Conventional vs. Sustainable: A Matrix for Decision Making

APWA National Sustainability Conference
Pittsburg, PA
June 26, 2012
Introduction

Larry Stevens, PE
Project Director, HR Green, Inc., Johnston, IA
Director, Institute for Sustainable Infrastructure
Director, American Public Works Association

Jennifer Winter, PE
Project Director, HR Green, Inc., Cedar Rapids, IA
Committee Member, Institute for Sustainable Infrastructure
Objectives

- Advantages of sustainable design and construction
- Framework to compare/contrast conventional vs. sustainable
- Obstacles to implementing sustainable design
The Dilemma

- Defining true cost of conventional projects
- Measuring benefit of “externalities” of sustainable projects
- Challenges by peers, elected officials, and the public of the worth of sustainable vs. conventional methods
- Conventional thinking limits opportunities
- Current approaches are conducive to sustainability
The Conventional Approach

- Identify the problem
- Determine the solution to the problem
- Implement the solution – generally by the most cost effective and timely path
Why Conventional Approaches are becoming less applicable

- Urban areas are more dynamic
  - Development patterns try to integrate residential, commercial, civic, and employment centers rather that separate them
- Cumulative impacts of projects are becoming more pronounced
  - This is particularly true for stormwater impacts, water quality, and air quality, just to name a few
- There is heightened interest in those things that just make good financial sense
- More emphasis on quality of life issues
Sustainable approach
Progress toward Sustainable Approaches

• Why is it important to work towards sustainability in public works?
• Sustainability in public works means seeking a balanced approach (APWA)
  • for a vibrant community today and tomorrow, and
  • it is accomplished by the efficient delivery of infrastructure
  • in an environmentally and socially responsible way that
  • ensures the best economic choice in the long term
Envision™ Categories

- Quality of Life
- Leadership
- Resource Allocation
- Natural World
- Climate and Risk
Comparing Conventional vs. Sustainable

CASE STUDIES
### Quality of Life

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Checklist</th>
</tr>
</thead>
<tbody>
<tr>
<td>QL 1.1 Improve Community Quality of Life</td>
<td>Yes</td>
</tr>
<tr>
<td>QL 1.2 Stimulate Sustainable Growth and Development</td>
<td>No</td>
</tr>
<tr>
<td>QL 1.3 Develop Local Skills and Capabilities</td>
<td>NA</td>
</tr>
<tr>
<td>QL 1.4 Enhance Public Health and Safety</td>
<td>Yes</td>
</tr>
<tr>
<td>QL 2.1 Minimize Noise and Vibration</td>
<td>No</td>
</tr>
<tr>
<td>QL 2.2 Minimize Light Pollution</td>
<td>NA</td>
</tr>
<tr>
<td>QL 2.3 Maximize Community Mobility and Access</td>
<td>Yes</td>
</tr>
<tr>
<td>QL 2.4 Encourage Alternative Modes of Transportation</td>
<td>No</td>
</tr>
<tr>
<td>QL 2.5 Improve Accessibility, Safety and Wayfinding</td>
<td>NA</td>
</tr>
<tr>
<td>QL 3.1 Preserve Historic and Cultural Resources</td>
<td>Yes</td>
</tr>
<tr>
<td>QL 3.2 Preserve Views and Local Character</td>
<td>No</td>
</tr>
<tr>
<td>QL 3.3 Enhance Public Space</td>
<td>NA</td>
</tr>
<tr>
<td>QL 4.1 Manage Heat Island Effects</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Leadership

<table>
<thead>
<tr>
<th>Collaboration</th>
<th>Checklist</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD 1.1 Provide Effective Leadership and Commitment</td>
<td>Yes</td>
</tr>
<tr>
<td>LD 1.2 Establish a Sustainability Management System</td>
<td>No</td>
</tr>
<tr>
<td>LD 1.3 Foster Collaboration and Teamwork</td>
<td>NA</td>
</tr>
<tr>
<td>LD 1.4 Provide for Stakeholder Involvement</td>
<td>Yes</td>
</tr>
<tr>
<td>LD 1.5 Reduce Energy Consumption</td>
<td>No</td>
</tr>
<tr>
<td>LD 1.6 Reduce Excavated Materials Taken Offsite</td>
<td>NA</td>
</tr>
<tr>
<td>LD 1.7 Provide for Deconstruction and Recycl</td>
<td>Yes</td>
</tr>
<tr>
<td>LD 1.8 Provide for Deconstruction and Recycl</td>
<td>No</td>
</tr>
<tr>
<td>LD 1.9 Reduce Energy Consumption</td>
<td>NA</td>
</tr>
<tr>
<td>LD 2.1 Pursue By-Product Synergy Opportunities</td>
<td>Yes</td>
</tr>
<tr>
<td>LD 2.2 Improve Infrastructure Integration</td>
<td>No</td>
</tr>
<tr>
<td>LD 2.3 Commission and Monitor Energy Systems</td>
<td>NA</td>
</tr>
<tr>
<td>LD 2.4 Reduce Energy Consumption</td>
<td>Yes</td>
</tr>
<tr>
<td>LD 2.5 Manage Heat Island Effects</td>
<td>No</td>
</tr>
<tr>
<td>LD 2.6 Improve Accessibility, Safety and Wayfinding</td>
<td>NA</td>
</tr>
<tr>
<td>LD 2.7 Provide for Deconstruction and Recycl</td>
<td>Yes</td>
</tr>
<tr>
<td>LD 2.8 Provide for Deconstruction and Recycl</td>
<td>No</td>
</tr>
<tr>
<td>LD 2.9 Reduce Energy Consumption</td>
<td>NA</td>
</tr>
<tr>
<td>LD 3.1 Plan For Long-term Maintenance and Monitoring</td>
<td>Yes</td>
</tr>
<tr>
<td>LD 3.2 Address Conflicting Regulations and Policies</td>
<td>No</td>
</tr>
<tr>
<td>LD 3.3 Extend Useful Life</td>
<td>NA</td>
</tr>
</tbody>
</table>

### Resource Allocation

<table>
<thead>
<tr>
<th>Materials</th>
<th>Checklist</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA 1.1 Reduce Net Embodied Energy</td>
<td>Yes</td>
</tr>
<tr>
<td>RA 1.2 Support Sustainable Procurement Practice</td>
<td>No</td>
</tr>
<tr>
<td>RA 1.3 Use Recycled Materials</td>
<td>NA</td>
</tr>
<tr>
<td>RA 1.4 Use Regional Materials</td>
<td>Yes</td>
</tr>
<tr>
<td>RA 1.5 Divert Waste from Landfills</td>
<td>No</td>
</tr>
<tr>
<td>RA 1.6 Reduce Excavated Materials Taken Offsite</td>
<td>NA</td>
</tr>
<tr>
<td>RA 1.7 Provide for Deconstruction and Recycling</td>
<td>Yes</td>
</tr>
<tr>
<td>RA 1.8 Provide for Deconstruction and Recycling</td>
<td>No</td>
</tr>
<tr>
<td>RA 1.9 Reduce Energy Consumption</td>
<td>NA</td>
</tr>
<tr>
<td>RA 2.1 Reduce Energy Consumption</td>
<td>Yes</td>
</tr>
<tr>
<td>RA 2.2 Use Renewable Energy</td>
<td>No</td>
</tr>
<tr>
<td>RA 2.3 Commission and Monitor Energy Systems</td>
<td>NA</td>
</tr>
<tr>
<td>RA 3.1 Protect Fresh Water Availability</td>
<td>Yes</td>
</tr>
<tr>
<td>RA 3.2 Reduce Potable Water Consumption</td>
<td>No</td>
</tr>
<tr>
<td>RA 3.3 Monitor Water Systems</td>
<td>NA</td>
</tr>
</tbody>
</table>

### Natural World

<table>
<thead>
<tr>
<th>Siting</th>
<th>Checklist</th>
</tr>
</thead>
<tbody>
<tr>
<td>NW 1.1 Preserve Prime Farmland</td>
<td>Yes</td>
</tr>
<tr>
<td>NW 1.2 Preserve Wetlands - Surface Water</td>
<td>No</td>
</tr>
<tr>
<td>NW 1.3 Preserve Prime Farmland</td>
<td>NA</td>
</tr>
<tr>
<td>NW 1.4 Avoid Adverse Geology</td>
<td>Yes</td>
</tr>
<tr>
<td>NW 1.5 Preserve Floodplain Functions</td>
<td>No</td>
</tr>
<tr>
<td>NW 1.6 Avoid Unsuitable Development on Steep Slopes</td>
<td>NA</td>
</tr>
<tr>
<td>NW 1.7 Provide for Deconstruction and Recycling</td>
<td>Yes</td>
</tr>
<tr>
<td>NW 1.8 Provide for Deconstruction and Recycling</td>
<td>No</td>
</tr>
<tr>
<td>NW 2.1 Manage Stormwater</td>
<td>NA</td>
</tr>
<tr>
<td>NW 2.2 Reduce Pesticides and Fertilizer Impacts</td>
<td>Yes</td>
</tr>
<tr>
<td>NW 2.3 Prevent Surface &amp; Groundwater Contamination</td>
<td>No</td>
</tr>
<tr>
<td>NW 3.1 Preserve Species Biodiversity</td>
<td>NA</td>
</tr>
<tr>
<td>NW 3.2 Control Invasive Species</td>
<td>Yes</td>
</tr>
<tr>
<td>NW 3.3 Restore Disturbed Soils</td>
<td>No</td>
</tr>
<tr>
<td>NW 3.4 Maintain Wetland &amp; Surface Water Functions</td>
<td>NA</td>
</tr>
</tbody>
</table>

### Climate and Risk

<table>
<thead>
<tr>
<th>Emissions</th>
<th>Checklist</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR 1.1 Reduce Greenhouse Gas Emissions</td>
<td>Yes</td>
</tr>
<tr>
<td>CR 1.2 Reduce Air Pollutant Emissions</td>
<td>No</td>
</tr>
<tr>
<td>CR 1.3 Assess Climate Threat</td>
<td>NA</td>
</tr>
<tr>
<td>CR 2.1 Assess Climate Threat</td>
<td>Yes</td>
</tr>
<tr>
<td>CR 2.2 Avoid Traps and Vulnerabilities</td>
<td>No</td>
</tr>
<tr>
<td>CR 2.3 Prepare for Long Term Climate Adaptability</td>
<td>NA</td>
</tr>
<tr>
<td>CR 2.4 Prepare for Short Term Hazards</td>
<td>Yes</td>
</tr>
<tr>
<td>CR 2.5 Prepare for Short Term Hazards</td>
<td>No</td>
</tr>
</tbody>
</table>

### Wellbeing

- Envision™ Stage 1 checklist

### Collaboration

<table>
<thead>
<tr>
<th>Management</th>
<th>Checklist</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD 1.1 Provide Effective Leadership and Commitment</td>
<td>Yes</td>
</tr>
<tr>
<td>LD 1.2 Establish a Sustainability Management System</td>
<td>No</td>
</tr>
<tr>
<td>LD 1.3 Foster Collaboration and Teamwork</td>
<td>NA</td>
</tr>
<tr>
<td>LD 1.4 Provide for Stakeholder Involvement</td>
<td>Yes</td>
</tr>
<tr>
<td>LD 1.5 Reduce Energy Consumption</td>
<td>No</td>
</tr>
<tr>
<td>LD 1.6 Reduce Excavated Materials Taken Offsite</td>
<td>NA</td>
</tr>
<tr>
<td>LD 1.7 Provide for Deconstruction and Recycling</td>
<td>Yes</td>
</tr>
<tr>
<td>LD 1.8 Provide for Deconstruction and Recycling</td>
<td>No</td>
</tr>
<tr>
<td>LD 1.9 Reduce Energy Consumption</td>
<td>NA</td>
</tr>
<tr>
<td>LD 2.1 Pursue By-Product Synergy Opportunities</td>
<td>Yes</td>
</tr>
<tr>
<td>LD 2.2 Improve Infrastructure Integration</td>
<td>No</td>
</tr>
<tr>
<td>LD 2.3 Commission and Monitor Energy Systems</td>
<td>NA</td>
</tr>
<tr>
<td>LD 2.4 Reduce Energy Consumption</td>
<td>Yes</td>
</tr>
<tr>
<td>LD 2.5 Manage Heat Island Effects</td>
<td>No</td>
</tr>
<tr>
<td>LD 2.6 Improve Accessibility, Safety and Wayfinding</td>
<td>NA</td>
</tr>
<tr>
<td>LD 2.7 Provide for Deconstruction and Recycling</td>
<td>Yes</td>
</tr>
<tr>
<td>LD 2.8 Provide for Deconstruction and Recycling</td>
<td>No</td>
</tr>
<tr>
<td>LD 2.9 Reduce Energy Consumption</td>
<td>NA</td>
</tr>
<tr>
<td>LD 3.1 Plan For Long-term Maintenance and Monitoring</td>
<td>Yes</td>
</tr>
<tr>
<td>LD 3.2 Address Conflicting Regulations and Policies</td>
<td>No</td>
</tr>
<tr>
<td>LD 3.3 Extend Useful Life</td>
<td>NA</td>
</tr>
<tr>
<td>Purpose</td>
<td>Quality of Life</td>
</tr>
<tr>
<td>---------</td>
<td>----------------</td>
</tr>
<tr>
<td>QL 1.1</td>
<td>Improve Community Quality of Life</td>
</tr>
<tr>
<td>QL 1.2</td>
<td>Stimulate Sustainable Growth and Development</td>
</tr>
<tr>
<td>QL 1.3</td>
<td>Develop Local Skills and Capabilities</td>
</tr>
<tr>
<td>QL 2.1</td>
<td>Enhance Public Health and Safety</td>
</tr>
<tr>
<td>QL 2.2</td>
<td>Minimize Noise and Vibration</td>
</tr>
<tr>
<td>QL 2.3</td>
<td>Minimize Light Pollution</td>
</tr>
<tr>
<td>QL 2.4</td>
<td>Improve Community Mobility and Access</td>
</tr>
<tr>
<td>QL 2.5</td>
<td>Encourage Alternative Modes of Transportation</td>
</tr>
<tr>
<td>QL 2.6</td>
<td>Improve Accessibility, Safety and Wayfinding</td>
</tr>
<tr>
<td>QL 3.1</td>
<td>Preserve Historic and Cultural Resources</td>
</tr>
<tr>
<td>QL 3.2</td>
<td>Preserve Views and Local Character</td>
</tr>
<tr>
<td>QL 3.3</td>
<td>Enhance Public Space</td>
</tr>
<tr>
<td>QL 4.1</td>
<td>Manage Heat Island Effects</td>
</tr>
</tbody>
</table>
1. Purpose

QL 1.1 Improve Community Quality of Life

Intent: Does the project improve the net quality of life of all communities affected by the project and mitigate negative impacts to communities?

Metric: Measures taken to assess community needs and improve quality of life while minimizing negative impacts.

- Has the project team identified and taken into account community needs, goals, plans and issues?
- Has the project team sought to align the project vision and goals to the needs and goals of the host and affected communities as well as address potential adverse impacts?
- Were affected communities meaningfully engaged in the project design process? Have the affected communities been meaningfully engaged in the project design process?
- Have the project owner and the project team designed the project in a way that improves existing community conditions and rehabilitates infrastructure assets?
Case Study: Highway Corridor

- Project Challenges:
  - LOS
  - Deteriorating pavement
  - Project limits impact two cities
  - Project funding challenges
  - Construction
The Conventional Approach

- Add Lanes
- Reconstruct or Resurface
- Develop Plans
- Bid
- Build
What Have We Missed?

- Impacts of widening
  - Segregation of commercial businesses
  - Pedestrian movements
- Public Input
  - Complete Streets
  - Stormwater
- Other
  - Social
  - Environmental
  - Economic
Framework to Compare – Quality of Life
Purpose/Community/Wellbeing

Conventional Approach
Problem – Need Capacity  Solution - Add Lanes

Sustainable Approach
• Improving the net quality of life?
• Improving community mobility and access?
  • Impacts of added lanes
  • Are pedestrian underpasses needed?
• Encouraging alternative modes of transportation?
  • Opportunity to add bike lane or path?
  • Bus stops/pullovers
• Preserving views and local character?
Framework to Compare – Leadership Collaboration/Management/Planning

Conventional Approach
- Passive – distribute information
- Impact Focused – road closures, access
- Less costly?
- Risks – “angry mob” mentality, minimal buy-in, lawsuits, etc.

Sustainable Approach
- Establish meaningful involvement
  - Active approach
  - Engage stakeholders
  - Provide opportunities for input into decision-making
Framework to Compare – Resource Allocation

**Materials/Energy/Water**

### Conventional Approach
- Materials selection mainly cost based
- Recycling - with economic benefit

### Sustainable Approach
- Recycled materials –
  - Reduce load on landfill ➔ Save $$ in future
  - Reduce use of virgin material
- Regional materials
  - Improve local economy
  - Reduce transportation costs
- Reduce excavated materials taken offsite
  - Minimize soil movement/balance the site
  - Save $$ - transportation/disposal
Framework to Compare – Natural World
Siting/Land&Water/Biodiversity

Conventional Approach
Stormwater – use piping, meet min.regulatory requirements

Sustainable Approach
• Minimize impact of infrastructure on stormwater runoff quantity & quality
• Prevent surface & groundwater contamination
  • Rural ditches → Bioswales
  • Concrete → Permeable pavers
Framework to Compare – Climate & Risk

Emissions/Resilience

**Conventional Approach**
Meet minimum regulations

**Sustainable Approach**

- Reduce greenhouse gas emissions
- Reduce air pollutant emissions
  - Life-cycle carbon analysis?
  - Encourage alternate modes of travel
  - Correctly set signal timings
  - Reduce transportation during construction
Case Study: Former Quarry Redevelopment

• Challenges:
  • Abandoned quarry donated to the City;
  • City required to prepare a master plan defining the reuse of this site;
  • Access to capital;
  • Questions about the viability of this facility – will people use it?
Framework to Compare – Quality of Life
Purpose/Community/Wellbeing

Conventional Approach
• Meet EPA’s definition?
• Funds available for cleanup/repurposing

Sustainable Approach
• Improving the net quality of life?
  • How does the decision not to participate affect the quality of life?
  • Enhance the natural environment and public spaces
  • Create recreational opportunities
  • Remove environmental impairments that would otherwise stigmatize the property
  • Create a self-sufficient facility driven by rental payments for camp sites and facility fees.
• Encouraging alternative modes of transportation?
• Preserving views and local character?
Framework to Compare - Design

Conventional Approach

- 89 Campsites
  - (69 with 50 amp electrical service)
- 9,900 Lineal Feet of Recreational Trail
- 7,500 Lineal Feet of Paved Roads
- A dump station and 2 water stations
- 3 restroom facilities (one with shower facilities)
- Access for river fishing
- Beach area and access for swimming
- 2 ponds for fishing including 2 fishing docks
- Scenic Overlook area

Sustainable Approach

- See that trails tie into the regional trail system – enhancing the use and impact to the area
- Paving projects used recycled materials and local contractors
- Quarry basins were enhanced to create habitat for fish and related plant life
Questions & Closing

Presenter Contact Information:
Larry Stevens, P.E.
lstevens@hrgreen.com

Jennifer Winter, P.E.
jwinter@hrgreen.com

Useful Links:
ISI – www.sustainableinfrastructure.org
1. Purpose

**QL 1.1 Improve Community Quality of Life**

Intent: Does the project improve the net quality of life of all communities affected by the project and mitigate negative impacts to communities?

Metric: Measures taken to assess community needs and improve quality of life while minimizing negative impacts.

- Has the project team identified and taken into account community needs, goals, plans and issues?
- Has the project team sought to align the project vision and goals to the needs and goals of the host and affected communities as well as address potential adverse impacts?
- Were affected communities meaningfully engaged in the project design process? Have the affected communities been meaningfully engaged in the project design process?
- Have the project owner and the project team designed the project in a way that improves existing community conditions and rehabilitates infrastructure assets?

**QL 1.2 Stimulate Sustainable Growth and Development**

Intent: Does the project support and stimulate sustainable growth and development, including improvements in job growth, capacity building, productivity, business attractiveness and livability?

Metric: Assessment of the project’s impact on the community’s sustainable economic growth and development.

- Has the project created a significant number of jobs during its design and construction?
- Do the delivered works create new, or increase the quality of existing, operating, recreational or cultural capacity for business, industry, or the public?
- Do the delivered works significantly improve community productivity?
- Does the project improve community attractiveness for compatible businesses and industries, improve recreational opportunities, and generally improve the economic condition of the community?
- As part of the delivery of the constructed works, does the project rehabilitate, restore, or repurpose existing community infrastructure assets in the natural and/or built environment, and in doing so, improve community prospects for sustainable economic growth and development?

**QL 1.3 Develop Local Skills and Capabilities**

Intent: Does the project expand the knowledge, skills and capacity of the community workforce to improve their ability to grow and develop?

Metric: The extent to which the project will improve local employment levels, skills mix and capabilities.
QUALITY OF LIFE

- Will the project contribute to local employment, training and education, with emphasis on the most needy and/or disadvantaged groups, through project planning, design and construction?
- Will the project contribute to long term community competitiveness?

2. Wellbeing

QL 2.1 Enhance Public Health and Safety

Intent: How does the project take into account the health and safety implications of using new materials, technologies or methodologies above and beyond meeting regulatory requirements?

Metric: Efforts to exceed normal health and safety requirements, taking into account additional risks in the application of new technologies, materials and methodologies.

- Has the project owner and the project team assessed the exposures and risks created by the application of new and/or non-standard technologies, materials, equipment and methodologies to be employed on the project?
- Has the project owner and the project team assessed and made the appropriate changes to the project design to reduce the risk to public and worker health and safety to acceptable levels, and received approval and signoff by the appropriate environmental and public health and safety officials?
- Did the project owner and the project team institute the appropriate health and safety methodologies and protocols during construction?

QL 2.2 Minimize Noise and Vibration

Intent: Does the project minimize noise and vibration generated during construction and in the operation of the constructed works to maintain and improve community livability?

Metric: The extent to which noise and vibration will be reduced during construction and operation.

- Were appropriate studies been carried out to predict the levels of air-borne, ground-borne and structure-borne noise and vibration that will be present during construction and when the completed works is in operation?
- Were proposals for ambient noise and vibration mitigation and monitoring been made and incorporated into the project design to reduce noise and vibration to accepted standard target levels?
- Was the project been designed to markedly reduce ambient noise and vibration down to levels that substantially improve community livability?
QL 2.3 Minimize Light Pollution

Intent: Does the project prevent excessive glare, light at night, and light directed skyward to conserve energy and reduce obtrusive lighting and excessive glare?

Metric: Prevent excessive glare, light at night, and light directed skyward to conserve energy and reduce obtrusive lighting and excessive glare.

- Has the project team conducted an overall assessment of lighting needs for the project? How did the project team assess the lighting needs for the project?
- Did the project team design the lighting components of the project in a way that reduces lighting energy requirements?
- Did the project team design the lighting components of the project in a way that reduces or eliminates light spillage into sensitive environments and preserves the night sky?

QL 2.4 Improve Community Mobility and Access

Intent: Was the project located, designed and constructed in a way that eases traffic congestion, improves mobility and access, does not promote urban sprawl, and otherwise improves community livability?

Metric: Extent to which the project improves access and walkability, reductions in commute times, traverse times to existing facilities and transportation, and improved user safety considering all modes, e.g., personal vehicle, commercial vehicle, transit and bike/pedestrian.

- Have the impacts of the project on community access and mobility during construction and operation been properly and comprehensively addressed?
- Did the project team coordinate with owners and operators of adjacent facilities, amenities and/or transportation hubs to address issues of mobility and access during operation of the constructed works?
- Did the project team consider and incorporate, when feasible, the use of alternate modes of transport?
- Has the project team developed plans to reduce traffic disruption during construction, including monitoring, and corrective action?
- Has the project team expanded mobility and access considerations to include improvements to long-term transportation infrastructure efficiency, walkability, and livability?

QL 2.5 Encourage Alternative Modes of Transportation

Intent: Does the project improve accessibility to non-motorized transportation and public transit. Promote alternative transportation and reduce congestion?

Metric: The degree to which the project has increased walkability, use of public transit, non-motorized transit.
• Were the constructed works designed within walking distance to multi-modal transportation facilities?
• Were the constructed works and associated infrastructure designed to restrict the parking of motorized vehicles?
• Were the constructed works and associated infrastructure designed for convenience in access to multi-modal transportation facilities?
• Are the constructed works configured and located so that users are encouraged to use non-motorized transportation? (flat topography, network of pathways, etc.)
• Did the project owner and the project team work with the community to develop programs to encourage the use of alternative modes of transportation?
• Has the project team identified pathways, bikeways, rail and/or water modes of transportation that are unused and/or in disrepair or have barriers to safe use; and has the team sought to upgrade these elements and integrate them into the existing transportation infrastructure as part of the project?

QL 2.6 Improve Accessibility, Safety and Wayfinding

Intent: How does the project improve user accessibility, safety, and wayfinding of the site and surrounding areas?

Metric: Clarity, simplicity, readability and broad-population reliability in wayfinding, user benefit, and safety.

• Has the project owner and the project team developed the appropriate signage for safety and wayfinding in and around the constructed works?
• Have the project owner and the project team appropriately addressed safety and accessibility in and around the constructed works for emergency personnel?
• Have the project owner and the project team extended accessibility and signage to protect nearby sensitive sites (wetland, cultural sites, etc.) or, in populated areas, neighborhood safety and security?
• Has the project owner and the project team designed the project to have a net positive impact on public safety?
• Do the constructed works integrate well with the local community and its surroundings?

3. Community

QL 3.1 Preserve Historic and Cultural Resources

Intent: Does the project preserve or restore significant historical and cultural sites and related resources to preserve and enhance community cultural resources?

Metric: Summary of steps taken to identify, preserve or restore cultural resources.

• Has the project team worked with the community and required regulatory and resource agencies to identify cultural resources?
QUALITY OF LIFE

• Has the project team incorporated preservation or enhancement of historical and cultural resources?
• Has the project team conducted a feasibility analysis to understand the possibilities of incorporating preservation or enhancement of historic and cultural resources into the project?
• Has the project team worked with cultural stakeholders to develop a sensitive design and approach, with the ultimate goal of avoiding all cultural resources or fully preserving the character-defining features of that resource?
• Has the project team given special consideration to enhancing or restoring existing cultural resources?

QL 3.2 Preserve Views and Local Character

Intent: Was the project designed in a way that maintains the local character of the community and does not have negative impacts on community views?

Metric: Thoroughness of efforts to identify important community views and aspects of local landscape, including communities, and incorporate them into the project design.

• Has the project team demonstrated an understanding of local character of the project setting, in terms of landform or levels, views, natural landscape features, materials, planting, style/detailing, scale, and landscape/townscape pattern?
• Has the project team worked to preserve important view sheds and local character?
• Does the final design address views and local character?
• Has the project team worked with local official, communities, and decision makers?
• Does the contract include clauses on the preservation of high value landscapes and landscape features, including stated penalties for non-compliance and programs to inspect outcomes and enforce?
• Has the project team aided local communities in developing or improving local policies and regulations regarding views and fit with local characters?

QL 3.3 Enhance Public Space

Intent: Is existing public space including parks, plazas, recreational facilities, or wildlife refuges improved to enhance community livability?

Metric: Did the team develop or use existing plans and commitments to preserve, conserve, enhance and/or restore the defining elements of the public space?

• Are the effects the project will have on public space, (e.g., parks, plazas, recreational facilities, or wildlife refuges, space that enhances community livability) documented in public records? Has the project team enhanced existing public space?
• Did the project team work to satisfy public agencies and other stakeholders with the project plans? Are the public agencies and other stakeholders satisfied with the project plans involving public space?
• Will meaningful and beneficial restoration efforts be undertaken?
QL 3.4 Manage Heat Island Effects

Intent: Does the project minimize surfaces with a high solar reflectance index (SRI) to reduce localized heat accumulation and manage microclimates?

Metric: Percentage of site area that meets SRI Criteria.

- Does the project meet heat island requirements through shading or minimum SRI requirements for the designated percentage of hardscapes?
1. Collaboration

**LD 1.1 Provide Effective Leadership and Commitment**

Intent: Did the project team provide effective leadership and commitment to achieve project sustainability goals?

Metric: Demonstration of meaningful commitment of the project owner and the project team to the principles of sustainability and sustainable performance improvement.

- Have the project owner and the project team made public commitments, both organizational and project specific, to improving sustainable performance?
- Has the project owner and project team measured the project by a community adopted climate change adaptation or other sustainability-oriented plans?

**LD 1.2 Establish a Sustainability Management System**

Intent: Did the project team create a project management system that can manage the scope, scale and complexity of a project seeking to improve sustainable performance?

Metric: The organizational policies, authorities, mechanisms and business processes that have been put in place and the judgment that they are sufficient for the scope, scale and complexity of the project.

- Did the project team assign the project roles, responsibilities and authorities for addressing the issues of sustainability for the project?
- Did the project team create a sustainability management policy commensurate with the scope, scale and complexity of the project?
- Has the project owner and the project team assessed and prioritized the environmental, economic and societal aspects of the project, and set project sustainability goals, objectives and targets appropriate for the affected communities?
- Is the system sufficient in scope and does it contain an adequate set of mechanisms and business processes to manage the project and achieve the project’s objectives and targets?
- Has the project team designed the project sustainability management system so that it is sufficient to manage extraordinary change in environmental operating conditions, or key design variables?

**LD 1.3 Foster Collaboration and Teamwork**

Intent: Did the project team eliminate conflicting design elements, and optimize system by using integrated design and delivery methodologies and collaborative processes?

Metric: The extent of collaboration within the project team and the degree to which project delivery processes incorporate whole systems design and delivery approaches.
LEADERSHIP

- Has the project team incorporated the principles of collaboration, teamwork and whole systems design in the execution of the project?
- Did the project owner and project team address risk and reward sharing in the contract? Has this been made part of the contract between the project owner and the project team?

LD 1.4 Provide for Stakeholder Involvement

Intent: Did the project team establish sound and meaningful programs for stakeholder identification, engagement and involvement in project decision making?

Metric: The extent to which project stakeholders are identified and engaged in project decision making. Satisfaction of stakeholders and decision makers in the involvement process.

- Did the project team identify and characterize the key stakeholders and were their concerns and issues identified?
- Has the project team solicited and assessed stakeholder issues and concerns through meetings and information exchanges?
- Have the project owner and the project team provided opportunities for stakeholder input into project plans and decision-making?
- Has stakeholder participation and communication programs been established on the project to facilitate stakeholder communication and feedback?

2. Management

LD 2.1 Pursue By-Product Synergy Opportunities

Intent: Did the project reduce waste, improve project performance and reduce project costs by identifying and pursuing opportunities to use unwanted by-products or discarded materials and resources from nearby operations?

Metric: The extent to which the project team identified project materials needs, sought out nearby facilities with by-product resources that could meet those needs and capture synergy opportunities.

Did the project team search for and identify unwanted by-products or discarded materials located in nearby facilities for potential use in the project?

- Did the project team assess the potential salvage and/or reuse materials for use on the project?
- Did the project team pursue potential by-product synergy opportunities?
- Did the project team successfully make use of salvaged or reused material on the project?
LD 2.2 Improve Infrastructure Integration

Intent: Did the project team design the project to take into account the operational relationships among other elements of community infrastructure which results in an overall improvement in infrastructure efficiency and effectiveness?

Metric: The extent to which the design of the delivered works integrates with existing and planned community infrastructure, and results in a net improvement in efficiency and effectiveness.

- Did the project team seek to improve project sustainability performance through project-wide systems integration?
- Did the project team seek to improve sustainable performance of infrastructure through community-wide infrastructure systems integration?
- Has the project team sought to restore existing community infrastructure assets for the purpose of achieving higher performance through infrastructure systems integration?

3. Planning

LD 3.1 Plan For Long-term Maintenance and Monitoring

Intent: Did the project team put in place plans and sufficient resources to ensure as far as practical that ecological protection, mitigation and enhancement measures are incorporated in the project and can be carried out?

Metric: Comprehensiveness and detail of long-term monitoring and maintenance plans, and commitment of resources to fund the activities.

- Did the project team put in place a clear and comprehensive plan for long-term monitoring and maintenance of the constructed works?
- Have sufficient resources been allocated for the monitoring and maintenance of the constructed works?

LD 3.2 Address Conflicting Regulations and Policies

Intent: Did the project team work with officials to identify and address laws, standards, regulations or policies that may unintentionally create barriers to implementing sustainable infrastructure?

Metric: Efforts to identify and change laws, standards, regulations and/or policies that may unintentionally run counter to sustainability goals, objectives and practices.

- Has the project team identified and assessed regulations and policies that impede sustainable practices?
- Has the project team worked with regulators to resolve conflicts over current laws and policies that impede sustainable practices?
LD 3.3 Extend Useful Life

Intent: Did the project team extend a project’s useful life by designing the project in a way that results in a completed works that is more durable, flexible and resilient?

Metric: The degree to which project team incorporates full life cycle thinking in improving the durability, flexibility and resilience of the project.

- Have the owner and project team considered ways to extend the durability and resilience of the project early in the planning and design stage to reduce future maintenance and waste?
- Have the owner and project team considered the ability for future expansion or reconfiguration?
- Have the owner and project team conducted a feasibility study to determine areas for potential long term cost savings by extending the project’s useful life?
1. Materials

RA 1.1 Reduce Net Embodied Energy

Intent: Does the project conserve energy by reducing the net embodied energy of project materials over the project life?

Metric: Percentage reduction in net embodied energy from a life cycle energy assessment.

- Did the project team consider the estimations of materials’ embodied energy assessed by means of streamlined LCA?
- Did the owner and project team reduce the net embodied energy of the project by at least 10%?

RA 1.2 Support Sustainable Procurement Practices

Intent: Did the project team obtain materials and equipment from manufacturers and suppliers who implement sustainable practices?

Metric: Percentage of materials sourced from manufacturers who meet sustainable practices requirements.

- Has the project team defined a sound and viable sustainable procurement plan?
- Has the project team specified that a minimum of 15% of materials used on the project must come from sustainable procurement sources?
- Has the project team specified that at least 15% of purchased materials and supplies will be certified by reputable, third-party accreditation and standard-setting organizations?
- How did the project team work to identify any unresolved worker health and safety or environmental violations of manufacturers or suppliers identified for the project?

RA 1.3 Use Recycled Materials

Intent: Did the project team reduce the use of virgin materials and avoid sending useful materials to landfills by specifying reused materials, including structures, and material with recycled content?

Metric: Percentage of project materials that is reused or recycled.

- How did the project team identify the appropriate reuse of existing structures and materials on site and incorporated them into the project?
- Has the project team specified materials with recycled content? (Examples include reclaimed bricks, elements or components using recycled materials such as recycled plastics or reprocessed timber)
RA 1.4 Use Regional Materials

Intent: Did the project team minimize transportation costs and impacts and retain regional benefits through specifying local sources?

Metric: Percentage of project materials by type and weight or volume sourced within the required distance.

- How did the project team work to minimize transportation costs and impacts?
- How did the project team work to use special local sources of materials for the project?
- Has the project team specified locally sourced materials, plants, aggregates, and soils?

RA 1.5 Divert Waste from Landfills

Intent: Was waste reduced, and were waste streams diverted away from disposal to recycling and reuse?

Metric: Percentage of total waste diverted from disposal.

- How has the project team developed an operations waste management plan to decrease and/or divert at least 25% of project waste from landfills and incinerators during construction and operation?
- Has the project team identified potential recycling and reuse destinations for construction and demolition waste generated on site?
- Has the project team diverted at least 25% of waste from landfills?

RA 1.6 Reduce Excavated Materials Taken Offsite

Intent: Did the project team minimize the movement of soils and other excavated materials off site to reduce transportation and environmental impacts?

Metric: Percentage of excavated material retained on site.

- Has the project team designed the project to balance cut and fill in order to reduce the excavated material taken off site?

RA 1.7 Provide for Deconstruction and Recycling

Intent: Was the project designed in a way to encourage future recycling, up-cycling, and reuse by designing for ease and efficiency in project disassembly or deconstruction at the end of its useful life?

Metric: Percentage of components that can be easily separated for disassembly or deconstruction.
• How has the owner and project team specified materials so that they can be easily recycled or reused after the useful life of the project has ended?
• How has the design team facilitated the future disassembly and recycling of materials?

2. Energy

RA 2.1 Reduce Energy Consumption

Intent: Does the project conserve energy by reducing overall operation and maintenance energy consumption throughout the project life cycle?

Metric: Percentage of reductions achieved.

• How have the owner and project team conducted planning or design reviews to identify and analyze options for reducing energy consumption during operations and maintenance of the constructed works?
• How has the owner and project team conducted feasibility and cost analysis to determine the most effective methods for energy reduction and how were they incorporated into the design?
• Does the project reduce energy consumption by a minimum of 10% over industry norms?

RA 2.2 Use Renewable Energy

Intent: Did the project team meet energy needs of the project through renewable energy sources?

Metric: Extent to which renewable energy resources are incorporated into the design, construction and operation.

• Does the project meet at least 25% of its energy needs through renewable energy?

RA 2.3 Commission and Monitor Energy Systems

Intent: Did the project team ensure efficient functioning and extend useful life by specifying the commissioning and monitoring of the performance of energy systems?

Metric: Third party commissioning of electrical/mechanical systems and documentation of system monitoring equipment in the design.

• Has the owner and project team engaged an independent commissioning of the project?
• How has the project team assembled the necessary information needed to train operations and maintenance workers in a way that facilitates proper training and operations?
3. Water

RA 3.1 Protect Fresh Water Availability

Intent: Does the project reduce the negative net impact on fresh water availability, quantity and quality?

Metric: The extent to which the project uses fresh water resources without replenishing those resources at its source.

- How has the owner and project team conducted a water availability assessment?
- How has the project team assessed project water requirements?
- How has the project team incorporated design features to minimize the long term negative net impact on ground and surface water source quality and quantity or to achieve a net positive impact on water sources?
- How does the project achieve a net positive water impact replenishing the quantity and quality of fresh water surface and groundwater supplies?

RA 3.2 Reduce Potable Water Consumption

Intent: Does the project reduce overall potable water consumption and encourage the use of grey water, recycled water, and stormwater to meet water needs?

Metric: Percentage of water reduction.

- How has the project team conducted planning or design reviews to identify potable water reduction strategies during operation and maintenance of the project, and considered alternatives such as non-potable water, recycled grey water, and stormwater?
- How has the project team conducted feasibility and cost analysis to determine the most effective methods for potable water reduction and how were they incorporated into the design?
- Does the project reduce potable water consumption by at least 25% over industry norms?
- Does the project result in a net positive generation of water, and water upcycling, as a result of on-site purification or treatment?

RA 3.3 Monitor Water Systems

Intent: Did the project team implement programs to monitor water systems performance during operations and their impacts on receiving waters?

Metric: Documentation of system in the design

- Has the owner and project team engaged an independent entity to monitor or oversee the monitoring of the whole system or periodically check the monitoring of the project?
How has the project design incorporated the means to monitor water performance during operations?

Will the project integrate operations and impact monitoring to mitigate negative impacts and improve efficiency?
1. Siting

NW 1.1 Preserve Prime Habitat

Intent: Did the project team avoid placing the project – and the site compound/temporary works – on land that has been identified as of high ecological value or as having species of high value?

Metric: Avoidance of high ecological value sites and establishment of protective buffer zones.

- Does the project avoid development on land that is judged to be “prime habitat” by a third party (including SFI, FSC, or CSA)?
- Does the project preserve, at minimum, an appropriately sized buffer zone of undeveloped land or other habitat protection and connectivity according to the specified width around all prime habitat areas?
- Does the project significantly increase the area of prime habitat through habitat restoration and connectivity (as determined by a qualified habitat restoration professional)?

NW 1.2 Preserve Wetlands and Surface Water

Intent: Did the project protect, buffer, enhance and restore areas designated as wetlands, shorelines, and water bodies by providing natural buffer zones, vegetation and soil protection zones?

Metric: Size of natural buffer zone established around all wetlands, shorelines, and water bodies.

- Is the project located on a site that neither contains nor is located within the buffer zone (50 feet or the distance specified by state and local regulations, whichever is longer) around wetlands, shorelines, or water bodies unless the project is located on a previously developed site?
- If the site contains wetlands or water bodies, has the project team established a vegetation and soil protection zone (VSPZ) to provide a natural zone unaffected by development that maintains a buffer equal to the specified distance?
- Has the project team restored previously degraded buffer zones to a natural state on a previously developed site?

NW 1.3 Preserve Prime Farmland

Intent: Did the project team identify and protect soils designated as prime farmland, unique farmland, or farmland of statewide importance?

Metric: Percentage of prime farmland avoided during development.
Has the project owner and the project team assessed the project site and determined whether or not the on-site soils have been identified as prime farmland, unique farmland, or farmland of statewide importance to conserve for future generations?

Are prime farmland, unique farmland, and farmland of statewide importance protected or preserved for future generations by this project?

Has farmland, unique farmland, or farmland of statewide importance to conserve for future generations been restored by this project?

**NW 1.4 Avoid Adverse Geology**

**Intent:** Did the project avoid development in adverse geologic formations and safeguard aquifers to reduce natural hazards risk and preserve high quality groundwater resources?

**Metric:** Degree to which natural hazards and sensitive aquifers are avoided and geologic functions maintained.

- Has the project team identified and delineated earthquake faults, low lying coastal areas and karst formations or aquifers?
- Has the project team developed plans and designs to reduce the risk of damage, established operating procedures, and established a monitoring program for adverse geologic settings?
- Has the project team established hazard areas, developed buffers around adverse geologic areas, and created runoff controls, spill prevention, and cleanup plans?
- Has the project team chosen a site that avoids earthquake and karst-related damage and that does not affect underlying aquifers?

**NW 1.5 Preserve Floodplain Functions**

**Intent:** Does the project preserve floodplain functions by limiting development and development impacts to maintain water management capacities and capabilities?

**Metric:** Efforts to avoid floodplains or maintain predevelopment floodplain functions.

- Does the project avoid or limit new development within the design frequency floodplain for waterways of all sizes, or is the project water-dependent infrastructure designed to minimize floodplain impacts or waterway crossings?
- Does the project maintain pre-development floodplain infiltration and water quality?
- Does the project maintain or enhance riparian and aquatic habitat and the maintenance or enhancement of the riparian and in-channel physical and vegetative habitat to support threatened and endangered or otherwise desirable species, and how has a flood emergency plan been prepared for all infrastructure in the floodplain?
- Does the project maintain or enhance aquatic habitat connectivity and sediment transport? Is infrastructure subject to frequent damage by floods being modified or removed?
NW 1.6 Avoid Unsuitable Development on Steep Slopes

Intent: Did the project team protect steep slopes and hillsides from inappropriate and unsuitable development in order to avoid exposures and risks from erosion and landslides, and other natural hazards?

Metric: The degree to which development on steep slopes is avoided, or to which erosion control and other measures are used to protect the constructed works as well as other downslope structures.

- Does the project follow best management practices to manage erosion and prevent landslides?
- Was the project sited optimally and managed to avoid excessive erosion?
- Does the project avoid high risk hillsides or steep slopes?

NW 1.7 Provide for Deconstruction and Recycling

Intent: Did the project team conserve undeveloped land by locating projects on previously developed greyfield sites and/or sites classified as brownfields?

Metric: Percentage of site that is a greyfield or the use and cleanup of a site classified as a brownfield.

- Does the project conserve undeveloped land and make use of previously developed greyfield sites and/or sites classified as brownfields?
- Is the project located on a site that was previously 25% or more developed (greyfield)?
- Is the project located on a site where all or part of it is documented as contaminated according to a ASTM E1903-97 Phase II Environmental Assessment or on a site deemed a brownfield by local, state, or federal government agencies?
- Was a brownfield remediation plan been prepared and was it prepared according to the ASTM report?

2. Land and Water

NW 2.1 Manage Stormwater

Intent: Does the project minimize the impact of infrastructure on stormwater runoff quantity and quality?

Metric: Infiltration and evapotranspiration capacity of the site and return to pre-development capacities.

- Has the project team documented the site's proposed water storage, infiltration, evapotranspiration, and/or water harvesting capacity needed to achieve targeted water storage capacity?
• Does the project achieve at least 30% improvement in greyfield water storage capacity, at least 20% improvement in brownfield water storage capacity, and 100% maintenance of greenfield water storage capacity?

**NW 2.2 Reduce Pesticides and Fertilizer Impacts**

**Intent:** Does the project reduce non-point source pollution by reducing the quantity, toxicity, bioavailability and persistence of pesticides and fertilizers, or by eliminating the need for the use of these materials?

**Metric:** Efforts made to reduce the quantity, toxicity, bioavailability and persistence of pesticides and fertilizers used on site, including the selection of plant species and the use of integrated pest management techniques.

• Have operational policies been developed to control the application of fertilizers and pesticides?
• Have runoff controls been designed to minimize groundwater and surface water contamination?
• Has the project team selected pesticides and fertilizers that have low toxicity, persistence and bioavailability?
• Has the project team designed the landscaping to incorporate plant species that require no pesticides, herbicides and fertilizers, or use integrated pest management approaches?

**NW 2.3 Prevent Surface + Groundwater Contamination**

**Intent:** Does the project preserve fresh water resources by incorporating measures to prevent pollutants from contaminating surface and groundwater and monitor impacts over operations?

**Metric:** Designs, plans and programs instituted to prevent and monitor surface and groundwater contamination.

• Have adequate and responsive surface and groundwater quantity and quality monitoring systems been incorporated into the project design?
• Have spill and leak prevention and response plans and design been incorporated into the design?
• Has the project team reduced or eliminated potentially polluting substances from the construction and operation of the completed works?
• Has the project team sought to reduce future contamination by cleaning up areas of contamination and instituting land use controls to limit the introduction of future contamination sources?
• Have spill and leak prevention and response plans and designs been incorporated into the project design?
• Has the project team reduced or eliminated potentially polluting substances from the construction and operation of the completed works?
• Has the project team sought to reduce future contamination by cleaning up areas of contamination and instituting land use controls to limit the introduction of future contamination sources?

3. Biodiversity

NW 3.1 Preserve Species Biodiversity

Intent: Does the project protect biodiversity by preserving and restoring species and habitats?

Metric: Degree of habitat protection.

• Has the project team documented that the project does not impact natural habitat and movement corridors or that it will mitigate adverse impacts of development to biodiversity?
• Does the project facilitate movement between habitats, provide new connections, or otherwise improve existing habitat?
• Does the project increase available habitat, increase connectivity between habitat areas by providing new connections that were not available before, or by removing existing barriers to movement and habitat?

NW 3.2 Control Invasive Species

Intent: Does the project use appropriate non-invasive species and control or eliminate existing invasive species?

Metric: Degree to which invasive species have been reduced or eliminated.

• Does the project use locally appropriate and non-invasive plants on the site?
• Does the project control invasive species already on the site?
• Does the project actively eliminate existing invasive species and ensure that invasive species stay off the site?

NW 3.3 Restore Disturbed Soils

Intent: Did the project team restore soils disturbed during construction and previous development to bring back ecological and hydrological functions?

Metric: Percentage of disturbed soils restored.

• Has the project restored soils disturbed during construction and previous development to bring back ecological and hydrological functions?
• Have 100% of soils disturbed during construction been restored and reused properly?
• Have 100% of soils disturbed by previous development been restored and reused properly?
NW 3.4 Maintain Wetland & Surface Water Functions

Intent: Does the project maintain and restore the ecosystem functions of streams, wetlands, water bodies and their riparian areas?

Metric: Number of functions maintained and restored.

- Does the project maintain or enhance hydrologic connection?
- Does the project maintain or enhance water quality?
- Does the project maintain or enhance habitat?
- Does the project maintain or restore sediment transport?
- Does the project maintain all ecosystem functions and fully restore any disturbed functions?
1. Emissions

CR 1.1 Reduce Greenhouse Gas Emissions

Intent: Did the project team conduct a comprehensive life-cycle carbon analysis and use this assessment to reduce the anticipated amount of net greenhouse gas emissions during the life cycle of the project, reducing project contribution to climate change?

Metric: Life-cycle net carbon dioxide equivalent (CO2e) emissions.

- Has the project team performed a life-cycle carbon assessment on the project, using recognized and accepted methodologies, data sources and software?
- Is the project designed to reduce carbon emissions by at least 10% more than the emissions calculated in the life-cycle carbon assessment?

CR 1.2 Reduce Air Pollutant Emissions

Intent: Does the project reduce the emission of six criteria pollutants; particulate matter (including dust), ground level ozone, carbon monoxide, sulfur oxides, nitrogen oxides, lead, and noxious odors?

Metric: Measurements of air pollutants as compared to standards used.

- Has the project team designed the project to follow the California Ambient Air Quality Standards?
- Has the project team designed the project to follow Sections XI and XIV of South Coast Air Quality Management Rules?
- Did the project reduce air pollution to the required level, or improve existing air quality to a higher than pre-development level?

2. Resilience

CR 2.1 Assess Climate Threat

Intent: Did the project team develop a comprehensive Climate Impact Assessment and Adaptation Plan?

Metric: Summary of steps taken to prepare for climate variation and natural hazards.

- Has the project team created a Climate Impact Assessment and Adaptation Plan?
- Has the project team identified climate change risks and possible responses?

CR 2.2 Avoid Traps and Vulnerabilities

Intent: Does the project avoid traps and vulnerabilities that could create high, long-term costs and risks for the affected communities?
Metric: The extent of the assessment of potential long-term traps, vulnerabilities and risks due to long-term changes such as climate change and the degree to which these were addressed in the project design and in community design criteria.

- Has the project team identified and assessed possible changes in the project to avoid or eliminate traps or vulnerabilities that could create high, long-term costs and risks for affected communities?
- Has the project team assessed potential traps and vulnerabilities and their associated potential costs and risks?
- Does the project avoid, alleviate or eliminate significant infrastructure traps, i.e., high and long term operational costs and/or vulnerabilities?

CR 2.3 Prepare for Long-Term Climate Adaptability

Intent: Did the project team prepare infrastructure systems to be resilient to the consequences of long-term climate change, perform adequately under altered climate conditions, or adapt to other long-term change scenarios?

Metric: The degree to which the project has been designed for long-term resilience and adaptation.

- Has the project team selected the site and designed the infrastructure project and its related systems to be resilient and adaptive to these changes and function under altered climate conditions, supply shortfalls, or other significant changes in operational or environmental conditions?
- Has the project team worked to restore or rehabilitate any existing effects of long-term change, e.g., desertification, beach erosion, loss of wetlands, etc.?

CR 2.4 Prepare for Short-Term Hazards

Intent: Does the project increase resilience and long-term recovery prospects of the project and site from natural and man-made short-term hazards?

Metric: Steps taken to improve protection measures beyond existing regulations.

- Has the project team considered which types of natural and man-made hazards are possible in the region, and have they researched how the frequency and severity of these disasters may change over the life of the project? (catastrophic wildfires, floods, tornadoes, hurricanes, earthquakes, tsunamis, etc.)
- Has the project team incorporated design strategies into the project to safeguard against natural hazards?
- Does the project restore habitats in a way that reduces the impacts of future short-term disasters?