and maintenance. http://www.epa.gov/iaq/moisture/index.html
- **Center for Disease Control Mold Website** – Provides information on mold and health, including an inventory of state indoor air quality programs and advice on assessment, cleanup and prevention of mold growth. http://www.cde.gov/mold
- **HUD Healthy Homes Mold and Moisture Website** – Information on preventing and getting rid of mold. http://portal.hud.gov/hudportal/HUD?src=/program_offices/healthy_homes/healthyhomes/mold

Heating Systems

- **EPA Burn Wise** – An EPA partnership program emphasizing the importance of burning the right wood, the right way, in the right wood-burning appliance to protect your home and health. Wood-burning appliance change-out program and best burn practice information. http://www.epa.gov/burnwise
- **EPA Burn Wise Certified Appliances** – EPA certified wood stoves, pellet stoves, fireplaces, hydronic heaters and gas stove information and lists. http://www.epa.gov/burnwise/appliances.html

Santa Ynez Band of Chumash Indians in California: Solar thermal system on top of Chumash Casino Resort

SECTION 6: ASSESSMENT – ENERGY EFFICIENCY AND RENEWABLE ENERGY

Energy efficiency is an essential aspect of green building. Through energy efficiency, heating and cooling loads can be reduced. If those loads are met with energy from fossil fuels, the carbon footprint of a building is also reduced. Reducing heating and cooling loads through energy efficiency and passive solar design also reduces building operating costs.

6.1. Passive Solar Design

Passive solar design takes advantage of natural heating and cooling cycles to efficiently reduce active energy use. Passive energy uses thermal mass such as a building's walls, water or earth to absorb heat energy from the sun,

and then radiate this heat. Passive energy does not require a distribution system, such as an electricity grid or gas pipelines.

Some energy efficient design strategies utilize the passive solar strategies. The climates of many tribal lands create both heating and cooling demands for buildings. In some locations one is significantly more important than the other, while in other places only heating or cooling is needed.

Passive solar design with daylighting. *Photo: U.S. Department of Energy*

Skylight for natural daylighting. *Photo: U.S. Department of Energy*

Key Strategies in North America include:

- Use proper siting, orientation and building design to optimize heat gain from the sun during the winter and/or minimize it during the summer:
  - Orient long axis of the house east-west where heat gain in winter is desired
  - Install glass and, or windows on the south and east sides of a building
  - Minimize skylights and west-facing glass where summer cooling is important
  - Size roof overhangs so the low winter sun penetrates the building, but windows are shaded from high summer sun
  - Specify windows with high solar heat gain coefficient
  - Install thermal mass (thick tile, stone, concrete, earthen materials, water) in areas where winter sun penetrates to collect and store solar heat (e.g., concrete, stone or adobe floors or “trombe walls”)
- Maximize south sloping roof area if installing, or planning for, solar photovoltaic or solar hot water panels
- Create efficient thermal envelope (high insulation values, low air infiltration, double glazed windows and low-emissivity glass)
- Plant vegetation that shades windows from unwanted summer sun, but not the desired winter sun
- Consider benefits or detriments of shading existing adjacent buildings in siting of new construction
- Provide passive cooling with nighttime ventilation that flushes heat out with cooler nighttime air (e.g., thermal chimneys, clerestory windows or with minimal powered assistance of “whole house fans”)
  - Use evaporative cooling methods

6.2. Energy Efficiency and Optimizing Building Performance

Optimizing a building’s energy performance reduces the costs associated with energy use and minimizes associated environmental impacts, including air pollution and greenhouse gas emissions.

Key Strategies:

- Enact and implement the International Energy Conservation Code
- Obtain ENERGY STAR Homes Certification
- Purchase ENERGY STAR/energy efficient appliances and technologies, such as:
  - Lighting
  - Heating, ventilating, and air conditioning (HVAC)
  - Water heating, plumbing, and pumping
  - Kitchen appliances
- Purchase ENERGY STAR/energy efficient windows and doors
- Use of off-grid systems
- Energy audits and commissioning
- Diverse generation and storage systems

6.3. Renewable Energy – Generation, Storage and Distribution

On-site renewable energy generation can produce significant environmental, economic, and sovereignty benefits. On-site renewable energy reduces energy costs by decreasing a building's susceptibility to fossil fuel price volatility. It also reduces air pollution and greenhouse gas emissions. Tribal generation of renewable energy can support tribal sovereignty and self-sufficiency by reducing reliance on non-tribal utility sources.

While tribal lands comprise 2% of U.S. lands, technical potential on tribal lands comprises 4.8% of the total national U.S. technical capacity potential for renewable energy and 6% of the total generation, varying by resource. Solar photovoltaics (both urban and rural), concentrated solar power, and wind have the largest technical potential of the renewable energy resources on tribal lands.

Key Strategies:

- Utilization of on-site renewable energy sources, such as:
  - Solar – including systems such as solar electric (photovoltaic) and solar hot water, and passive solar design systems
  - Geothermal
  - Wind
  - Micro-hydroelectric
  - Wood-fired heat/power

Barriers to Sustainable Practices?

The federal government, through the Department of Energy (DoE), supports energy efficiency in buildings through the development of model codes and standards for adoption by states.

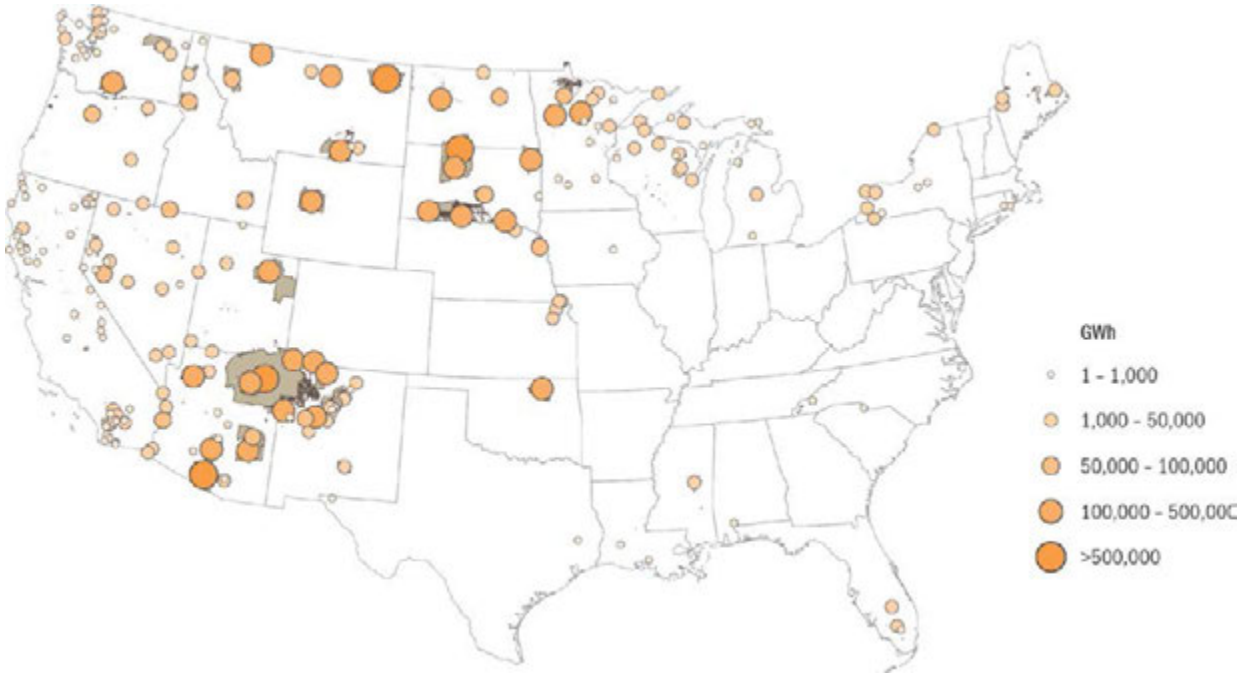
The legislation authorizing this program (42 U.S.C. § 6833) does not mention tribal governments.

The development of the model energy code for residential buildings is conducted by the International Code Council (ICC), which updates its model code every three years. Federal law (42 U.S.C. § 12709) requires that most new federally-assisted public housing, and new homes with federally insured mortgages, meet or exceed the standards in the 2006 edition of the ICC energy code.

This requirement, however, does not apply to housing funded through the Native American Housing Assistance and Self-Determination Act (NAHASDA).

Energy efficiency investments are allowable under NAHASDA (25 U.S.C. § 4132), but there is a countervailing regulatory requirement that housing be of "moderate design" and subject to a prescribed limit on "total development cost" (25 C.F.R. §§ 1000.156, 1000.158).

Tribal lands solar photovoltaic (PV) utility-scale rural generation potential



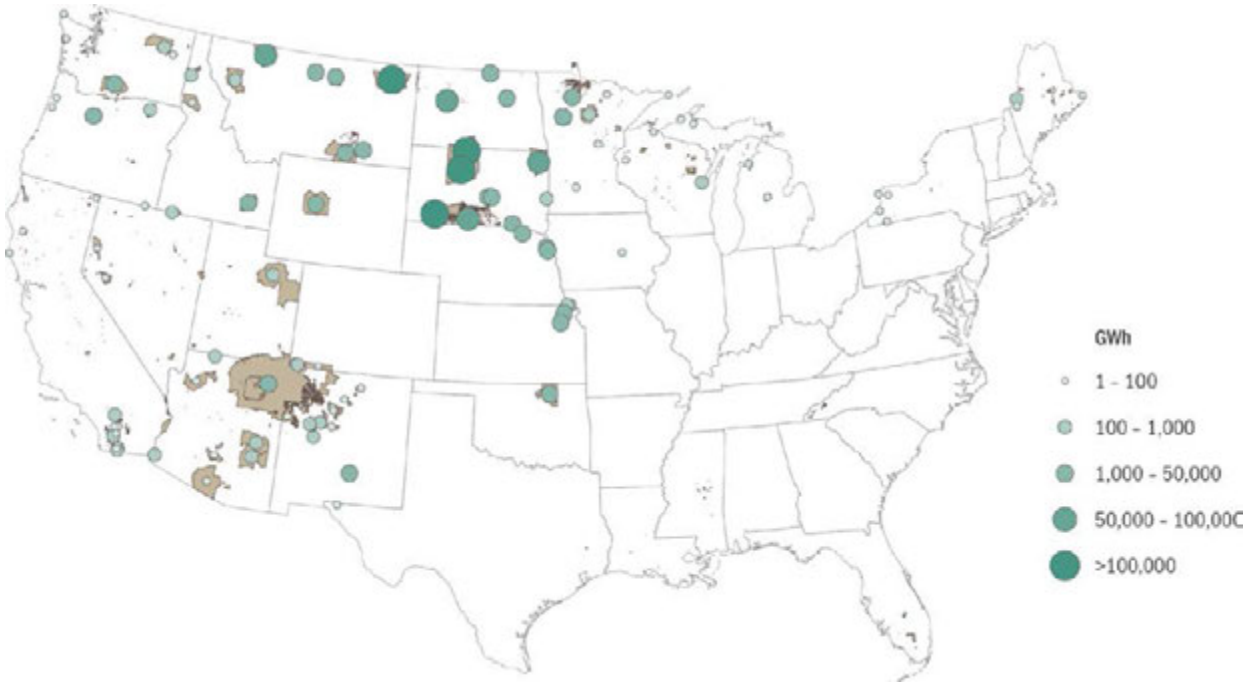
U.S. Department of Energy Geospatial Analysis of Renewable Energy Technical Potential on Tribal Lands: Department of Energy (2013)

Top 25 Tribal Lands by Technical Potential for Rural Utility-Scale Photovoltaic Generation

Tribal Land	State	Rural Utility PV Power Potential Annual Generation (MWh)	Rural Utility PV Potential Installed Capacity (MW)	Rural Utility PV Available Land (km^2)
Navajo	NM, UT, AZ, CO	2,494,474,583	1,087,316	22,652
Hopi	AZ	2,295,637,379	998,053	20,793
Tohono O'odham	AZ	986,595,977	427,892	8,914
Standing Rock	SD, ND	932,953,632	503,395	10,487
Fort Peck	MT	609,883,158	327,966	6,833
Pine Ridge	NE, SD	450,036,180	240,320	5,007
Uintah and Ouray	UT	442,003,250	203,766	4,245
Osage	OK	325,020,763	166,400	3,467
Cheyenne River	SD	323,595,921	172,803	3,600
Wind River	WY	318,333,071	158,647	3,305
Blackfeet	MT	299,959,630	161,304	3,361
Rosebud	NE, SD	284,184,572	151,746	3,161
Lake Traverse (Sisseton)	SD, MN, ND	266,608,010	142,810	2,975
Zuni Pueblo	NM, AZ	196,586,404	85,349	1,778
San Carlos	AZ	187,916,024	81,500	1,698
Crow	WY, MT	183,354,288	98,599	2,054
White Earth	MN	180,721,292	109,009	2,271
Laguna Pueblo	NM	172,651,833	74,984	1,562
Fort Berthold	ND	168,674,984	95,006	1,979
Fort Belknap	MT	168,388,007	90,551	1,886
Jicarilla Apache	NM, CO	150,130,043	65,203	1,358
Hualapai	AZ	134,901,150	58,507	1,219
Leech Lake	MN	129,919,796	78,366	1,633
Gila River	AZ	129,768,914	56,282	1,173
Yankton	NE, SD	121,296,780	64,759	1,349

U.S. Department of Energy Geospatial Analysis of Renewable Energy Technical Potential on Tribal Lands: Department of Energy (2013)

Tribal lands wind generation potential



U.S. Department of Energy Geospatial Analysis of Renewable Energy Technical Potential on Tribal Lands: Department of Energy (2013)

Top 25 Tribal Lands by Technical Potential for Wind Electricity Generation

Tribal Land	State	Wind Potential Annual Generation at 80 m and GCF>= 30% (MWh)	Wind Potential Installed Capacity at 80 m and GCF>= 30% (MW)	Wind Available Land at 80 m and GCF>= 30% (km²)
Cheyenne River	SD	188,088,492	57,806	11,561
Standing Rock	SD, ND	149,093,091	45,972	9,194
Fort Peck	MT	126,258,676	41,331	8,266
Pine Ridge	NE, SD	113,398,124	38,028	7,606
Rosebud	NE, SD	87,002,780	25,833	5,167
Blackfeet	MT	69,911,790	24,476	4,895
Lake Traverse (Sisseton)	SD, MN, ND	60,824,322	17,736	3,547
Fort Berthold	ND	51,781,459	16,409	3,282
Osage	OK	43,853,495	16,357	3,271
Crow	WY, MT	43,407,456	16,497	3,299
Fort Belknap	MT	32,739,605	11,725	2,345
Yankton	NE, SD	21,573,834	6,732	1,346
White Earth	MN	19,367,345	7,400	1,480
Crow Creek	SD	17,699,282	5,722	1,144
Lower Brule	SD	14,521,816	4,509	902
Devils Lake Sioux	ND	14,300,155	4,533	907
Omaha	IA, NE	12,508,456	3,919	784
Wind River	WY	12,306,226	4,345	869
Northern Cheyenne	MT	9,371,963	3,522	704
Winnebago	IA, NE	6,601,533	2,094	419
Santee	NE	6,489,284	2,118	424
Mescalero Apache	NM	5,566,143	2,240	448
Fort Hall	ID	5,031,295	2,026	405
Potawatomi Prairie Band	KS	4,562,289	1,548	310
Yakama	WA	3,720,634	1,383	277

U.S. Department of Energy Geospatial Analysis of Renewable Energy Technical Potential on Tribal Lands: Department of Energy (2013)

Case Study: Big Sandy Rancheria Band of Western Mono Indians

The Big Sandy Rancheria Band of Western Mono Indians is located roughly two miles east of the town of Auberry, in Fresno County, California. The Rancheria is situated on a small valley floor in a rugged foothill portion of the Sierra Nevada National Forest. The Rancheria includes about fifty homes and 151 residents. About 80% the community is low-to-middle income and 30% do not have motorized transportation. All water on the Rancheria is provided by community wells and is treated for uranium contamination.

The tribe had just split the single department responsible for both housing and environmental management into two separate departments and had started to focus on long-term planning for housing, community and business development when EPA offered green building codes technical assistance.

Big Sandy Rancheria home with solar panels. *Photo: Jaime Collins*

The Housing Manager, an experienced contractor, was facilitating a shift from hiring outside contractors or purchasing mobile homes to building homes in-house using local labor. The Environmental Programs Manager brought her background in architecture and knowledge of green building, energy efficiency and sustainable materials. The tribe recognized that adopting green codes could help ensure that future development would meet the needs and standards the tribe sought to provide for its community members.

The Tribe was particularly interested in codes that would increase energy efficiency, reduce negative health impacts from poor indoor air quality, minimize and properly dispose of construction waste, cut building operating and maintenance costs and conserve water and wastewater – a special concern because of uranium contamination of their wells.

The Tribe joined the EPA Tribal Green Building Codes Workgroup and EPA's contractors provided information on the draft Pinoleville Tribal Green Building Code, the CALGreen state code for California, resources about moisture and mold, alternatives to spray foam insulation and more.

The Tribe liked the layout and structure of the Pinoleville draft code, so it modified and improved that code to meet tribal priorities.

In September 2014, the Tribal Council adopted the long-range plan and green building code. The process was aided by having key managers and the Tribal Council Vice Chairperson on the team that drafted the code.

Tribal Involvement: Big Sandy Environmental Programs Office, Big Sandy Rancheria Indian Housing Authority, Tribal Council Vice Chairperson.

Non-Tribal Involvement: U.S. EPA Region 9, Development Center for Appropriate Technology, GreenWeaver Inc.

Code Incentive Examples

General	Targeted – Energy
• Expedited permitting process • Expedited easement approval process • Permit fee waivers or reductions • Reduced inspections	• Incentives to build smaller • Incentives to use less energy per square foot • Incentives to construct buildings that are more energy efficient than the minimum requirements of the jurisdiction • Incentives for renewable energy: solar, wind, geothermal, low-impact hydro or bio-gas projects

Questions to Assess Energy Efficiency and Renewable Energy Strategies

6.1. Passive Solar Design

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Do codes or policies address solar siting and orientation of buildings for new construction? *Potential Tools and Techniques:* • *Consider passive solar potential in the siting, orientation, and relationship between all buildings and facilities.* • *If cultural needs require the building or a feature (such as the entrances) to face in a certain direction, develop code accommodations.*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Do codes or policies take into account shading of adjacent buildings to assure solar access for new construction? *Potential Tools and Techniques:* • *Regulate the siting and height of new construction to prevent obstruction of solar access for existing buildings or planned building sites.*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Section 6.1 Totals:	Green:	Yellow:	Red:	Not Applicable:

6.2. Optimized Energy Performance

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Do codes or policies require analysis of potential passive solar design contributions to minimize heating and cooling loads? *Potential Tools and Techniques:* • *Require design of new buildings to include analysis of passive solar design potential.*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Do codes or policies allow for optimal sizing of HVAC equipment, including the potential for downsizing or eliminating systems based on the contribution from passive solar design? *Potential Tools and Techniques:* • *Allow residential projects that can demonstrate that a design is capable of maintaining safe and minimal levels of temperature and ventilation through passive means to eliminate or downsize mechanical HVAC systems.* • *Allow these projects to use high-efficiency (EPA certified) wood stoves, cooling towers, and other traditional or alternative systems as back-up systems to conventional mechanical systems.* • *ENERGY STAR Home Heating and Cooling Guidance*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do ordinances require commercial building energy-related systems to be installed and calibrated and to perform according to the most up-to-date model code or standard? Additional considerations include: • Are there incentives to build smaller or use less energy per square foot? • Are there incentives to construct buildings that are more energy efficient than the minimum requirements of the jurisdiction? *Potential Tools and Techniques:* • *Commercial building requirements* • *Enhanced energy provisions of the International green Construction Code (IgCC) or ASHRAE 189.1*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes

Are checklists, certification, field testing, and/or verification required to ensure energy performance standards are met?
 	
Potential Tools and Techniques:
• *ENERGY STAR:*
  o *Homes Certification*
  o *Qualified Homes Program Checklist*
  o *Energy Design Guidance Checklist*
  o *Target Finder in Commercial Buildings*
• *DOE Zero Energy Ready Home National Program*
• *Third-party building inspection or commissioning of equipment, insulation, ductwork, etc., prior to completion.*
• *Diagnostic testing to assure proper installation and verification by a certified Home Energy Rating System rater*
• *Verification of energy performance for change of occupant and re-sale through audits and utility data disclosure.*
	Green
	☐ Required by code/ordinance
	☐ Incentivized
	Yellow
	☐ Expressly allowed
	☐ Code/ordinance silent, but typically allowed
	Red
	☐ Code/ordinance silent, but not typically approved
	☐ Expressly prohibited
	☐ **Not Applicable**
		Green
		☐ Will be required or incentivized by code/ordinance
		Yellow
		☐ Will be expressly allowed in code/ordinance
		Red
		☐ Will be prohibited or discouraged
		☐ **Not Applicable**

Do codes or ordinances provide for ongoing accountability of building energy consumption? *Potential Tools and Techniques:* • *Ordinances requiring measurement devices with ability to provide daily energy data* • *Ordinances providing for sub-metering of large or significant loads in commercial buildings* • *Ordinances providing for sub-metering of individual apartments in multi-family buildings and of individual tenants in commercial buildings*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Are there requirements in place (e.g., maximum allowed lumens per square foot for each lighting zone) for outdoor lighting related to: buildings and structures, recreational areas, parking lot and street lighting, landscape lighting, billboards and other signage? *Potential Tools and Techniques:* • *Dark skies or night skies ordinances* • *Adoption of the latest energy codes*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Are high efficiency appliances encouraged or required? *Potential Tools and Techniques:* • *ENERGY STAR appliances (i.e., refrigerators, freezers, air purifiers, clothes washers, dehumidifiers and dishwashers)* • *Efficient heating element specifications* • *WaterSense labeled plumbing fixtures (i.e., toilets, faucets, showerheads and urinals)*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Are solar water heating systems allowed or encouraged by code? *Potential Tools and Techniques:* • *Permit fee waiver* • *Priority permit processing* • *Solar easements* • *Solar requirements or ordinance* • *Solar-ready construction requirement*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Are hot water systems required to be efficient? *Potential Tools and Techniques:* • *WaterSense New Home Specifications* • *Hot water piping insulation* • *Hot water recirculating pumps* • *Minimizing hot water plumbing distances and store no more than .5 gallons of water between the source and furthest fixture* • *Use of on-demand water heaters* • *Maximum service pressure of 60 PSI*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Section 6.2 Totals:	Green:	Yellow:	Red:	Not Applicable:

6.3. Renewable Energy – Generation, Storage and Distribution

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Is renewable energy use promoted? *Potential Tools and Techniques:* • *Renewable energy requirements or incentives* • *ENERGY STAR Renewable Energy Ready Homes Specifications* • *Green Power programs* • *Solar-ready construction requirement*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Are renewable energy technologies allowable under existing local ordinances? Examples include: • Tree ordinances that limit solar • Structural height limitations that impact solar • Prohibitions on the use of groundwater in geothermal projects • Structural restrictions for small and large scale wind generation *Potential Tools and Techniques:* • *Incentives for renewable solar, wind, geothermal, low-impact hydro or bio-gas projects*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Are there allowances for using renewable energy technologies at registered historic properties or resources? *Potential Tools and Techniques:* • *Historic preservation ordinance* • *Sustainable design of historic buildings policy*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Is net-metering encouraged by codes or ordinances? *Potential Tools and Techniques:* • *Net-metering policy or ordinance*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Section 6.3 Totals:	Green:	Yellow:	Red:	Not Applicable:

Combine your totals for all subsections and Tribal Priority Totals from Appendix B:

Section 6 Totals:	Green:	Yellow:	Red:	Not Applicable:

Resources: Passive Solar, Energy Efficiency and Renewable Energy

NOTE: *The Standards of Ethical Conduct do not permit the U.S. EPA to endorse any private sector website, product or service. The U.S. EPA does not exercise any editorial control over the information you may find on non-EPA websites.*

Passive Solar Design Information

- **National Institute of Building Sciences (NIBS) Whole Building Design Guide: Passive Solar Heating** – Technical resource for all aspects of design and construction with a comprehensive section on passive solar design. http://www.wbdg.org/resources/psheating.php
- **U.S. Department of Housing and Urban Development (HUD) Our Home: Buildings of the Land – Energy Efficiency Design Guide for Indian Housing** – Guide providing information on energy efficient building and development on tribal lands, including passive orientation and design of houses and developments. http://www.nrel.gov/docs/legosti/old/21217.pdf
- **U.S. Department of Energy (DOE) Energy.gov: Passive Solar Home Design** – Guidance on passive design strategies and resources. http://energy.gov/energysaver/articles/passive-solar-home-design

Energy Efficient Products

- **ENERGY STAR Certified Products for Homes** – A joint program of the EPA and the DOE with energy efficient product listings for windows, doors, skylights, roof products, seals, insulation, appliances (air purifiers, clothes washers, dehumidifiers, dishwashers, refrigerators and freezers), electronics and battery chargers. https://www.energystar.gov/products/certified-products
- **ENERGY STAR Advanced Lighting Package for New Homes** – Designation for homes with a minimum of 60% ENERGY STAR qualified hard-wired fixtures and 100% ENERGY STAR qualified ceiling fans where installed. http://www.energystar.gov/index.cfm?c=fixtures.alp_consumers
- **ENERGY STAR Heating and Cooling** – Guidance and checklists on maintaining efficient operation of residential heating, ventilation and air conditioning systems. http://www.energystar.gov/index.cfm?c=heat_cool.pr_hvac&s=mega

ENERGY STAR Homes

- **ENERGY STAR Certified Homes** – Homes are designed and built to standards delivering energy efficiency savings of up to 30% compared to typical new homes. A new home earning the ENERGY STAR label has undergone a process of inspections, testing and verification to meet requirements set by EPA. http://www.energystar.gov/index.cfm?c=new_homes.hm_index&s=mega
- **ENERGY STAR Homes Builder Information –** http://www.energystar.gov/homes
- **ENERGY STAR Affordable Housing** – Affordable housing solutions for reducing energy costs and saving money by making homes more affordable, sustainable and livable. http://www.energystar.gov/index.cfm?c=affordable_housing.affordable_housing

General Energy Code Information

- **DOE Energy Efficiency & Renewable Energy (EERE) Building Energy Code Program (BECP)** – Works with other government agencies, state and local jurisdictions, national code organizations and industry to promote stronger building energy codes. Provides resources on national model energy codes. http://www.energycodes.gov/
- **DOE EERE – Technical Assistance to States** – Specialized technical assistance to the states in the form of economic analysis, code comparisons, webcast training, and compliance material development requested by states to help them adopt, upgrade, implement and enforce their building energy codes. http://www.energycodes.gov/publications/general/BECP_Assistance_table.pdf
- **DOE Zero Energy Ready Home National Program** – Program requirements and verification information for single and multi-family homes with 3 stories or fewer. http://energy.gov/eere/buildings/downloads/doe-zero-energy-ready-home-national-program-requirements-rev-04
- **Building Codes Assistance Project (BCAP)** – Delivers state-based code advocacy on behalf of the DOE's BECP, serves as clearinghouse on energy code information, develops resources to support code compliance and provides energy code training. http://bcap-energy.org/
- **BCAP's Online Code Environment & Advocacy Network (OCEAN)** – An interactive, online resource designed to share lessons learned, best practices, educational resources and key facts related to building energy code adoption and implementation. http://bcap-ocean.org/
- **Best Practices for State Building Energy Code Policy: Improving Energy Efficiency through Building Energy Codes Policy** – Key policy measures governments can use to incorporate and enhance current model energy codes into local laws. http://www.energycodes.gov/why_codes/
- **Massachusetts Optional Stretch Energy Code** – Appendix to the state building code IECC 2009 Codes with Appendix. http://www.mass.gov/eea/docs/doer/green-communities/grant-program/stretch-code-qa-feb10-2011.pdf
- **Boulder, CO, HERS Rating Home Code** –
  - Requirement that a bigger home will need a better score - http://www.bouldercolorado.gov/index.php?option=com_content&task=view&id=8444&Itemid=22
  - Boulder adopts 2006 IECC for residential and community building efficiency [HERS Index of 100] - http://www.bouldercolorado.gov/index.php?option=com_content&task=view&id=207&Itemid=2173
  - HERS certificate required for Certificate of Occupancy - http://www.sustainablybuilt.com/hers.html
- **Database of State Incentives for Renewable Energy** – Database of tribal, state, local and utility incentives for renewable energy. http://www.dsireusa.org
- **Federal Incentives/Policies for Renewables and Efficiency** –http://www.dsireusa.org/incentives/index.cfm?state=us&re=1&EE=1

Energy Efficiency Incentive Information

- **Renewable Energy and Energy Efficiency Incentives: A Summary of Federal Programs** – An overview of federal programs by the Congressional Budget Office published October 2013. http://www.fas.org/sgp/crs/misc/R40913.pdf
- **Database of State Incentives for Renewables and Efficiency (DSIRE)** – Source of information on state, local, utility and federal incentives and policies that promote renewable energy and energy efficiency. http://www.dsireusa.org/
- **International Dark-Sky Association** – Information on preserving the nighttime environment through quality outdoor lighting. http://www.darksky.org
- **Outdoor Lighting Code Handbook** – Discusses issues relative to outdoor lighting codes, their effectiveness, implementation and enforcement. "Pattern code" included, to be modified for each community's needs. http://www.darkskysociety.org/handouts/idacodehandbook.pdf
- **Simple Guidelines for Lighting Regulations** – Guidelines for small communities, urban neighborhoods and subdivisions. http://docs.darksky.org/Codes/SimpleGuidelines.pdf

- **Light Levels SmartCode Module** – Supplements the Center for Applied Transect Studies SmartCode. http://transect.org/docs/LightLevels.pdf
- **Illuminating Engineering Society** – Provides information on all aspects of good lighting practice to its members, the lighting community and consumers through programs, publications and services. http://www.ies.org

Tribal Renewable Energy Information

- **DOE Geospatial Analysis of Renewable Energy Technical Potential on Tribal Lands** – Provides maps, analysis and potential renewable energy generation on tribal lands and lists top tribal renewable energy opportunities. http://www.nrel.gov/docs/fy13osti/56641.pdf

Wind Energy Information

- **American Wind Energy Association (AWEA)** – AWEA promotes wind energy as a clean source of electricity for consumers around the world. www.awea.org/
- **National Renewable Energy Laboratory (NREL) Wind Systems Integration** – NREL provides studies and resources for the integration of wind power into traditional utility systems as well as state wind resource maps for the assessment of local wind. http://www.nrel.gov/wind/systemsintegration/
- **Eagle County, CO, Performance-Based Permitting System** – Example permitting system that awards points for producing wind energy. http://www.eaglecounty.us/
- **Nevada, IA, Zoning Regulations** – Allows small Wind Energy Conversion Systems (WECS) in industrial districts and by special use permit in all other districts, subject to performance standards. WECS are exempt from the general height restrictions of the zone districts, but height is limited through a use standard. http://www.ci.nevada.ia.us/default.php

Solar Energy Information

- **ENERGY STAR Renewable Energy Ready Homes Specifications** – Helps homebuilders assess and equip new homes with features that make it easier and less expensive to install solar systems after the home is built. http://www.energystar.gov/index.cfm?c=rerh.rerh_index
- **American Solar Energy Society** – The American Solar Energy Society is a leading association of solar professionals and advocates. http://www.ases.org
- **Department of Energy Building America Best Practices for High-Performance Technologies: Solar Thermal and Photovoltaic (PV) Systems** – Provides an alternative to traditional panels in areas where aesthetics are of significant concern (e.g., historic districts). http://apps1.eere.energy.gov/buildings/publications/pdfs/building_america/41085.pdf
- **Gresham, OR, Development Code, Solar Access Standard** – See Appendix 8: Solar Access; also A8.02 for Exceptions to Setback Requirements for Solar Energy Collecting Structures. http://greshamoregon.gov/city/city-departments/planning-services/developmentplanning/template.aspx?id=3586
- **City of Berkeley, CA Title 23 (Zoning Ordinance) Section 23D.04.** – Example lot and development standards including solar energy equipment standards. http://www.ci.berkeley.ca.us/uploadedFiles/Clerk/Level_3_-_BMC/BMC-Part2-- 032508.pdf
- **Pullman, WA, Development Code, Planned Residential Development Section 17.107** – Example incentives for solar access. http://www.law.du.edu/documents/rmlui/sustainable-development/SolarAccess.pdf
- **Teton County, WY, Solar Access Regulations** – Registration of the right to solar access as a property right. http://clerk1.state.wy.us/plan/docs/ComprehensivePlan/Resolutions/Solar.pdf
- **DSIRE Solar: Electric and Thermal** – Information on state, local, utility and federal incentives and policies that promote the adoption of solar technologies. http://www.dsireusa.org/solar/index.cfm?ee=1&RE=1&spf=1&st=1
- **Inspector Guidelines for PV Systems** – A framework for the permitting and inspection of PV systems. http://irecusa.org/wp-content/uploads/2010/07/PV-Field-Inspection-Guide-June-2010-F-1.pdf

Geothermal and Tidal Energy Information

- **DOE Geothermal Technologies Office** – Information and resources on geothermal energy and geothermal energy technologies. http://www1.eere.energy.gov/geothermal/
- **GeoExchange Geothermal Heat Pump Consortium** – Partnership between the DOE, EPA, electric utilities and the GeoExchange heat pump industry. Find a geothermal manufacturers and contractors by state or province. http://www.geoexchange.org
- **DOE Water Power Program** – Researches, tests, evaluates and develops innovative technologies capable of generating renewable, environmentally responsible, cost-effective electricity from water resources. This includes hydropower as well as marine and hydrokinetic energy technologies. http://energy.gov/eere/water/water-power-program

Energy Rating Information

- **ENERGY STAR**– Includes a variety of proven energy-efficient features that contribute to improved building quality, tenant comfort, lower energy demand and reduced air pollution. http://www.energystar.gov/
- **Residential Energy Services Network (RESNET)** – Information on energy audits and rating processes. Also includes a directory to certified energy auditors, raters and qualified contractors and builders. http://www.resnet.us/
- **Home Energy Rating System (HERS)** – Based on the home's construction plans and on-site inspections, the Home Energy Rater uses an energy efficiency software package to perform an energy analysis of the home. This analysis yields a projected, pre-construction HERS Index. http://www.resnet.us/home-energy-ratings

Energy Consumption Monitoring Information

- **Berkeley, CA, Residential Energy Conservation Ordinance** – First city in the nation to require efficiency upgrades for residential buildings at the point of sale. Before the transfer of title can occur, the seller must have an energy inspection to verify performance. http://www.ci.berkeley.ca.us/uploadedFiles/Planning_and_Development/Level_3_-_Energy_and_Sustainable_Development/Residential%20Energy%20Conservation%20Ordinance%20Compliance%20Guide%202008.pdf
- **California Assembly Bill 1065** – Standards to progressively reduce energy consumption from offsite sources. http://info.sen.ca.gov/pub/09-10/bill/asm/ab_1051-1100/ab_1065_bill_20100104_amended_asm_v97.pdf
- **District of Columbia Bill 17-0492 The Clean and Affordable Energy Act of 2008** – Washington, D.C. law requiring ENERGY STAR benchmarking of all government buildings. http://www.greenplaybook.org/resources/whats_new/post4/category6.htm

Other Energy Information

- **EPA Resources for Incorporating Energy Efficiency/Renewable Energy in State and Tribal Implementation Plans** – Good resources and a roadmap for planning. http://epa.gov/airquality/eere/index.html
- **EPA's Clean Energy Information Resources Database (CEIRD)** – Describes key resources and documents relevant to the National Action Plan for Energy Efficiency. http://cfpub.epa.gov/ceird/index.cfm?fuseaction=napee.search_js
- **DOE Office of Energy Efficiency & Renewable Energy (EERE)** – EERE programs on building technologies, federal energy management, geothermal technologies, hydrogen, fuel cells, biomass, infrastructure technologies, industrial technologies, renewable energy technologies and weatherization. http://www.eere.energy.gov/
- **American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)** – ASHRAE advances heat, ventilation, air conditioning and refrigeration through research, standards writing, publishing and continuing education. http://www.ashrae.org
- **American Council for an Energy Efficient Economy** – A non-profit dedicated to advancing energy efficiency to promote economic prosperity, energy security, and environmental protection. www.aceee.org
- **Alliance to Save Energy** – The Alliance to Save Energy is a non-profit coalition of business, government, environmental and consumer leaders. http://ase.org/

- **American Council for an Energy-Efficient Economy** – Non-profit organization that does technical and policy analysis, works with companies and organizations, advises policymakers and managers and promotes energy efficiency education. Publications for purchase. http://aceee.org/
- **American Council on Renewable Energy (ACORE)** – An organization of member companies and institutions that are dedicated to moving renewable energy into the mainstream of America's economy. http://www.acore.org
- **DOE EERE Building Technologies Program** – Partners with the private sector, government agencies, national laboratories and universities to improve efficiency of buildings and the equipment and systems within them. The program supports research and development activities and provides tools, guidelines, training and access to technical and financial resources. http://www1.eere.energy.gov/buildings/index.html
- **Bonneville Power Administration Weatherization Specifications** – Best practices that apply to existing residential (retrofit) weatherization for electrically heated single family and manufactured homes. http://www.bpa.gov/energy/n/residential/Weatherization/FINAL_BPA_Wx_Specs.pdf

On-Site Generation and Interconnection to the Utility Grid

- **DOE Federal Energy Management Program (FEMP) Interconnection and Permitting Guide** – Guide to assist federal energy managers in navigating interconnection and permitting information. http://www1.eere.energy.gov/femp/technologies/derchp_ipg.html
- **The Federal Energy Regulatory Commission (FERC)** – Standardized procedures and a standard interconnection agreement for the interconnection of generators to the power grid. The rules differ depending on whether the generator is larger or smaller than 20 megawatts. http://www.ferc.gov/industries/electric/indus-act/gi.asp
- **Standards Board of the Institute for Electrical and Electronics Engineers, Inc. (IEEE) Standard 1547** – Standard for Interconnecting Distributed Resources with Electric Power Systems. http://grouper.ieee.org/groups/scc21/dr_shared/
- **The DSIRE Database** – Lists state interconnection rules. http://www.dsireusa.org/
- **California Rule 21** – California standards for interconnection of distributed energy resources. http://www.energy.ca.gov/distgen/interconnection/california_requirements.html

Offsite Renewable Energy – Green Power Information

- **EPA Green Power Partnership** – Voluntary program supporting the organizational procurement of green power by offering expert advice, technical support, tools and resources. http://www.epa.gov/greenpower/
- **DOE: The Green Power Network** – Information network on the green power market including green power providers, product offerings, consumer protection issues, policies affecting green power markets and a reference library. http://apps3.eere.energy.gov/greenpower/
- **Green Power Locators by state** – http://www.epa.gov/greenpower/pubs/gplocator.htm
- **Green Power Network** - http://apps3.eere.energy.gov/greenpower/buying/buying_power.shtml

Duck Valley Tribe, Nevada

SECTION 7: ASSESSMENT – WATER ACCESS, MANAGEMENT AND SANITATION

Access to safe and reliable water is a challenge for communities all over the world, including tribal communities in many parts of the U.S. Water conservation is an important aspect of water access and water management. With drought and climate shifts already occurring, some regions will continue to see declines in water supply. Creating safe and effective sanitation and wastewater systems also poses challenges. The main components of this section relate to the management of water resources, water access, water conservation, sanitation and wastewater treatment.

Where there are pollution or contamination issues (e.g., radon, uranium, heavy metals or other toxic chemicals), harvested rainwater can be used as a cleaner, safer source than conventional sources. Using captured rainwater for irrigation can also help alleviate soil salinization issues in gardens and agricultural areas.

Key Questions:

- Is water availability and/or accessibility an issue for your tribe?
- Do building and land use codes encourage water conservation and reuse?
- Are there protections from pollution and contamination and strategies to ensure water quality?

Key Terms:

- **Greywater:** Wastewater generated by sinks, showers, bath tubs and laundry, which can be recycled on-site for uses like toilet flushing and landscape irrigation.
- **Permaculture:** A branch of ecological design and construction that develops sustainable architecture, regenerative and self-maintained habitat and agricultural systems modeled from natural ecosystems.
- **Xeriscaping:** Landscaping approaches that eliminate or reduce the need for supplemental water from sprinkler systems or irrigation.

7.1. Safe Water Access: Building Water Sources

Water sources for buildings can vary from private wells, surface water, rain water and reused water. Identifying a safe and reliable water source is a key component of any building project.

Key Strategies:

- Regular testing for radon and other contaminants in building water sources
- Treatment as needed for potable water uses (filtration, ultra-violet light, chlorination or other methods)
- Discharge quality requirements

7.2. Conservation of Existing Water Supplies

Water metering is critical to track water conservation and detect leaks. Passive water systems (gravity-driven) can be used for storing and circulating water. They require little or no maintenance, and may be less expensive to install than active systems. Active water systems are a common element in most new developments. They use one or more pumps to circulate water and require maintenance.

Key Strategies:

- On-site water metering and sub-metering of buildings
- Installation or creation of land contours, gutters and drains, and basins or retention areas (especially for passive systems)
- Locating development close to water sources
- Promoting natural water filtration through strategic plantings
- Installation of WaterSense/water-conserving appliances:
    - Faucets and showerheads with flow restrictors
    - Low-flow or dual-flush toilets
    - Efficient washing machines and dishwashers
    - High-efficiency cooling systems

- Using dual-plumbed systems and other greywater plumbing and usage strategies
- Locating containment tanks adjacent to structures, and inclusion of vents and overflows in tanks

7.3. Rain Harvesting and Innovative Sanitation and Wastewater Treatment Systems

Rainwater harvesting and storage can supply some or all of a building's water needs. Innovative sanitation and wastewater treatment and reuse systems (e.g., use of greywater, reclaimed water, or on-site wastewater treatment) can diminish water needs.

Key Strategies:

- Installation of rainwater collection and storage system (tailored to the climate and demand)
- Use of composting or urine-diverting dehydrating toilets (UDDTs)
- Wastewater treatment systems and use planning
- Greywater-ready piping

A rain barrel used to collect rooftop runoff using a gutter downspout system.

Barriers to Sustainable Practices

Examples of barriers to sustainable practices as well as regulations that institute unsustainable practices can be found in many codes.

For example, "... in most places all water entering a building is required to be potable water (drinking water quality) regardless of its intended use, and once used must be treated as blackwater (raw sewage) regardless of the use. If there is an available sewer system, typically there is a legal requirement to connect to it, and if not, a requirement to install a water-based septic system. In most jurisdictions, toilet flushing using rainwater or greywater is prohibited.

The result is that in most places there is a legal requirement to intentionally pollute drinking water with human excrement."

Source: Eisenberg, David and Pearsom, Sonja, Living Building Challenge: Code, Regulatory and Systemic Barriers Affecting Living Building Projects, 2009

7.4. Water-Efficient Landscaping and Landscape Irrigation

Water-efficient landscaping offers many economic and environmental benefits that can include lower water bills, decreased energy use, reduced water irrigation, reduced landscaping and labor maintenance and conservation of natural resources.

Key Strategies:

- Street and stormwater harvesting
- Appropriate siting of food and landscaping plants
- Lawn conversion to xeriscape
- Native and drought tolerant plants
- Gravity-fed watering systems

Case Study: Pinoleville Pomo Nation, Water Conservation and Community Visioning

PPN tribal green home built with HUD funding. *Photo: Sustainable Native Communities Collaborative*

The Pinoleville Pomo Nation (PPN), located in Northern California, developed a performance-based tribal green building code through a community-based planning and building process. The PPN also worked with green building code experts, engineering students from the Community Assessment of Renewable Energy and Sustainability (CARES) Program at the University of California, Berkeley and the U.S. EPA to develop a codes framework that would assert cultural sovereignty, address tribal priorities, and build capacity.

In addition to developing building codes, the PPN collaborated with CARES to design and build two prototype homes. These homes were built to the PPN building code that incorporated "remembering" Pomo architecture in their design.

PPN and CARES Building Design Charrette – 2008
Photo: Pinoleville Pomo Nation

PPN Straw Bale Construction Workshop - 2012
Photo: Pinoleville Pomo Nation

To complete the homes, the PPN invited tribal builders from several nearby communities to join in the hands-on training and construction process. These highly efficient homes feature straw bale walls, earthen plasters,

no-to-low volatile organic compound paints and stains, ground-source heat pumps, greywater irrigation and rainwater catchment.

The development, protection and conservation of water resources are a priority for the PPN and its building code supports this priority by requiring contractors and/or designers to provide performance submittals for requirements such as:

- Capacity to harvest and utilize rainwater
- Capacity to recycle greywater
- Water metering capabilities
- Proposed allocation of water for food, medicine, and fiber production on-site, either inside or outside of the proposed building
- All washing machines shall have greywater plumbing

Rainwater catchment and greywater systems are particularly important in this region because they reduce vulnerability to water shortages and support on-site gardens and landscaping.

Pinoleville Draft Green Building Code: http://www.epa.gov/region9/greenbuilding/codes/pdfs/pinoleville-green-building-code-draft.pdf

Tribal Involvement: Pinoleville Pomo Nation Environmental Department, Pinoleville Pomo Nation Housing Authority, construction workers for the tribe and nearby tribes, community members -- including elders and high school students.

Non-Tribal Involvement: Community Assessment of Renewable Energy & Sustainability (CARES) and the Departments of Mechanical Engineering and Architecture at the University of California Berkeley, U.S. EPA Region 9, Development Center for Appropriate Technology, GreenWeaver Inc., LACO Associates, Vital Systems.

Code Incentive Examples

General	Targeted – Water
• Expedited permitting process • Expedited easement approval process • Permit fee waivers or reductions • Reduced inspections	• Rebate programs or tax forgiveness for water conserving appliances and fixtures • Incentives for rainwater collection systems • Lawn removal incentive program • Post-construction stormwater credits - reduced stormwater fees for property owners who reduce stormwater runoff or improve the quality of their stormwater runoff

Questions to Assess Water Access and Management

7.1. Water Access: Building Water Sources

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Does the tribe have water access and use rights to support infrastructure and building project developments? *Potential Tools and Techniques:* • *Tribal water rights* • *Ground and surface water use agreements* • *Rainwater harvesting ordinances*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do policies or ordinances include water source protection requirements or standards? *Potential Tools and Techniques:* • *Source water protection ordinances* • *Setback requirements* • *Zoning approaches* • *Protection practices (e.g., double wall underground storage tanks)*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Is there a policy or requirement for testing source water for radon, uranium or other known regional sources of water contamination for new or existing water sources? *Potential Tools and Techniques:* • *Building permit requirement for water testing*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Do codes or ordinances require identifying and addressing potential contamination of water sources from failing septic systems, abandoned and uncapped water wells, underground storage tanks, mine tailings or oil and gas wells? *Potential Tools and Techniques:* • *Building permit requirement for water testing* • *Source water protection ordinances* • *Setback requirements* • *Zoning approaches* • *Protection practices (e.g., double wall underground storage tanks)*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Section 7.1 Totals:	Green:	Yellow:	Red:	Not Applicable:

7.2. Conservation of Existing Water Supplies

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Do codes, standards, ordinances, guidelines, or policies require or support site-based metering and responsible water management? *Potential Tools and Techniques:* • *Water metering requirement for all construction to support conservation and leak detection* • *Water management policies*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do provisions require or encourage metering of individual units in multi-family housing to reduce water consumption? *Potential Tools and Techniques:* • *Revising code for multi-family buildings* • *Water metering information*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Is the reuse of air conditioning condensate water encouraged to reduce unnecessary use of potable water? *Potential Tools and Techniques:* • *Air conditioning condensate water reuse* • *Upgrade plumbing code*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Do codes or policies support the use of high efficiency and innovative plumbing fixtures and fittings to reduce water consumption? *Potential Tools and Techniques:* • *Requirement for WaterSense homes* • *Incentives, such as rebate programs or tax forgiveness* • *Plumbing code for WaterSense/high efficiency fixtures* • *Composting toilet information* • *Urine Diverting Dehydrating Toilet information*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Are dual plumbed systems for use of reclaimed water or other non-potable sources for toilet flush water or outside irrigation allowed by codes or ordinances? *Potential Tools and Techniques:* • *Revising code for greywater of dual plumbing systems* • *Guidance and signage for safe use of reclaimed water*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do codes or ordinances allow greywater use for landscape irrigation? *Potential Tools and Techniques:* • *Revising code for greywater use* • *Greywater codes, ordinances* • *Guidance and outreach on safe greywater use*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Are there existing or planned codes or policies to manage site erosion and sedimentation during construction? *Potential Tools and Techniques:* • *Stockpile and protect disturbed topsoil from erosion for reuse* • *Control the path and velocity of runoff with silt fencing or comparable measures* • *Protect on-site storm sewer inlets, streams and lakes with straw bales, silt fencing, silt sacks, rock filters or comparable measures* • *Provide swales to divert surface water from hillsides* • *If soil in a sloped area (i.e., 4:1 slope) is disturbed during construction, use tiers, erosion blankets, compost blankets, filter socks and berms or some comparable approach to stabilize the soil*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Section 7.2 Totals:	Green:	Yellow:	Red:	Not Applicable:

7.3. Rainwater Harvesting and Innovative Wastewater Treatment Systems

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Are natural wastewater treatment systems, like constructed wetlands or other innovative infiltration systems, encouraged by codes or ordinances? *Potential Tools and Techniques:* • *Constructed wetlands information* • *Innovative wastewater reuse*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Are on-site wastewater treatment systems encouraged by codes or ordinances to capture or reuse reclaimed wastewater? *Potential Tools and Techniques:* • *Reclaimed wastewater plan requirements* • *Reclaimed wastewater ordinance*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Is collected rainwater allowed for indoor use, such as toilet flushing to reduce unnecessary use of potable water? *Potential Tools and Techniques:* • *Rainwater harvesting ordinances* • *Rainwater harvesting plan requirements*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do codes or ordinances allow the on-site filtration of rainwater for potable use? *Potential Tools and Techniques:* • *Revising code for residential potable water treatment system requirements*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Are there existing or planned codes, standards, ordinances, guidelines or policies that address stormwater runoff and utilization? *Potential Tools and Techniques:* • *Rainwater harvesting model ordinances and plan requirements* • *Control or capture runoff from building roofs, pavement, and other hardscape surfaces using cisterns, swales or site retention*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do adopted or planned codes, standards or policies support alternatives to potable water use for outside irrigation? *Potential Tools and Techniques:* • *Rainwater harvesting ordinances, codes or guidelines* • *Greywater ordinances, codes or guidelines* • *Reclaimed wastewater information* • *Upgraded/green plumbing code*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do codes or ordinances encourage water catchment, and can tanks or cisterns be stored near structures? *Potential Tools and Techniques:* • *Revising code for on-site retention of rainwater* • *Guidance for siting of tank systems, cisterns, below grade and surface retention of rainwater* • *Guidance for safe use and construction of water catchment systems*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Section 7.3 Totals:	Green:	Yellow:	Red:	Not Applicable:

7.4. Water-Efficient Landscaping and Landscape Irrigation

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Is there a requirement for using plants that will reduce the use of water for landscape maintenance? *Potential Tools and Techniques:* • *Grouping plants according to their water needs, or using native and low-water-use or drought-resistant plants* • *Xeriscaping ordinances that, when possible, include tribal or state-adopted plant species list* • *Lawn removal incentive programs*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Is the use of high efficiency irrigation systems (such as WasteSense products, moisture sensors, drip vs. spray. etc.) encouraged? *Potential Tools and Techniques:* • WaterSense labeled irrigation *products*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Section 7.4 Totals:	Green:	Yellow:	Red:	Not Applicable:

Combine your totals for all subsections and Tribal Priority Totals from Appendix B:

Section 7 Totals:	Green:	Yellow:	Red:	Not Applicable:

Resources Water Access and Management Codes

NOTE: *The Standards of Ethical Conduct do not permit the U.S. EPA to endorse any private sector website, product or service. The U.S. EPA does not exercise any editorial control over the information you may find on non-EPA websites.*

Water Efficiency Information

- **WaterSense** – An EPA partnership program, including WaterSense labeled products, specification for new homes and Best Management Practices that protects the nation's water supply by promoting water efficiency and enhancing the market for water-efficient products, programs and practices. http://www.epa.gov/watersense/
- **Alliance for Water Efficiency (AWE)** – Water efficiency resources and a template of suggested maximum water use thresholds and standards (such as ASTM, WaterSense). http://www.allianceforwaterefficiency.org/
- **EPA Protecting Water Resources with Smart Growth** – Offers ideas on using smart growth techniques to protect water resources. Section I focuses on techniques at the regional level and Section II on site level techniques for developing water resources. http://www2.epa.gov/smart-growth/protecting-water-resources-smart-growth
- **EPA Growing Toward More Efficient Water Use: Linking Development, Infrastructure, and Drinking Water Policies** –Three sections detail: land use decisions and water systems, how smart growth can help communities reduce costs and conserve water and policy options to better manage water demand. http://www2.epa.gov/smart-growth/growing-toward-more-efficient-water-use-linking-development-infrastructure-and-drinking

Source Water Protection Information

- **EPA Guide on Source Water Protection Ordinances** – Includes model language, examples and supporting documentation. http://www.epa.gov/nps/ordinance/sourcewater.htm
- **EPA Guide on Local Planning and Regulatory Approaches to Source Water Protection** – Identifies ways that local entities can plan for and implement source water protection. Contains links to technical guidance, funding, best management practice tools and resources. http://cfpub.epa.gov/safewater/sourcewater/sourcewater.cfm?action=Protection#
- **EPA Guide on Source Water Protection Practices** – Includes topics on managing underground storage tanks.
  - http://cfpub.epa.gov/safewater/sourcewater/sourcewater.cfm?action=Publications&view=filter&document_type_id=103
  - http://water.epa.gov/infrastructure/drinkingwater/sourcewater/protection/index.cfm
  - http://water.epa.gov/infrastructure/drinkingwater/sourcewater/protection/localprotection.cfm
  - http://water.epa.gov/infrastructure/drinkingwater/sourcewater/protection/casestudies/index.cfm

Rainwater Harvest/Reuse Information

- **EPA's Rainwater Harvesting Handbook** – Handbook on managing wet weather with green infrastructure. http://water.epa.gov/infrastructure/greeninfrastructure/index.cfm
- **Tucson and Southern Arizona Water Harvesting Resources** – Rainwater harvesting and greywater reuse resources. http://watershedmg.org/sites/default/files/docs/raingraywaterrev.pdf
- **Tucson, AZ, Rainwater Collection and Distribution Requirements, Ordinance 10597, 2008** – Requires offset of 50 percent for landscape water demand using harvested rainwater. http://www.ci.tucson.az.us/water/docs/rainwaterord.pdf
- **ARCSA** – Rainwater harvesting resources and publications. http://www.arcsa.org/content.asp?contentid=6
- **Collecting and Utilizing Rainfall Runoff: A Homeowner's Manual of Ideas for Harvesting Rainwater** – A manual that highlights different rainwater harvesting techniques. http://www.dcr.virginia.gov/documents/stmrainharv.pdf
- **Tucson, AZ Commercial Rainwater Harvesting Ordinance** – First city in the U.S. to require rainwater harvesting for 50 percent of landscape water demand. http://scotie.sonoraninstitute.org/component/content/article/25-tucson-az-commercial-rainwater-harvestingordinance.html

- **EPA's Managing Wet Weather with Green Infrastructure: Municipal Handbook** – Sample rainwater harvesting policies and documents to help local officials implement green infrastructure in their communities. http://water.epa.gov/infrastructure/greeninfrastructure/index.cfm

Water Reduction Incentive Information

- **Green Building Incentives** – Example incentives offered through Indiana, Duke Energy, South Central Indiana REMC and Bloomington. http://bloomington.in.gov/green-building-incentives
- **USGBC** – Green building incentive strategies. http://www.usgbc.org/advocacy/priorities/incentives-financing

Composting Toilet Information

- **EPA Water Efficiency Technology Fact Sheet** – Fact sheet on composting toilets. http://water.epa.gov/aboutow/owm/upload/2005_07_14_comp.pdf
- **Composting Toilet World** – An organization dedicated to providing information on composting toilets. http://www.compostingtoilet.org/

Urine Diverting Dehydrating Toilet (UDDT) Information

- **Stockholm Environment Institute, Ecological Sanitation –** Provides research on systems that save water, prevent water pollution and recycle the nutrients in human excreta while to protecting against water-borne diseases. http://www.ecosanres.org/pdf_files/Ecological_Sanitation_2004.pdf
- **Stockholm Environment Institute, Urine Diversion – One Step Towards Sustainable Sanitation Report -** Report presenting research on urine-diverting systems. http://www.ecosanres.org/pdf_files/Urine_Diversion_2006-1.pdf
- **Women in Europe for a Common Future, Developing a Water and Sanitation Safety Plan in a Rural Community** – Resources on developing a water and sanitation safety plan to obtain and maintain safe drinking water and sanitation systems and to minimize related diseases. http://www.wecf.eu/english/publications/2014/WSSP-Publication.php

Water Metering Information

- **EPA Water Efficiency & Conservation** – Program guide to water efficiency. http://www.epa.gov/waterinfrastructure/wec_wp.htm
- **EPA Cases in Water Conservation** – How efficiency programs help water utilities save water and avoid costs. http://www.epa.gov/owm/water-efficiency/docs/utilityconservation_508.pdf
- **EPA Top Ten Water Management Techniques** – Top 10 water management techniques that have proven helpful in managing water use at facilities throughout the EPA. http://www.epa.gov/greeningepa/water/techniques.htm

Greywater Regulation Information

- **Arizona Grey Water Law** – Three-tiered greywater permitting approach for new construction and remodels with different requirements based on the amount of water used. http://oasisdesign.net/greywater/law/improve/ImprovementsToGWlaws.pdf
- **Tucson, Arizona, Residential Grey Water Ordinance 10579** – Requires new single family and duplex residential units to install segregated drains for greywater and blackwater plumbing fixtures to allow future greywater distribution systems. http://www.ci.tucson.az.us/water/docs/graywaterord.pdf

Innovative Wastewater Treatment Information

- **Innovative Treatment Technologies for Wastewater and Water Reuse** – EPA research to address the dynamic requirements for improved water quality and the growing demands for safe and reliable reclaimed wastewater and stormwater. http://www.epa.gov/awi/res_technologies.html
- **EPA Office of Wastewater Management** – Municipal technologies for wastewater and stormwater assistance such as constructed wetlands and decentralized systems. http://www.epa.gov/owm/mtb/

Water Efficient Landscaping Information

- **Sustainable Sites Initiative: The Case for Sustainable Landscapes** – A companion volume to the larger report, "The Sustainable Sites Initiative: Guidelines and Performance Benchmarks 2009," cited in Sustainable Sites category. http://www.sustainablesites.org/report/The%20Case%20for%20Sustainable%20Landscapes_2009.pdf
- **EPA GreenScapes** – Cost-efficient and environmentally friendly solutions for landscaping that encourage holistic decisions regarding waste generation and disposal and the associated impacts on land, water, air and energy use. http://www.epa.gov/wastes/conserve/tools/greenscapes/index.htm
- **Bay Friendly Landscaping & Gardening Coalition** – San Francisco Bay Area rating system and certified professionals program that reduces water use by 50% and runoff by 70-80% while creating vibrant landscapes and gardens. http://bayfriendlycoalition.org/
- **Tucson, Arizona, Rainwater Collection and Distribution Requirements, Ordinance 10597** – Requires offset of 50% for landscape water demand using harvested rainwater. http://www.ci.tucson.az.us/water/docs/rainwaterord.pdf

Summit Lake Paiute Tribe, Nevada

SECTION 8: ASSESSMENT – RESILIENCE AND ADAPTABILITY

To meet climate change and disaster preparedness needs, tribes and communities are looking at their codes and ordinances to promote public safety and building resiliency. Resilient buildings and communities are those that reduce vulnerability and are capable of recovering quickly from disasters. By integrating resilience and adaptability into building codes, tribal officials can improve the durability and flexibility of new and existing construction.

Key Questions (consider which are relevant to your tribe):

- Have vulnerability assessments or emergency planning been done?
- How does your tribe understand and interpret the concepts of resilience and adaptation?

- How can siting and design be used to reduce vulnerabilities and increase resilience?

Key Terms:

- **Adaptability:** The ability to change or adjust to different or varying conditions, such as fluctuating climate conditions.
- **Bioswale:** A vegetated or mulched channel that provides treatment and retention as they move stormwater from one place to another. Vegetated swales slow, infiltrate, and filter stormwater flows.
- **Passive survivability:** A building's ability to maintain habitability without relying on external utility systems for power, fuel, water or sewer services.
- **Permeable Pavement:** Paved surfaces that infiltrate, treat, and/or store rainwater where it falls. Permeable pavements may be constructed from pervious concrete, porous asphalt, permeable interlocking pavers, and several other materials.
- **Resilience:** Preventing or protecting against threats and incidents, such as extreme weather events, infrastructure discontinuity or man-made disasters.
- **Vulnerability Assessment:** The process of identifying and understanding the vulnerabilities that natural systems, human systems, buildings and infrastructure have to various threats (e.g., extreme weather, wildfires or seismic events).

Importance of Resilient Design

"…resilient design is a life-safety issue that is critical for the security and wellbeing of families in a future of climate uncertainty and the ever-present risk of terrorism"

– Alex Wilson, founder of BuildingGreen

Source: "Resilient Design: Dramatically Better Building Envelopes," Green Building Advisor, January 2012

8.1. Energy, Heating and Cooling Resilience

Building and infrastructure design should include planning for energy, heating, cooling and water systems that can withstand unpredictable climate conditions and other disasters.

Key Strategies:

- Daylighting and Passive solar design (e.g., south-facing windows)
- High level of insulation and shading
- Employ on-site renewable energy sources with backup inverters and batteries
- Install redundant systems as backups (e.g., generators)
- Move HVAC and electrical equipment above projected flood levels.

8.2 Water System Resilience

Planning for water resilience should include planning for flooding, water conservation and alternative water supply options.

Key Strategies:

- Install bioswales and permeable pavement to reduce flooding
- Multiple/large culverts to reduce flooding

- Building storm doors to resist flooding
- Water conserving fixtures and systems
- Encourage stormwater management and heat island reduction strategies such as green infrastructure, green roofs, cool pavements, etc.
- Install water reuse and rainwater systems
- Hand pumps for water

Vegetated Bioswale.

Permeable Pavement.

8.3. Disaster Resilience and Adaptability

Some tribal locales are more susceptible to disasters than others, but it is important for all tribes to assess their vulnerabilities and plan accordingly. By incorporating disaster resilience and adaptability into building and development, both disaster impacts and recovery costs can be significantly reduced.

Key Strategies:

- Assess risk and plan for possible disasters including, but not limited to:
  - Earthquakes
  - Volcanic activity
  - Flooding and high wind events
  - Fires
  - Electrical and water utility interruptions
  - Road/bridge/tunnel closures
- Firewise construction practices
  - Avoid vented roofing and gutters to reduce fire risk
  - Class A roofing

8.4. Climate Resilience and Adaptability

As local climates change, tribes may want to incorporate resilience concepts into new and existing buildings, so that they are better able to handle new pressures that may arise (e.g., increasing extreme weather events or rising sea levels). Threats will be specific to a tribe's location, so it is important to conduct vulnerability assessments to identify climate resilience planning priorities.

Key Strategies:

- Assess risk and plan for possible climate variability including, but not limited to:
  - Extreme weather
  - Wildfires
  - Relocation pressures (e.g., due to rising sea levels)
  - Need for emergency shelters to protect vulnerable populations from extreme weather conditions, flooding, etc.
- Assess local reliance on key climatic patterns (e.g., rain requirements for crop production) and plan for adaptations if shifts were to occur.
- Incorporate evolving, rather than static, predictions of climate-related stresses on structures into building codes so codes change automatically when a certain levels of impact are reached (e.g., tie annual rainfall levels to water conservation and/or greywater infrastructure code requirements).
- Climate-resilient construction practices and materials:
  - Strengthen buildings against strong winds
  - Flood proof ground floors and doors
  - Use fire-resistant design and building materials

Case Study: Rosebud Sioux Tribe, Keya Wakpala Waíçageyapi Community Development

Case study narrative provided by Rosebud Economic Development Corporation and Blue Star Studio Inc.

Project Vision Statement: *"Keya Wakpala Waíçageyapi is a safe place for all Lakota people and their neighbors who seek a unique community encouraging resilience, health, education, and helpfulness while renewing a culturally meaningful way of life."*

Keya Wakpala Waíçageyapi ("Turtle Creek Development") is a resilient Lakota community development project planned on nearly 600 acres of tribal trust lands on the Rosebud Indian Reservation in Mission, South Dakota. The Tribe has a young population, with a median age of 22, that is growing alongside poverty. The region also faces limited infrastructure and economic opportunities.

The Sicangu Lakota Oyate ("Burnt Thigh Nation") of the Rosebud Indian Reservation is one of seven tribes of the Great Sioux Nation, and is a community built on the social systems and cultural expressions of Wolakota or "all that is Lakota." This Tribal Nation holds paramount their relationship to the land, its people and the Earth.

The project is led by the Rosebud Economic Development Corporation (REDCO), the tribally chartered arm of the Rosebud Sioux Tribe. Together with a diverse stakeholder group and skilled design and engineering professionals, REDCO is committed to reinvigorating traditional homeland culture, familial tribal structure and Lakota language while nurturing economic development and community health and safety.

This commitment is manifested through the Keya Wakpala Resilient Development Master Plan, which identifies mixed-use development, including renewable and distributed energy, energy efficient housing, community support facilities, new businesses and infrastructure projects.

Indigenous design emerges from community values: its buildings and aligned function, how community members move within these spaces, what local materials are sourced and aesthetic considerations are all unique to a Tribe.

Project participation began with the spiritual and cultural leaders who imparted Lakota values and perceptions leading to the project vision statement. A survey and cognitive mapping exercise captured ideas and attitudes about the new community and desired elements. The survey started by asking some basic questions, including:

What is a "resilient green community, capable of self-sufficiency and independence?"

Participation in cultural activities including comprehension of the language and ceremony was also important to developing mutual understanding and respect.

Conceptual perspective view of the site looking over the wetlands.
Image: Blue Star Studio Inc., Copyrighted 2014

This development project is in Phase Two of a twenty-year plan. Anticipated outcomes include preservation and promotion of language, self-sufficiency and sustainable growth, community healing through the strengthening of Lakota values and the implementation of culturally relevant community standards.

The project seeks to generate 200 temporary construction jobs and at least 100 new permanent jobs. A one-acre community garden is located adjacent to the tribally-owned Turtle Creek Crossing supermarket. Near-term projects set to get underway are green community codes and covenants, energy efficient family housing, renewable energy and green infrastructure expansion, fuel/travel plaza, casino expansion, business office/retail building, crafts/farmers' market, community gardens, community house and veterans' supportive housing.

The project plan will be conducted with the following goals in mind:

- Tie into regional transportation, housing, water and air quality plans aligned to local comprehensive land use and capital investment plans.
- Align federal planning and investment resources mirroring local and regional strategies for achieving sustainable and livable communities.

- Increase participation and decision-making in developing and implementing a long range vision by populations traditionally marginalized in public processes.
- Reduce social and economic disparities for the low-income, minority communities, and other disadvantaged populations.
- Strengthen internal capacity and local tribal social, economic and environmental resilience.

Tribal Involvement: Rosebud Sioux Tribe (RST), Sicangu Wicoti Awayankapi Corporation, Ojinjintka Housing Development Corporation, Rosebud Agency Bureau of Indian Affairs, Rosebud Indian Health Service, RST Rural Water Supply System, RST Buffalo Project, Sinte Gleska University, Blue Star Studio Inc., Sustainable Nations, Rosebud Economic Development Corporation, community members.

Non-Tribal Involvement: Minnesota Housing Partnership; Rosebud Indian Health Service; South Dakota USDA Rural Development; South Dakota State University; The Rural Futures Institute of the University of Nebraska, Lincoln; Wica Agli; Enterprise Community Partners; Clinton Global Initiative.

Design Team: Blue Star Studio Inc., Sustainable Nations, Chad Renfro Design, Development Center for Appropriate Technology, Biohabitats Inc., LeBeau Development LLC, Dream Design International Inc., PAE Engineers, Rosebud Economic Development Corporation.

Code Incentive Examples

General	Targeted – Resilience and Adaptability
• Expedited permitting process • Expedited easement approval process • Permit fee waivers or reductions • Reduced inspections	• Credits or rebates for green or cool roofs • Renewable energy incentives • Incentives for bioswales or permeable pavement • Earthquake retrofit incentive programs • Incentives for innovative technologies to address resiliency • Incentives for retrofits to meet climate adaptation/resiliency goals

Questions to Assess Resilience and Adaptability

8.1. Energy and Infrastructure Resilience

Specific Question and Potential Tools and Techniques	Assessment of Question: Tribe WITH Building Codes	Assessment of Question: Tribe WITHOUT Building Codes
Do ordinances or requirements allow for passive heating and cooling? *Potential Tools and Techniques:* • *Design based on local needs and materials* • *Passive solar heating and cooling*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do ordinances or requirements support stormwater management and heat island reduction? *Potential Tools and Techniques:* • *Green infrastructure* • *Green roofs or cool (highly reflective) roofs* • *Cool pavements*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do policies or requirements allow or incentivize on-site renewable energy? *Potential Tools and Techniques:* • *Tribal renewable energy policy or incentives*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Specific Question and Potential Tools and Techniques	Assessment of Question: Tribe WITH Building Codes	Assessment of Question: Tribe WITHOUT Building Codes
Do policies or requirements allow nontraditional options for human waste management in the event of non-operating municipal wastewater systems? *Potential Tools and Techniques:* • *Emergency Human Waste Management Plan* • *Composting toilets*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do policies or requirements allow diverse and redundant systems to meet basic needs such as electricity, fuels, water, lighting, ventilation and transportation? *Potential Tools and Techniques:* • *HVAC and electrical systems above projected flood levels* • *Redundant water systems and water storage for potable uses* • *Passive solar design* • *Back-up generators* • *Daylighting*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Section 8.1 Totals:	Green:	Yellow:	Red:	Not Applicable:

8.2. Disaster Resilience and Adaptability

Specific Question and Potential Tools and Techniques	Assessment of Question: Tribe WITH Building Codes	Assessment of Question: Tribe WITHOUT Building Codes
Do codes or ordinances include a requirement for stringent earthquake engineering for all building types? *Potential Tools and Techniques:* • *Earthquake retrofit incentive programs*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do policies or requirements consider designing for access and egress in a natural disaster or other disaster? *Potential Tools and Techniques:* • *Building code requirements* • *Emergency Preparedness Plans and policies*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Section 8.2 Totals:	Green:	Yellow:	Red:	Not Applicable:

8.3. Climate Resilience and Adaptability

Specific Question and Potential Tools and Techniques	Assessment of Question: Tribe WITH Building Codes	Assessment of Question: Tribe WITHOUT Building Codes
Is periodic reevaluation of zoning and building codes or standards with respect to the latest local and or regional climate change data required by ordinances or other policies? *Potential Tools and Techniques:* • *Mapping of vulnerabilities* • *Updated climate data* • *Flexible zoning techniques such as Planned Unit Development (PUD)*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do codes or ordinances require responsiveness to changing climate conditions based on future predicted conditions? *Potential Tools and Techniques:* • *Local climate change impact projections*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do codes or ordinances incentivize or require that renovations and retrofits of existing buildings be made in response to changing climate conditions and risks? *Potential Tools and Techniques:* • *Periodic review and updating of building codes*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Specific Question and Potential Tools and Techniques	Assessment of Question: Tribe WITH Building Codes	Assessment of Question: Tribe WITHOUT Building Codes
Do ordinances or codes incentivize or require the use of evolving or innovative technologies to address resiliency? *Potential Tools and Techniques:* • *Innovation or pilot allowance code clauses* • *Periodic review and updating of building codes*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Are current or planned policies or requirements for building design responsive to evolving extreme weather events? *Potential Tools and Techniques:* • *Wind, water and fire-resistant building materials and techniques*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do current or planned policies or requirements respond to needs to handle increased stormwater flows in building or rebuilding physical infrastructure? *Potential Tools and Techniques:* • *Stormwater infrastructure planning and development* • *Bioswales, permeable pavement and/or increased culverts*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Specific Question and Potential Tools and Techniques	Assessment of Question: Tribe WITH Building Codes	Assessment of Question: Tribe WITHOUT Building Codes
Do current or planned policies or requirements take advantage of natural, biological erosion-control solutions? *Potential Tools and Techniques:* • *Utilizing compost and mulch* • *Native vegetative cover*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do zoning and siting requirements include limitations for areas of extreme wildfire risk and are there design requirements for fire protection? *Potential Tools and Techniques:* • *Mapping* • *Siting requirements* • *Design or building materials requirements*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do zoning and siting ordinances consider sea level rise and extreme storms events? *Potential Tools and Techniques:* • *Floodproof lower levels* • *Raise HVAC and electrical system above projected flood levels* • *Buffer ordinances* • *Buffer design requirements* • *Zoning and Master Plan* • *Tribal overlay* • *Environmental quality and monitoring requirements*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Specific Question and Potential Tools and Techniques	Assessment of Question: Tribe WITH Building Codes	Assessment of Question: Tribe WITHOUT Building Codes
Do current or planned policies or requirements address the possibility of temporary shelter or relocation for local populations due to climate change? *Potential Tools and Techniques:* • *Evacuation Plans and Emergency Site Plans* • *Relocation assessments*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Do current or planned policies or requirements address and allow locally available, renewable, or reclaimed resources? *Potential Tools and Techniques:* • *Emergency Site Plans*	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**

Section 8.3 Totals:	Green:	Yellow:	Red:	Not Applicable:

Combine your totals for all subsections and Tribal Priority Totals from Appendix B:

Section 8 Totals:	Green:	Yellow:	Red:	Not Applicable:

Resources: Resilience and Adaptability

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See also Land Use, Materials, Energy and Water Resources for adaptable, passive resources.

Passive Survivability

- **Environmental Building News - Passive Survivability: A New Design Criterion for Buildings** – Information on defining and achieving passive survivability and the connection to building codes. http://www.buildinggreen.com/auth/article.cfm/2006/5/3/Passive-Survivability-A-New-Design-Criterion-for-Buildings
- **Mandate Passive Survivability in Building Codes** – Explanation of the rationale for including passive survivability in building codes. http://www.finehomebuilding.com/how-to/departments/cross-section/mandate-passive-survivability-in-building-codes.aspx
- **Passive Survivability** – Information on commercial strategies for passive survivability including storm resilience, cooling-load avoidance, natural ventilation, a highly efficient building envelope, passive solar heating, natural daylighting, renewable energy and onsite water collection and storage. http://greenmanual.rutgers.edu/newcommercial/strategies/survivability.pdf

Resilience and Adaptability

- **Tribes & Climate Change Website –** Information, resources, case studies and an open forum tailored to helping Native people gain a better understanding of climate change and its impacts on tribal communities. http://www4.nau.edu/tribalclimatechange/index.asp
- **EPA Climate Change Impacts and Adapting to Change** – http://www.epa.gov/climatechange/impacts-adaptation/
  - **Overview** – http://www.epa.gov/climatechange/impacts-adaptation/adapt-overview.html
  - **Tools for Public Officials** – http://www.epa.gov/climatechange/impacts-adaptation/adapt-tools.html
  - **Promoting Generations of Self-Reliance: Stories and Examples of Tribal Adaptation to Change** – http://www.epa.gov/region10/pdf/tribal/stories_and_examples_of_tribal_adaptation_to_change.pdf
- **FEMA Building Codes Toolkit** – Guidance and tools on building codes for property owners, engineers and design professionals, building codes officials and the general public. http://www.fema.gov/earthquake-publications/building-codes-toolkit-0
- **FEMA –** Links to FEMA/private sector partnerships to support disaster preparedness and response in the building sector. http://www.fema.gov/pdf/privatesector/building_science_private_sector_v2.pdf
- **U.S. Green Building Council and the University of Michigan** - **Green Building and Climate Resilience: Understanding Impacts and Preparing for Changing Conditions** – Discusses green building options for addressing climate resilience, covering the climate impacts it addressed, the expected useful life of various approaches and LEED credit references. http://www.usgbc.org/ShowFile.aspx?DocumentID=18538
- **Metropolitan Washington Council of Governments Summary of Potential Climate Change Impacts, Vulnerabilities, and Adaptation Strategies** – A summary of lessons learned from the Metropolitan Washington Council of Governments' climate adaptation planning initiatives. http://www.mwcog.org/store/item.asp?PUBLICATION_ID=460
- **Alaska Climate Change Adaptation Planning Tool** – Tool covering climate impacts facing Alaska and a Vulnerability Risk Matrix. http://seagrant.uaf.edu/map/climate/docs/adaptation-planning-tool.pdf
- **Resilient Design Institute** – Creates solutions that enable buildings and communities to survive and thrive in the face of climate change, natural disasters and other disruptions. http://www.resilientdesign.org/
- **Environmental Building News - Checklist: Resilient Design: A Checklist of Actions** – Lists specific design approaches to help ensure that buildings are resilient to storms, flooding, temperature extremes, power loss, water shortages and

fire. http://www.buildinggreen.com/auth/article.cfm/2012/2/28/Resilient-Design-Smarter-Building-for-a-Turbulent-Future/?checklist=1

- **Environmental Building News - Design for Adaptation: Living in a Climate-Changing World** – Provides specific climate adaptation considerations and techniques. http://www.buildinggreen.com/auth/article.cfm/2009/8/28/Design-for-Adaptation-Living-in-a-Climate-Changing-World

Floods

- **FEMA Building Code Resources for Floods and Other Hazards** – Summarizes flood resistant building codes, related resources and National Flood Insurance Program requirements. http://www.fema.gov/building-code-resources
- **Improving the Flood Performance of New Buildings: Flood Resilient Construction** – Guidance on designing buildings for flood resilience developed from the Department for Communities and Local Government: London and the joint Defra/Environment Agency Flood Risk Management Research and Development Programme. http://www.planningportal.gov.uk/uploads/br/flood_performance.pdf

Earthquakes

- **FEMA Earthquake Building Codes** – Seismic building codes and seismic retrofit information. http://www.fema.gov/earthquake/building-codes
- **FEMA QuakeSmart** – A National Earthquake Hazards Reduction Program (NEHRP) initiative to help businesses in at-risk earthquake communities implement earthquake mitigation. http://www.fema.gov/quakesmart
- **Association of Bay Area Governments Earthquakes and Hazards Program** – http://quake.abag.ca.gov/resilience/

Fire

- **Firewise Communities** – Provides information on building and landscaping practices to reduce wildfire risk. http://www.firewise.org

Heat Island Effect

- **EPA Heat Island Effect** – Resources on reducing the urban heat island effect including: trees and vegetation, cool roofs, cool pavements and green roofs. http://www.epa.gov/hiri/index.htm

Grid Alternatives Solar Installation, Hopland Band of Pomo Indians, California

SECTION 9: CODE IMPLEMENTATION AND COMPLIANCE

There are many ways tribes can promote and ensure building and land use codes are adopted and complied with, including through traditional tribal governance structures or by creating new regulatory building and zoning departments.

Since tribal circumstances and needs are both extremely diverse, and often differ from those of most non-tribal communities, adoption and implementation strategies should be carefully considered by each tribe.

In addition, many green building and sustainable development practices align well with tribal goals and needs.

Key Questions:

- Have tribal goals been established for green building design, construction and sustainable land use development practices?
- Is there a process to incorporate tribal goals for green design into building and land use codes?
- Is there a process to ensure that the parties responsible for code compliance are knowledgeable about the green building goals and requirements?
- Is there an appeals process to address code implementation conflicts or disputes that may arise during different phases of a construction project?
- Is there a process in place for notice of planned adoption and implementation of new codes, standards or policies?
- Is the legal authority for any implementation and compliance activity included in the code adoption process?
- Has a periodic codes review cycle been developed?

Key Strategies:

- Identify code implementation and compliance approaches that are available and appropriate for the tribe to utilize:
  - Follow traditional governance processes
  - Develop relationships with builders and contractors to achieve collaborative, on-site construction problem solving. Notify those who will be affected (builders, planners, community members, etc.) and provide opportunities for questions and input for improving the implementation and compliance process
  - Hire an experienced building inspector
  - Train staff to conduct building inspections and provide green building education
  - Work with a local jurisdiction(s) to provide inspection support
  - Hire a third-party code inspector
- Conduct periodic reviews and updates of codes, standards and policies. Create and approve a process or policy that defines:
  - Time increments for review,
  - The review process,
  - Who should carry out the review and
  - How the results of the review will be presented to the appropriate tribal decision makers.
- Develop procedures for gathering feedback to inform the next review cycle and ensure that potential problems that arise in the interim can be addressed in a timely manner.

What Advantages Could my Tribe Gain by Implementing Green Building Codes?

Tribes are potentially in a better position than other communities to incorporate sustainable practices into their regulatory requirements because they may not need to overcome existing barriers within conventional codes, standards and policies.

Some conventional building codes have presented barriers to green building practices because they address a narrower set of hazards related to building.

Additionally, tribal sovereignty enables tribes to choose how best to address their needs and desires for managing building and development on their lands.

Compliance with Existing or New Land Use and Building Codes

Building codes are only effective to the degree they are followed. Ensuring code compliance requires both a process to review building plans to confirm that they meet regulatory requirements, as well as a process to review and approve variations.

Few tribes have fully staffed building or planning and zoning departments like those found in county or state governments. Therefore the processes for plan submittal and review for building and development are often handled in other ways. Tribes can develop plan review, inspection and code compliance capacity or work with building code enforcement experts to implement and ensure codes are followed.

Many non-tribal communities hire outside or private plan review and inspection services. Small communities often hire a single building official/inspector to serve multiple jurisdictions so they can share the expenses. Some tribes may be able to take advantage of similar arrangements with other tribes or with local or regional building departments. Regardless of the method used to provide inspections or plan review, a financial mechanism needs to be in place to pay for these services for long-term viability of the program.

What Should an Implementation Plan and Budget Include?

- Staffing needs
- Training needs
- Timeframes
- Defined organizational and operational structure
- Inter- and intra-departmental relationships and responsibilities
- Estimated costs
- Funding sources
- Fee schedule

Within tribal communities there can also be culturally-specific community engagement methods. These methods can inform the development of a tribe's code implementation and compliance strategy. For example, working with community builders and using engagement and mediation strategies have been used to minimize tribal code compliance issues.

Some tribes use other compliance processes when work is done by tribal entities or designers, contractors or developers with long-standing relationships and reliable past performance.

Key Questions:

- Has the tribe developed and adopted policies for building and land use code enforcement, which provide for timely plan review, approval and inspection services?
- Have appropriate community engagement methods been used to inform the tribe's compliance and enforcement strategy?

Examples of Tribal Code Inspection and Compliance Techniques:

- Training staff to conduct building inspections
- Hiring an experienced building inspector
- Working with a local jurisdiction to provide inspection support
- Hiring a third-party code inspector
- Using informal processes or mediation

Case Study: Agua Caliente Band of Cahuilla Indians

The Agua Caliente Band of Cahuilla Indians, located in Southern California, adopted its own Tribal Building and Safety Code in 1999.

The Code was most recently amended in January 2014 to reflect current industry standards. With this amendment, the Tribe incorporated by reference the latest International and California Building Codes (2013 edition), including the California Green Energy Code. By referencing these codes within the Tribal Building and Safety Code, the Tribe ensures that each project it reviews and approves meets the most current industry standards.

The Tribal Building and Safety Code is designed to:

- provide minimum standards to safeguard life or limb, health, property and public welfare by regulating and controlling the design, construction, quality of material, use and occupancy, location and maintenance of all buildings and structures on the Agua Caliente Indian Reservation not covered under a land use contract between the Tribe and a local jurisdiction;
- provide practical safeguarding from hazards arising from the use of electricity, heating, ventilating, cooling, refrigeration systems and incinerators; and
- adopt and enforce rules and regulations necessary to clarify the application of the provisions of the Code.

Permit fees are based on local cost of construction as well as Building Valuation Data as published by the International Conference of Building Officials.

The Tribe utilizes a third-party contractor to perform building and safety functions within the Tribe's jurisdiction. The designated Tribal Building Official is responsible for administering, enforcing and rendering interpretations of all provisions of the Tribal Building and Safety Code. Under the direction of the Tribal Building Official, qualified building and safety experts are authorized to enter upon private or public property to enforce the Code – including inspections, re-inspections and/or testing of any work performed.

Any violation of the Code is considered unlawful and a public nuisance which may result in any of the following: a stop work order, a notice to correct order with a specific timeline or administrative violations (including fines and potential suspension, revocation or denial of licenses or permits issued).

In addition to the Tribal Building and Safety Code, the Tribe recently participated in a local Voluntary Green Building program, which stemmed from a valley-wide greenhouse gas reduction program called Green for Life. The program was funded by grants through Southern California Edison, and it was managed locally by the Coachella Valley Association of Governments. The Voluntary Green Building program provided the Tribe with manuals for distribution to Tribal Members and other interested parties, which provided detailed illustrations explaining how to improve energy efficiency in one's residence or place of business.

Agua Caliente Ordinance: http://www.aguacaliente.org/downloads/Ordinance26.pdf

Tribal Involvement: Tribal Council, Tribal Building Division, Tribal Planning Division.

Non-Tribal Involvement: Coachella Valley Association of Governments, Southern California Edison.

Available Resources: Implementation and Enforcement

NOTE: *The Standards of Ethical Conduct do not permit the U.S. EPA to endorse any private sector website, product or service. The U.S. EPA does not exercise any editorial control over the information you may find on non-EPA websites.*

- **Department of Energy Building Energy Codes Program** –
  - Resource Guides on energy code compliance for designers, policy makers, code officials. http://www.energycodes.gov/resource-center/resource-guides
  - Model Policies for commercial and residential building, with examples. http://www.energycodes.gov/resource-center/model-policies
  - Regional Energy Efficiency Organizations – Though these groups primarily deal with state and local codes, they can be helpful as regionally knowledgeable resources. http://www.energycodes.gov/resource-center/related-links
- **Shared Enforcement of the Uniform Code and Energy Code** – A guide prepared by New York State on increasing efficiency by sharing code administration and enforcement responsibilities with one or more other local governments or contracting with a private, non-governmental provider to perform code enforcement services. Sample agreements are included. http://www.dos.ny.gov/LG/publications/CODE%20ENFORCEMENT/How%20To%20Book%20-%20May%202008.htm
- **Southwest Energy Efficiency Project (SWEEP)** – Publications on energy code implementation and enforcement. http://swenergy.org/publications/category.aspx?CategoryID=2

Havasupai Tribe, Arizona: Little Navajo Falls

SECTION 10: A PLAN TO UPDATE, ADAPT, ADOPT OR DEVELOP NEW CODES

Completing the Assessment Section of this Toolkit is a first step in achieving greener building codes for a tribe. **Below is a more comprehensive process that can help whether the tribe is updating, adapting or adopting existing codes or is developing new building codes.** Available resources, the timeframe in which the tribe wants to have greener codes in place and the availability of information will impact each tribe's code development and adoption process.

STEP 1: Complete the Toolkit Assessments and Conduct Initial Research

STEP 2: Review and Refine Priorities – Community Visioning

Steering Committee Planning

Community Assessments

Goal Setting Meeting
Design Workshop
Plan Review and Presentation

STEP 3: Assess Strengths, Weaknesses, Opportunities, and Barriers

STEP 4: Choose Approach and Types of Code(s)

STEP 5: Finalize Code for Tribal Government Approval, Adoption and Implementation

Finalize the code language, technical research and requirements
Plan approval, legal adoption and update process
Create communication strategy (tribal government, community, builders, others)
Seek approvals and legal adoption
Contract or hire, train and support staff
Community engagement and support

STEP 6: Create Implementation and Compliance System

STEP 7: Evaluate and Update the Code as Needed

STEP 1: Complete the Toolkit Assessment Section and Conduct Initial Research

Before creating an Action Plan, be sure to complete the Toolkit Assessment Section to help outline the tribe's green building priorities. Instruction for how to complete the Toolkit can be found in **Section 2**.

Based on the tribe's priorities, conduct initial research on:

- Historic and current ways that buildings and land use practices contribute to the community.
  - Are there buildings that serve community members particularly well, promote a healthy lifestyle and or balance with the local ecology?
  - Who has knowledge and understanding of the built and natural environment relationship from the tribe's perspective? What is this relationship?
    - What traditional and local building materials should be considered?
    - Which traditional activities can the code support/facilitate?
    - What are current health problems facing the community that relate to land use and the built environment – both outdoor and indoor?
    - Which health-promoting behaviors and actions can be promoted by building codes?
  - How have building locations, designs and construction practices been determined?
    - Who makes these decisions and through what process?
  - Are there buildings or land uses that are good (or bad) models for future development?
- Identify any potential partners that your tribe may want to coordinate with (nearby tribes, state or local government code officials, green building organizations, etc.).
- Assess codes that may be useful to review:
  - What green codes exist?
  - What green codes appear to meet the tribe's priorities?
  - What codes or standards were used in the construction of buildings in the community? By the housing authority? What are the lessons learned from construction and operation or use of those buildings?
  - Are there codes or standards that are required when accessing particular funding (HUD, BIA, etc.)? What are the lessons learned from construction and use of those buildings?

    - What building codes, standards or guidelines are being used by nearby tribes, local and state government, and registered architects and engineers? What can be learned from them to address tribal priorities and local issues, for example seismic design, local climatic conditions, etc.?
    - What type of construction is being planned (commercial or residential)?
- What traditional tribal governance practices might be incorporated into the code structure?
- Is there a need to support flexibility for tribal members to build their own homes?
- What tribal entities and outside agencies will be involved in or affected by code development and adoption?
- Can community members be part of the process of code development?
- Are insurance carriers insuring properties in the community and would green building codes impact this?

STEP 2: Review and Refine Priorities – Community Visioning

One way to refine the tribe's green building priorities is to undergo a community visioning process. Through this process, the tribe can identify community priorities and compare them to the Assessment Tool findings to inform code development. For example, if a community priority is to conserve water resources, the plumbing component of the building code could be written to require or provide incentives for greywater use and low-flow water fixtures for all new construction.

For tribes with codes, the Toolkit helps identify areas where codes could be updated to incorporate more green building elements. When determining how to update the existing codes, it can be useful to list and prioritize all of the areas within the codes where the Assessment questions were answered **RED** and **YELLOW**.

For tribes without codes, the Toolkit helps identify where the tribe already intends to incorporate **GREEN** building elements into their codes, and provides references and ideas for doing so. The Toolkit also identifies areas within the planned codes that **do not** fully incorporate **GREEN** building elements, as indicated by the Assessment questions that were answered **RED** and **YELLOW**. For these areas, the tribe may want to reconsider opportunities to prioritize more sustainable options to incorporate within their codes.

The questions below can help **tribes with or without codes** identify how the tribe can address the **RED** and **YELLOW** areas to make their codes more **GREEN.**

- What are the tribe's Assessment priorities to include as amendments, in a tribal overlay or as a new code?
- Do the Assessment priorities predominantly fall in one category or are they randomly distributed?
- What are the most important sustainability topics for the tribe to focus on? If this is not known, one way to determine the most important topics is by completing a community visioning process outlined in the **Tribal Green Building Visioning Process**, summarized below.

Example – Tribal Green Building Visioning Process

Each tribe's visioning process may be different. Here are some steps to consider.

- **Steering Committee Planning –** Identify who should be involved in the planning process (e.g., tribal government officials, elders, residents, architects, land use planners, natural resource experts, building users, etc.) and explain this process to all interested, eligible participants. Select a steering committee. A design team could also be chosen at the same time.

- **Community Assessments –** Determine how involved other members of the tribe want to be in the planning process. If they want to be involved, form focus groups, plan public meetings or go to established events where they can participate.
- **Goal Setting Meeting –** Set goals for your planning process (What is the potential vision? When will we complete the planning process?).
- **Design Workshop –** The steering committee and design team create a community concept plan, with input from the participating community members. The design team obtains the materials and feedback needed to create a draft Community Vision Plan.

Remembering

Related to community visioning, tribal members have encouraged "remembering" to look to past wisdom and knowledge of traditional ways that ensured safe, healthy housing and was aligned with tribal values.

This wisdom and knowledge can be incorporated into the tribe's code framework or code requirements.

- **Plan Review –** The design team presents the Community Vision Plan to the steering committee and participating community members, who will provide feedback for improvements.
- **Plan Presentation –** The design team will make final changes and present the plan to the steering committee and community for approval.

For more information on community visioning, visit the EPA Green Communities website: http://www.epa.gov/greenkit/index.htm

STEP 3: Assess Internal and External Barriers and Opportunities for Change

Tribal governments should consider which green building practices might have initial internal or external support or resistance. For example, if the tribal government knows a particular group has championed sustainability or has not been supportive of some sustainable design practices, a conversation should be started with them early in the process. Although it is difficult to anticipate potential issues early in the process, thinking them through can be helpful.

Assess Your Tribe's Internal Conditions

The following questions should be considered to gain a better understanding of the current internal conditions, and how they will impact developing, adapting or adopting codes:

- What opportunities and/or obstacles exist to achieve code development, implementation, and compliance?
  - Are sufficient or limited staff resources and knowledge available?
  - Are cultural beliefs reflected or disregarded by the proposed code?
  - Do community members support or disapprove of building codes and sustainable building?
- Can the tribe engage the community, builders and contractors to comply with the code?
- What is the tribe's capacity to implement the building code?
  - Is there sufficient staff and technical expertise to develop and implement the priorities?
  - Are additional resources needed to develop and implement the priorities?
- Is it more efficient to "bundle" the code priorities or implement them one-by-one?

- Should the tribe reevaluate whether improving existing codes, adopting codes, creating codes or some combination of these strategies is the best approach?
- Does the tribe need to reevaluate the existing or proposed process for implementation and compliance?
- What departments or tribal organizations will be affected by new or proposed changes to code/ordinances and implementation/compliance?
  - Have these departments or tribal organizations been given the opportunity to engage in the process?
  - Who are the specific people that would be directly affected?
  - What are their roles during the regulatory process and how would the proposed changes impact their roles?
  - Does the information sharing process or internal structure (e.g., the inter-departmental dynamics that dictate how permits are currently issued and complied with), need to be modified?
- What level of internal support does your tribe's government have for permitting changes?
  - Are there "champions" within tribal departments or tribal organizations?
  - Are there "champions" in tribal leadership?
  - Are there "champions" among the tribe's architects, builders or contractors?
- To what extent can the proposed regulatory changes be tried on a limited scale (e.g., first start with commercial development) before scaling up revised codes/ordinances for other sectors (e.g., residential)?
  - Would small scale application hurt or help promote the proposed changes?
  - Is implementing or phasing the changes dependent on funding the changes?

Assess External Conditions that May Affect Your Tribe

This section deals with identifying and working with external stakeholders and consensus building processes.

- Which outside entities could be affected by tribal building code changes, which have strong interest(s)?
  - Is there local government elected official (e.g., city council) interest, engagement and/or oversight?
  - Are there frequent conversations with non-profit groups, developers or builders?
  - How effective is the tribal government's ability to communicate with external parties to:
    - Make a compelling case for change?
    - Share information in a timely manner?
    - Understand expectations from the various internal and external stakeholder groups?
  - What additional information is needed to make decisions from an external perspective? Are these information needs similar to the internal needs?
  - What level of external support does the tribal government have for the proposed regulatory changes?
    - From federal agencies, other tribal government, state, county, etc.?
    - From the affected community—developers, builders, owners, etc.?
    - From non-governmental and civic organizations—environmental groups, local watershed groups, community groups, etc.?
    - From civic leaders and the general public:
      - Is this an issue that has been raised with the public before?
      - Is this an issue the public will actively care about?
      - Does the tribal government need active public support for this permitting change?
  - To what extent are the changes consistent with the non-tribal community's policies, mission or vision?
  - Have other tribal or local governments of similar size, geographic location, etc., adopted similar changes?

- Is it helpful to external parties to know that the proposed changes have been implemented elsewhere?
- Is it helpful to external parties to know that the tribal community would be the "first" (e.g., in the area, state, region, etc.) to try something new?

- What is the timing of the potential regulatory change?
  - Are the elected officials up for re-election or new to the tribal government?
  - Is the change being proposed during a busy or slow regulatory season?
  - Is the change occurring during a period of high or slow economic growth?
- Would a small scale application of proposed changes or a broader sustainable design or green building program be more likely to succeed?

Green Building Practices that May be Restricted by Conventional Codes:

- Rainwater use
- Greywater use
- Composting, non-water or urine separating toilets
- Ultra low tech materials and techniques
- Wall systems of adobe, straw bale, light straw clay, rammed earth, cob, hemp lime, woodchip clay, stone, cordwood, earthbag, tire, bamboo
- Green roofs
- Rubble trench foundations
- Rocket mass heaters
- Earthen floors
- Very small house sizes
- Constructed wetlands for wastewater treatment
- Super-efficient HVAC-free buildings

STEP 4: Choose Approach and Type of Building Code

A tribe looking to use codes for the first time or to change the codes currently used has a variety of choices. Four common choices for new codes are:

1. **Adopting** existing "off the shelf" codes
2. **Adapting** existing "off the shelf" codes
3. **Creating** a new code or codes or a new style of regulatory tool
4. **Combining** the above

Adopting Existing Codes

- Adopting existing codes may involve the least investment of time, effort and expertise of any of the code choices, although costs for purchasing codes and related standards may be high.
- Existing codes are typically extensive documents requiring expertise in interpretation and compliance.
- Most existing codes were not developed for or by tribes, and therefore may not address all needs or address needs well.
- Adopting existing codes typically includes basic amendments for local climatic and other conditions such as seismic risk factors, termite intensity, radon risk, etc.
- Some existing codes may restrict specific green building practices a tribe wants to utilize.

Adapting Existing Codes

- Tribes can adapt existing codes to include tribal priorities, local and cultural elements.
- Adapting existing codes can be a balanced way of using tribal resources to reach tribal goals.
- Adaptation of existing codes can include basic amendments mentioned above as well as more extensive changes such as deleting or adding sections or changing provisions.

- Adaptation can include selection of relevant appendix chapters that are available with some codes.
- Adapting existing codes may not change the complexity of the document and may not work well for some tribes.
- Use of a **tribal overlay** is one way to use an existing code while adding tribal priorities and local and cultural elements, such as:
  - Multigenerational homes
  - East-facing entry doors
  - Landscaping with native edible and medicinal plants
  - Large cooking and kitchen ventilation systems
  - Storage areas for tribal regalia, materials, or clothing
  - Passive solar design
  - Solar ready construction (for PV and/or Solar Hot Water)
  - Community involvement in design and construction
  - Preference for local and historical materials and methods
  - Material reuse

How to Use Tribal Overlays

The tribal overlay could be described as a "cultural code." An overlay can provide intent statements as in a performance code or specific requirements as in a prescriptive code about tribal goals for green building and cultural values that exceed or add to adopted codes.

Example intent statement: To incorporate water conservation, harvesting and reuse into projects whenever possible.

Example specific requirement: the maximum flow rate of a kitchen faucets shall not exceed 1.8 gallons per minute at 60 pounds per square inch (psi).

Creating New Codes

New codes can:

- Be comprehensive or limited to a specific purpose,
- Specifically support the tribe's unique vision, priorities and risks,
- Be simple or complex, and written in technical or non-technical language,
- Provide opportunities to develop a new code framework to align with current or traditional governance structure,
- Require expertise and experience with codes, green building and land use.

Developing codes for a tribe's unique goals can be an effective path towards achieving the tribe's envisioned future. Well-crafted codes can support tribal sovereignty and provide regulatory authority to achieve community goals. Options to exercise regulatory authority on non-tribal lands may be more limited, but many opportunities still exist to support green and culturally relevant development. A tribal code can also guide development projects owned or built by the tribe on non-tribal lands.

The choice to **adopt, adapt** or **create** a new code should be carefully considered. Conventional building and land use codes are extensive documents and typically updated on a three year cycle. An important consideration in choosing to develop a full code is a tribe's capacity to both develop and regularly update a code.

Kayenta Township, Navajo Nation, Arizona: Northeast Arizona Technical Institute for Vocational Education. *Photo: Kayenta Township Building Department*

Kayenta Township on the Navajo Nation adopted the International Green Construction Code (IgCC) with code electives to protect greenfields, conservation areas and agricultural land. The code was used on the Northeast Arizona Technical Institute for Vocational Education campus.

For a Tribe Adapting or Adopting Existing Code

If your tribe has not previously adopted codes or has limited resources, consider adapting or adopting an existing green building or land use code. Included at the end of this section is a list of existing codes, standards and other resources to consider when adapting or adopting codes. The tribe's priorities can be incorporated by using a tribal overlay with an existing code, simplifying an existing code with clear intent statements, phasing codes in over time or shifting from voluntary to eventual mandatory requirements.

For a Tribe Creating an Entirely New Code

The development of an entirely new code may serve some tribes better than anything that currently exists. Desire for a customized code to meet tribal goals, or a code written in less technical language may drive the decision. Traditional governance structures, blending of traditional knowledge and other elements, or the desire to involve elders may inform a new structure for a code unique to a specific tribe. Included at the end of this section is a list of resources that may be relevant for a tribe to consider when developing new codes.

Example of Unique Format for a New Tribal Code

The Green Building Code of the Big Sandy Rancheria includes requirements and options, with a reasoning statement that functions like the objectives in a performance code, and offers helpful resources to educate and ensure best practices. The code is infused with formatting elements from the Rocky Mountain Land Use Institute's Sustainable Community Development Framework.

http://www.law.du.edu/index.php/rmlui/rmlui-practice/code-framework/model-code

STEP 5: Finalize Code for Tribal Government Approval, Adoption and Implementation

- Finalize the code to be approved by the tribe's government
  - Conduct technical research and set requirements
  - Plan approval and legal adoption process
  - Plan periodic review and update process
  - Create communication strategy for the community, tribal government, builders and others
- Seek approvals and legal adoption
- Contract or hire and train staff
- Conduct community engagement and provide support

STEP 6: Create an Implementation Plan and Compliance System

An implementation plan and compliance system are key parts of successful code adoption. This is especially true when methods or materials, such as cultural building practices or local building materials, are introduced or implemented for the first time.

Key elements of an implementation plan include budgets, timeframes, staffing needs, defined organizational and operational structure and inter- and intra-departmental relationships and responsibilities, funding sources and fee schedules.

Key elements of a compliance system include developing good relationships with building designers, builders, contractors and residents. They system should cover plan review, inspection schedules and procedures, compliance and/or corrective action procedures and an appeals process.

STEP 7: Evaluate and Update the Code as Needed

An essential role of codes is to incorporate current knowledge of land use and building materials and methods while responding to updated information about risks and changing conditions. A regular review and update cycle should be incorporated into the model code development processes every three years.

Whether a tribe creates their own code or adopts an existing code that is updated through a process, a tribe should establish a regular review of adopted codes to respond to changes in information, risks and conditions to:

- Assess how well the code adoption process worked
- Evaluate code implementation and compliance efforts
- Identify adjustments or additional actions that are needed.

For more information on code development, visit the EPA Tribal Building Code Development website:

http://www.epa.gov/region9/greenbuilding/codes/

Resources for Updating, Adapting, Adopting or Developing New Codes

NOTE: *The Standards of Ethical Conduct do not permit the U.S. EPA to endorse any private sector website, product, or service. The U.S. EPA does not exercise any editorial control over the information you may find on non-EPA websites.*

Existing codes, standards and other resources that may be relevant for a tribe to consider when adapting or adopting codes.

Tribal Green Building Resources

- **EPA Tribal Green Building Codes Development website** – http://www.epa.gov/region9/greenbuilding/codes/
- **EPA Tribal Codes Working Group** – http://www.epa.gov/Region9/greenbuilding/tribal-workgroup.html
- **Sustainable Native Communities Collaborative** – http://www.sustainablenativecommunities.org/
- **CalRecycle Buying and Building Green in Indian Country** – http://www.calrecycle.ca.gov/publications/Documents/GreenBuilding%5C43304004.pdf

Comprehensive Life Safety Codes

- **International Residential Code** – http://publicecodes.cyberregs.com/
- **International Building Code, Fire, Plumbing, Mechanical and other codes** – http://publicecodes.cyberregs.com/
- **International Performance Codes for Buildings and Facilities** – http://publicecodes.cyberregs.com/
- **California Building Standards Codes with Chapter 11 California Green Building Standards Code (CALGreen)** – https://law.resource.org/pub/us/code/safety.html

Green Codes that Overlay Comprehensive Life Safety Codes

- **International Green Construction Code** – http://publicecodes.cyberregs.com/
- **International Energy Conservation Code** – http://publicecodes.cyberregs.com/
- **Green Plumbing & Mechanical Code Supplement** – http://iapmomembership.org/index.php?page=shop.product_details&flypage=flypage_iapmo.tpl&product_id=4&category_id=6&option=com_virtuemart&Itemid=3
- **Uniform Solar Energy Code** – http://iapmomembership.org/index.php?page=shop.product_details&flypage=flypage_iapmo.tpl&product_id=709&category_id=41&keyword=solar+energy&option=com_virtuemart&Itemid=3
- **Sustainable Community Development Code Framework** – http://www.law.du.edu/index.php/rmlui/rmlui-practice/code-framework
- **Oregon Energy Code** – http://www.bcd.oregon.gov/programs/energy.html
- **Washington Energy Code** – https://fortress.wa.gov/ga/apps/sbcc/page.aspx?nid=14

Green Standards, Rating and Labeling Systems and Points Programs

- **ENERGY STAR Certified New Homes** – http://www.energystar.gov/index.cfm?c=new_homes.hm_index&s=mega
- **EPA WaterSense Specifications for New Homes** – http://www.epa.gov/watersense/new_homes/homes_final.html
- **LEED for Homes** – http://www.usgbc.org
- **LEED for Neighborhood Development** – http://www.usgbc.org
- **Enterprise Green Communities Criteria** – http://www.enterprisecommunity.com/solutions-and-innovation/enterprise-green-communities/criteria
- **Evergreen Sustainable Development Standard** – http://www.commerce.wa.gov/Programs/housing/TrustFund/Pages/EvergreenSustainableDevelopment.aspx

- **Sustainable Community Development Code Framework** – http://www.law.du.edu/index.php/rmlui/rmlui-practice/code-framework
- **Home Energy Rating System (HERS)** – http://www.resnet.us/energy-rating
- **Living Building Challenge** – http://living-future.org/lbc
- **Green Globes** – http://www.greenblobes.com
- **Green Guide for Health Care** – http://gghc.org/
- **Collaborative for High Performance Schools Criteria** – http://www.chps.net/dev/Drupal/node/212
- **LEED for Schools** – http://www.usgbc.org/leed/rating-systems/schools

Resources for Developing New Codes

- **EPA Green Building Standards** – Summarizes and provides comparisons of some green building standards and codes. http://www.epa.gov/greenbuilding/standards/
- **Department of Energy, Going Beyond Code** – A guide to Creating Effective Green Building Programs for Energy Efficient and Sustainable Communities. http://www.energycodes.gov/sites/default/files/documents/GoingBeyondCode.pdf
- **Development Center for Appropriate Technology** – Works on sustainability and appropriate technology in relation to the built environment, building codes, standards, public policy. http://www.dcat.net
- **Ecological Building Network** – Promotes intelligent design, clean energy and healthy building materials. http://www.ecobuildingnetwork.org
- **Oasis Design** – Provides guidance about rainwater harvesting, gray water systems and integrated approaches to sustainability. http://www.oasisdesign.net
- **Building Codes Assistance Project's Online Code Environment and Advocacy Network (BCAP OCEAN)** – A collection of useful information about energy efficiency, renewable energy, green building codes and code resources. http://ww.bcap-ocean.org
- **The New Buildings Institute** – Assesses technologies, promotes design approaches, and helps guide policies and programs that will significantly improve the energy efficiency of buildings. http://www.newbuildings.org
- **Pacific Northwest Pollution Prevention Resource Center** – Provides an online archive of green building codes and standards. http://ww.pprc.org/pubs/greencon/code_std.cfm#codes
- **Columbia Law School Center for Climate Change Law Model Ordinances** – Provides best practices for municipal ordinances covering green buildings, wind and solar resources. http://www.law.columbia.edu/centers/climatechange/resources/municipal
- **Codes and Hannover Principles** – A living document supporting the understanding of human's interdependence with nature. http://www.mcdonough.com/writings/principles_practices_and.htm
- **Architecture 2030** – Establishes a challenge and resources for carbon-neutral buildings that use no fossil fuel, greenhouse-gas-emitting energy to operate. http://architecture2030.org/action/governments
- **Public Resource.org** – Maintains a list of safety codes adopted as law in state and select jurisdictions across the U.S. https://law.resource.org/pub/us/code/safety.html
- **2012 Washington Energy Prescriptive Checklist** – A visual guide to the Washington state energy code. http://www.energy.wsu.edu/Documents/2012_Prescriptive_Checklist.pdf

Summit Lake Paiute Tribe, Nevada

SECTION 11: CONCLUSION

Tribes have shown strong interest in developing healthy, green affordable housing; and in many tribal communities there is great need for such housing.

The U.S. EPA and the Tribal Green Building Codes Workgroup are interested in learning about your experiences using this Toolkit and with tribal green building practices. We welcome your feedback via email at **tribalcodes@epa.gov**.

APPENDIX A: GENERAL GREEN BUILDING RESOURCES

This appendix contains general green building codes and sustainable land use policies.

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ASHRAE

- **ASHRAE Standard 189.1** – Standard for the Design of High-Performance Green Buildings – Except Low-Rise Residential Buildings: http://www.ashrae.org/resources--publications/bookstore/standard-189-1

U.S. Green Building Council

- **USGBC** – Offers green building rating standards for new commercial construction and major renovations, residential construction and major renovations, and new construction standards for specific building types – http://www.usgbc.org
- **Roadmap to Sustainable Government Buildings** – This document guides government staff and officials in the development of a green building program based on the USGBC's LEED rating system. http://www.usgbc.org/resources/roadmap-green-government-buildings
- **USGBC Green Home Guide** – http://greenhomeguide.com/

Green Building Initiative

- **GBI** – A nonprofit organization accelerating the adoption of green building practices through the Green Globes and Guiding Principles cimpliance ans assessment programs. http://www.thegbi.org
- **Green Globes** – A green rating assessment, guidance and certification program for new construction, existing buildings and interiors. http://www.thegbi.org/green-globes-certification/

International Code Council

- **The International Green Construction Code** (I*g*CC) – References ICC-700 and ASHRAE 189.1 and is applicable to residential and commercial construction. http://www.iccsafe.org/cs/igcc/Pages/default.aspx
- **Code Adoption Resources** – Briefing papers on technical issues, samples of ordinances, endorsements and support materials from national organizations. http://www.iccsafe.org/gr/Pages/resources.aspx
- **ICC Green Resources Center** – Includes sections of resources for Green Building Design Tools and Resources and Green Building Program/Initiative Development Tools and Information. http://www.iccsafe.org/Communities/Green/Pages/ResourceCenter.aspx
- **ICC Communities of Interest** – A community meeting place for ICC members interested in the environmental impact of the buildings and in creating and using healthier and more resource-efficient models of construction, renovation, operation, maintenance and demolition. http://www.iccsafe.org/Communities/Pages/default.aspx

National Home Builders Association

- **NAHB/ICC-700-2008 National Green Building Standard** – Defines green building for single and multifamily homes, residential remodeling projects and site development projects. http://www.nahbgreen.org/ngbs/default.aspx

Green Tools

- **Whole Building Design Guide** – The goal of the guide is to create a successful high-performance building by applying an integrated design and team approach to the project during the planning and programming phases. http://www.wbdg.org/
- **Resource for General Green Technologies: The National Association of Home Builders Research Center** – Green technologies and practices are detailed to include summaries, manufacturers and resources. Information is provided on where the technologies or practices lie in terms of code acceptance. http://www.toolbase.org/ToolbaseResources/level3.aspx?BucketID=2&CategoryID=17
- **BCAP Code Builder Tool** – Provides information on advanced codes, explains terminology, references current practice of specific measures and applicability. The Code Builder also serves as a clearinghouse for next-generation code changes – including advances and green measures used in high performance homes. http://www.resnet.us/blog/bcap-unveils-code-builder-tool-on-advanced-codes/
- **The Chartered Institution of Building Services Engineers (CIBSE): Sustainability Tool** – Offers assistance on the following issues: energy and CO2 emissions, water use, adapting buildings for climate change, flood risk, sustainable drainage systems, transport, ecology and biodiversity, pollution, health, waste, lifecycle impacts of materials and equipment, local environment and community. http://sustain.cibse.org/
- **CalRecycles Sustainable Building Tool Kit** – Sustainable building case studies, virtual tours and research. http:// www.calrecycle.ca.gov/GreenBuilding/Toolkit.htm

Government and Nonprofit Resources

- **The District of Columbia City Council Enacted Legislation** – Requires all new government buildings to go green. By 2012, all new buildings larger than 50,000 square feet—public or private— must conform to green standards. http://www.greenbuildinglawupdate.com/articles/codes-andregulations/city/
- **New Mexico Executive Order 2006-001** – Requires all new state buildings and major renovations meet The 2030 Challenge's call for a 50 percent reduction in fossil-fuel energy consumption from what traditional buildings use by using a LEED-based system. http://energycodesocean.org/policy-actiontool/Level-II
- **San Jose City Council Green Building Ordinance** – Establishes green building requirements for new, private sector construction. http://www.sanjoseca.gov/clerk/Agenda/20090623/20090623_0702ord.pdf
- **Seattle, Washington City Council Bill 115524** – Amended the Land Use Code to allow a developer to build at a higher density than is normally allowed under the code, if the developer can certify that the building will be rated LEED Silver or its equivalent. The amendment applies only to buildings in downtown commercial districts. http://energycodesocean.org/sites/default/files/Level%20II%20Seattle%20Ordinance%20LEED.pdf
- **The South Carolina Legislature House Bill 3034** – Requires that all state-owned and state-funded construction greater than 10,000 square feet and any major renovation projects of greater than fifty percent of total building space or value achieve LEED-NC Silver certification or comparable standard. http://www.aceee.org/sector/statepolicy/south-carolina/ building-requirements
- **Creating Communities of Change: What We Learned in the Codes Forest** – Presentation by David Eisenberg, Director of the Development Center for Appropriate Technology for the West Coast Green Conference in 2007. http://www.dcat.net/resources/communitiesofchange_w-notes.pdf
- **California Green Building Standards Code** – California adopted the nation's first Green Building Standards Code, known as CalGreen. http://ag.ca.gov/globalwarming/pdf/green_building.pdf and http://www.hcd.ca.gov/
- calgreen.html

Chicago Green Permitting Program – By Chicago Department of Construction and Permits. If accepted into the program it would create an expedited permit process. The more green building elements in the project plans, the

shorter the timeline to obtain a permit.
http://www.iccsafe.org/Communities/Green/Documents/Chicago_GreenPermitBrochure.pdf

- **State of Minnesota Green Building Guidelines** – All Minnesota State bonded projects, new and substantially renovated are required to meet the Minnesota Sustainable Building 2030 (SB 2030) energy standards. http://www.msbg.umn.edu/
- **Green Communities: Self-Certification Process** – The first national green building program focused entirely on affordable housing. Launched by Enterprise in fall 2004, Green Communities is designed to help developers, investors, builders and policymakers make the transition to a greener future for affordable housing. http://www.greencommunitiesonline.org/
- **Green Single Family Rehab Specifications** – Guide specifications for reference to meet mandatory and optional 2008 Green Communities Criteria.
http://www.greencommunitiesonline.org/tools/resources/green_rehab_specs_gci_2008_criteria_final.pdf
- **Green Point Rating System** – Residential, voluntary rating system developed by Build It Green, a nonprofit organization of California. Rating systems for both single and multifamily new homes and existing homes are to be updated every three years to reflect changes to California Building Energy Efficiency Standards.
http://www.builditgreen.org/greenpoint-rated
- **National League of Cities Sustainable Cities Institute** - Affordable housing, case studies and model sustainble building ordinance information. http://www.sustainablecitiesinstitute.org/topics/buildings-and-energy
- **City of Bellingham, Washington** – Sustainable Connections Advanced Methods and Materials (AMM) guidance for permitting waterless urinals, composting toilets, rainwater harvesting systems, porous concrete and asphalt, vegetated roofs, amended soils and rain gardens. http://www.earthbuilding.info/gb/07_links/07-2_links_resources.htm

Compliance and Verification of Green Technologies

- **EPA Environmental Technology Verification Program** - A public-private partnership between EPA and nonproft testing and evaluation organizations that verified the performance of innovative technologies, including green building technologies. The program concluded operations in 2014, but archived infomation on certified technologies and protocols is available. http://www.epa.gov/etv/
- **Washington, D.C.'s Green Building Act of 2006** – Requires commercial projects to verify compliance through a District agency or a third party. http://www.dccouncil.washington.dc.us/

APPENDIX B: BLANK ASSESSMENT FORM

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Tribal Priority: *Potential Tools and Techniques:* •	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Tribal Priority: *Potential Tools and Techniques:* •	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**
Tribal Priority: *Potential Tools and Techniques:* •	**Green** ☐ Required by code/ordinance ☐ Incentivized **Yellow** ☐ Expressly allowed ☐ Code/ordinance silent, but typically allowed **Red** ☐ Code/ordinance silent, but not typically approved ☐ Expressly prohibited ☐ **Not Applicable**	**Green** ☐ Will be required or incentivized by code/ordinance **Yellow** ☐ Will be expressly allowed in code/ordinance **Red** ☐ Will be prohibited or discouraged ☐ **Not Applicable**