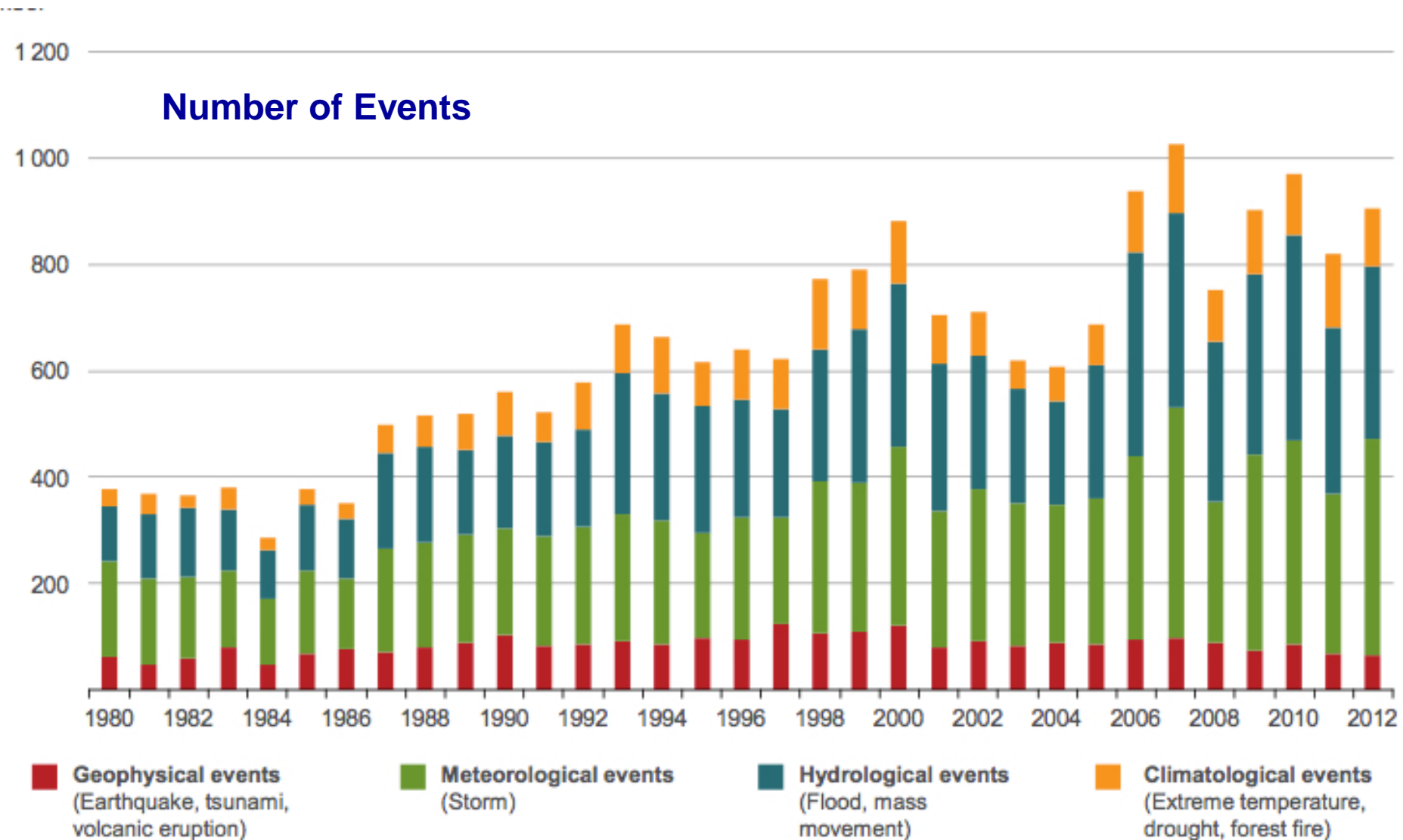# Envisioning a Sustainable Future
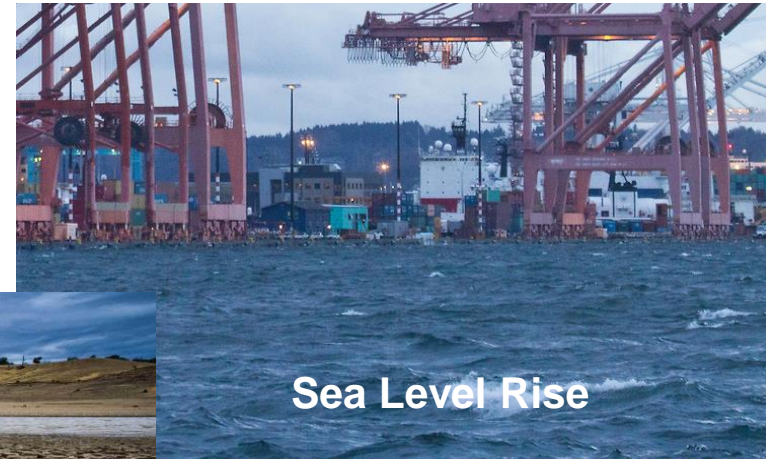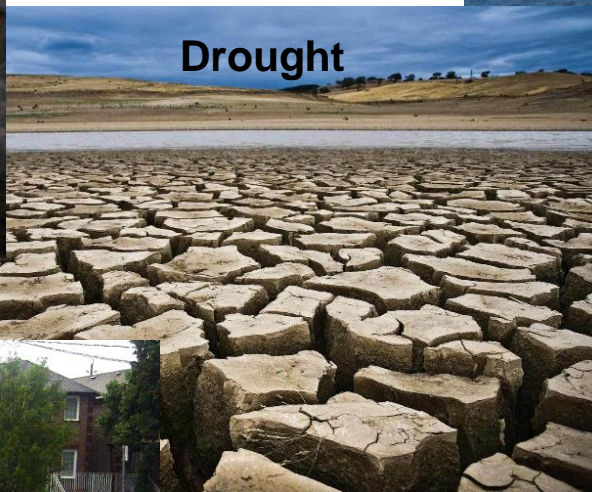
Duane Lindner, P.Eng. , ENV SP.

November 29, 2019

Natural Catastrophes Worldwide 1980-2012

Impacts of Climate Change

Forest Fires

Drought

Sea Level Rise

Extreme Rainfall

What is"Sustainability"??

SUSTAINABLE DEVELOPMENT GOALS

1 NO POVERTY	**2 ZERO HUNGER**	**3 GOOD HEALTH AND WELL-BEING**	**4 QUALITY EDUCATION**	**5 GENDER EQUALITY**	**6 CLEAN WATER AND SANITATION**
7 AFFORDABLE AND CLEAN ENERGY	**8 DECENT WORK AND ECONOMIC GROWTH**	**9 INDUSTRY, INNOVATION AND INFRASTRUCTURE**	**10 REDUCED INEQUALITIES**	**11 SUSTAINABLE CITIES AND COMMUNITIES**	**12 RESPONSIBLE CONSUMPTION AND PRODUCTION**
13 CLIMATE ACTION	**14 LIFE BELOW WATER**	**15 LIFE ON LAND**	**16 PEACE, JUSTICE AND STRONG INSTITUTIONS**	**17 PARTNERSHIPS FOR THE GOALS**	**SUSTAINABLE DEVELOPMENT GOALS**

…but what are we actually doing to be "Sustainable"?

ENERGY MONITOR   7:50 AM
26.5 MI

ENERGY MONITOR   8:08 AM
TRIP A 250.4 MI

Is that enough?

Editorial: Forget climate hysteria... fix the sewers.

"...Council's unanimous decision to declare a "**climate emergency**" was **long on rhetoric, short on reality**. The federal government recently did the same thing, as have 800 municipal governments around the world. Beyond cheap talk, here are some practical things governments can do to address climate change, no matter how it's caused."
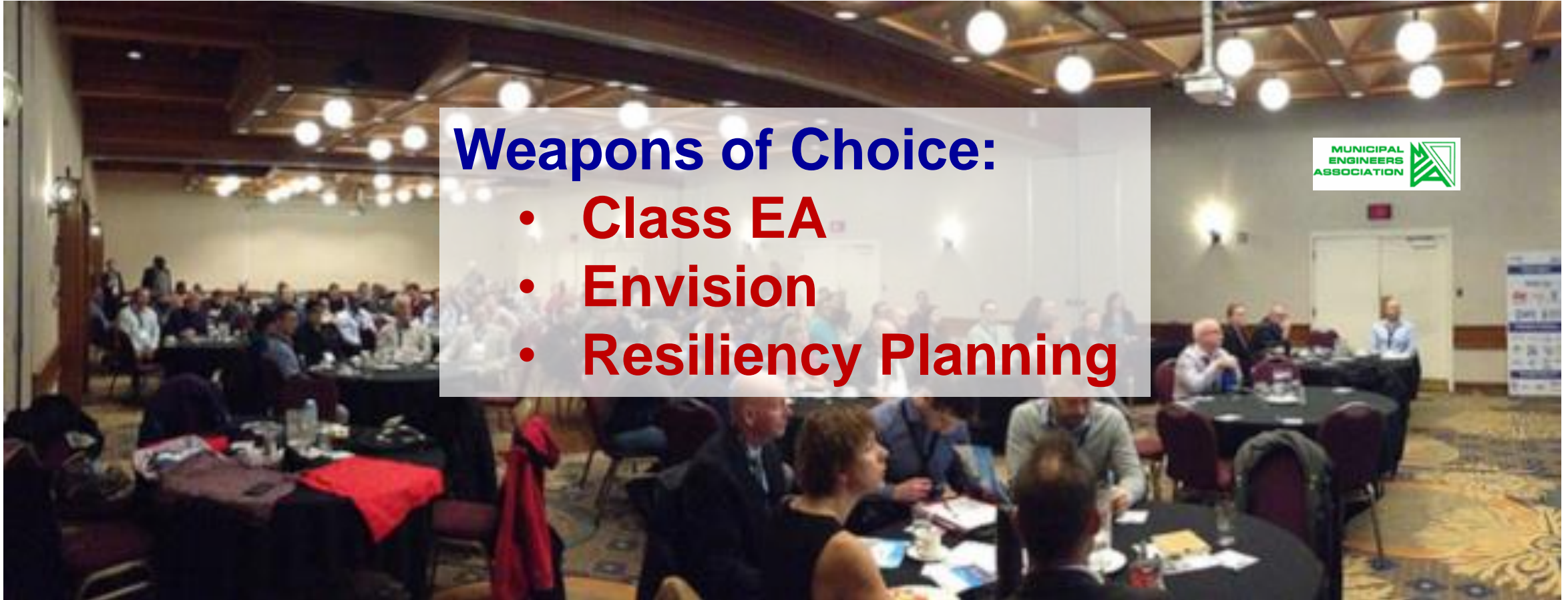
"...Maintain **municipal infrastructure** in a state of good repair"
(public transit, roads, bridges, water mains, sewers, buildings)

"...Plan and **co-ordinate city infrastructure projects** efficiently & properly."
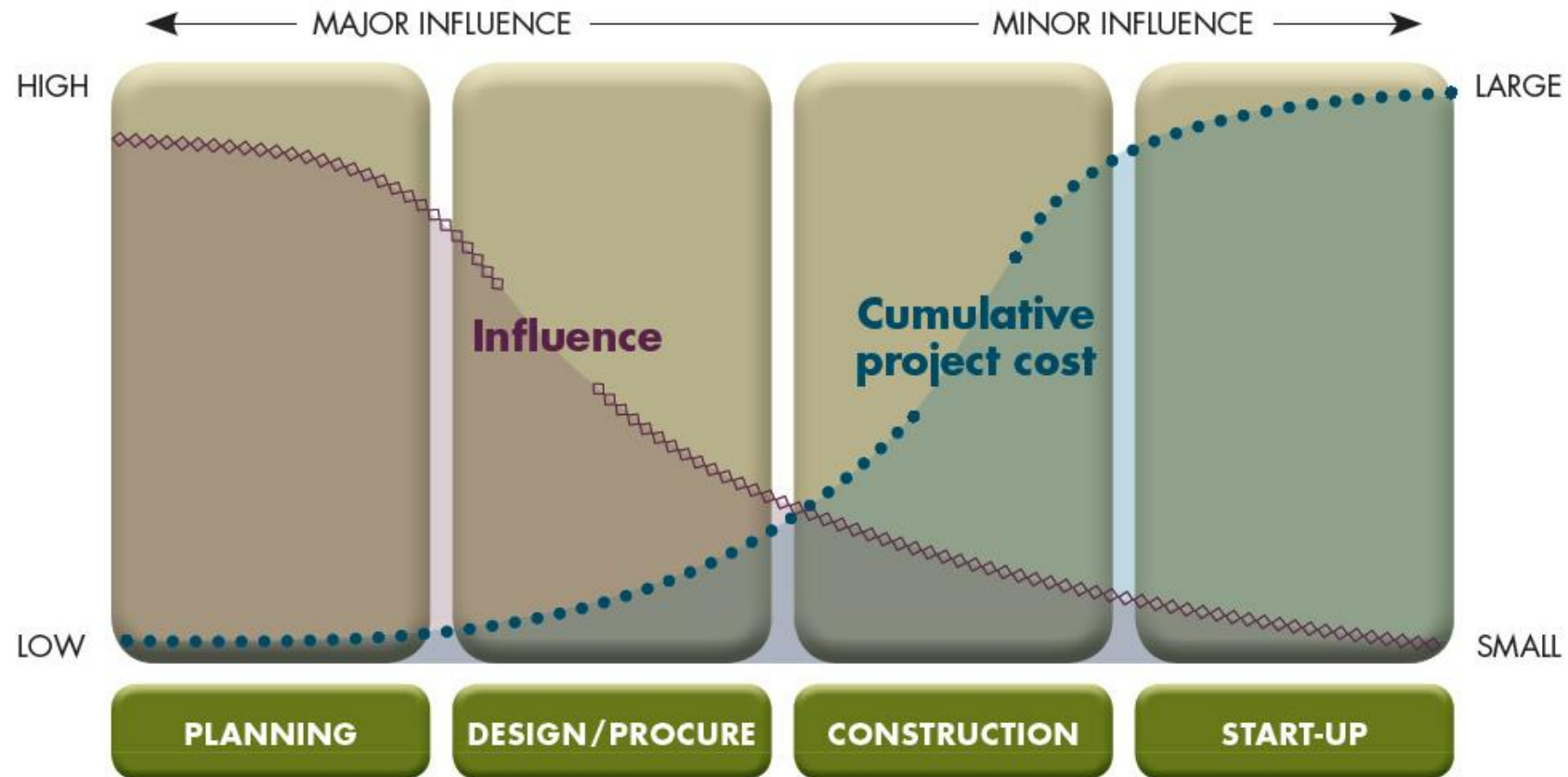
Frontline of Sustainable Action

Weapons of Choice:
- **Class EA**
- **Envision**
- **Resiliency Planning**

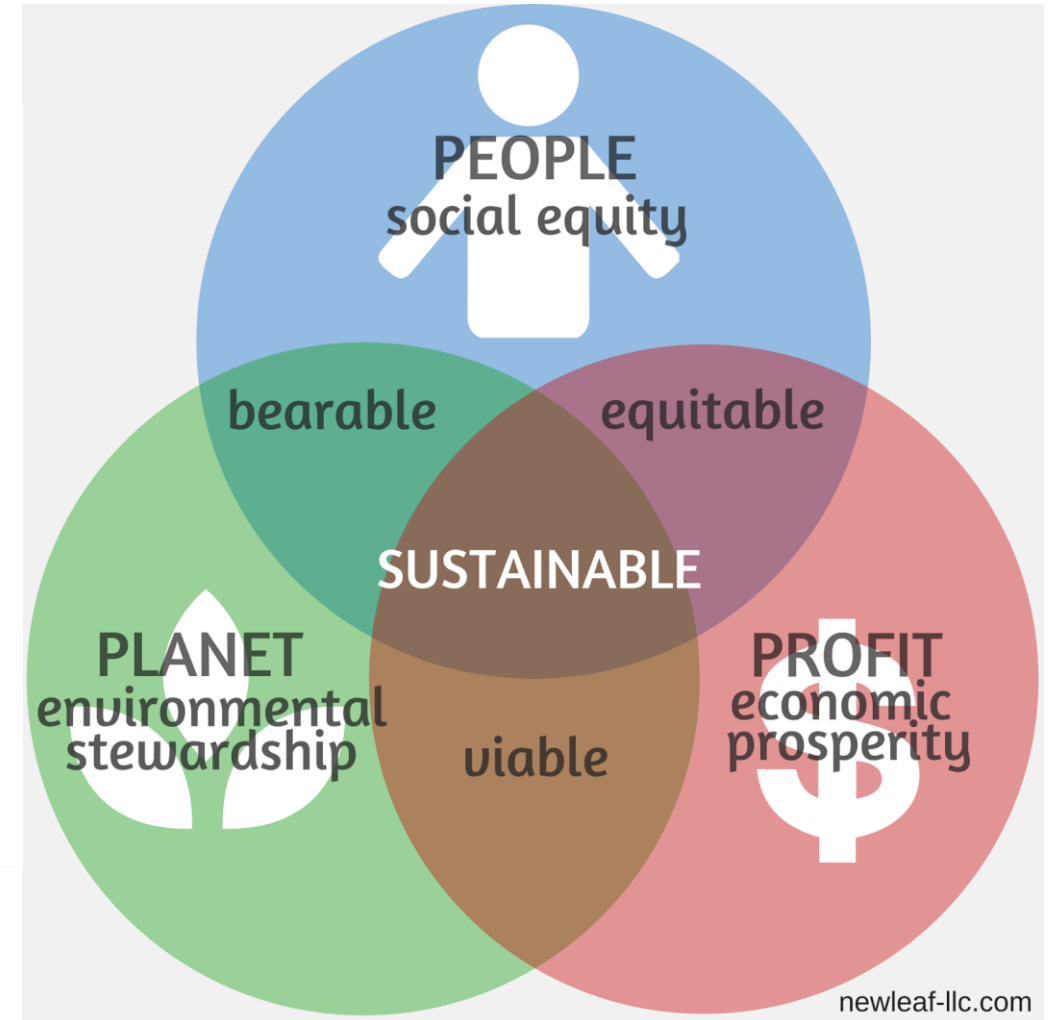# Opportunity to Influence

Project Cost / Influence Curve

MAJOR INFLUENCE ← → MINOR INFLUENCE

HIGH — LARGE

Influence

Cumulative project cost

LOW — SMALL

PLANNING | DESIGN/PROCURE | CONSTRUCTION | START-UP

Municipal Class EA - Overview

THE ENVISION™ RATING SYSTEM

INSTITUTE FOR SUSTAINABLE INFRASTRUCTURE

I S I

ZOFNASS PROGRAM
FOR SUSTAINABLE INFRASTRUCTURE

Graduate School of Design
Harvard University
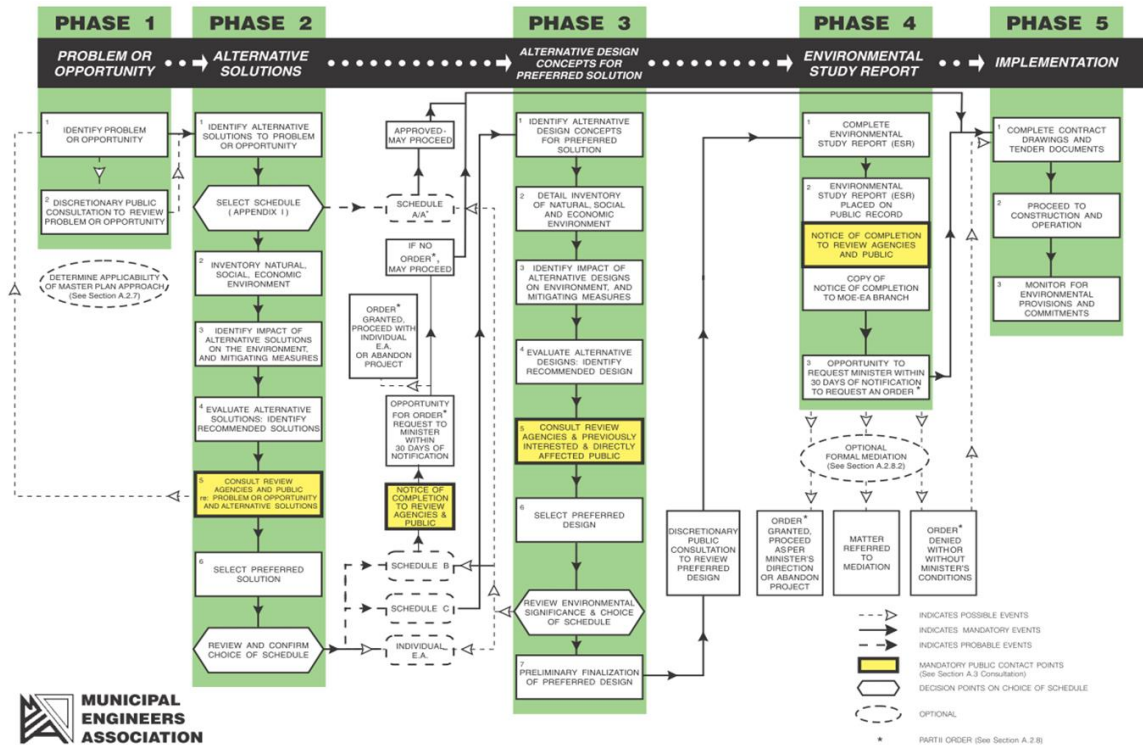
ACEC (American Council of Engineering Companies)
APWA (American Public Works Association)
ASCE (American Society of Civil Engineers)

Types of Infrastructure

ENERGY

Geothermal
Hydroelectric
Nuclear
Coal
Natural Gas
Oil/Refinery
Wind
Solar
Biomass

WATER

Potable water
distribution
Capture/Storage
Water Reuse
Storm Water
Management
Flood Control

WASTE

Solid waste
Recycling
Hazardous
Waste
Collection &
Transfer

TRANSPORT

Airports
Roads
Highways
Bikes
Pedestrians
Railways
Public Transit
Ports
Waterways

LANDSCAPE

Public Realm
Parks
Ecosystem
Services

INFO

Telecom
Internet
Phones
Satellites
Data Centers
Sensors

Key Envision Principles

"A holistic view of the built environment"

Asks the questions - Does this project:

- Add value to communities?
- Effectively use funds?
- Instill leadership?
- Protect and restore natural environment?
- Reduce wastes?
- Use energy and water efficiently?
- Adapt to climate uncertainties?

Why Use Envision?

Uphold the **principles of sustainability** in projects

- Provides a framework for establishing sustainability goals.
- Communicates social, environmental, and economic impacts
- Complements other rating systems and tools.
- Inspires incremental improvement.
- Evidence based - Documentation.
- *It is free!*

5 Categories *(Areas of Influence)*

Quality Of Life — 14 Credits

Purpose, Community, Well-being

Leadership — 12 Credits

Collaboration, Management, Planning

Resource Allocation — 14 Credits

Materials, Energy, Water

Natural World — 14 Credits

Siting, Land & Water, Biodiversity

Climate and Resilience — 10 Credits

Emission, Resilience

Envision Credit List

Quality Of Life — 14 Credits	Leadership — 12 Credits	Resource Allocation — 14 Credits	Natural World — 14 Credits	Climate and Resilience — 10 Credits

WELLBEING
QL1.1 Improve Community Quality of Life
QL1.2 Enhance Public Health & Safety
QL1.3 Improve Construction Safety
QL1.4 Minimize Noise & Vibration
QL1.5 Minimize Light Pollution
QL1.6 Minimize Construction Impacts

MOBILITY
QL2.1 Improve Community Mobility & Access
QL2.2 Encourage Sustainable Transportation
QL2.3 Improve Access & Wayfinding

COMMUNITY
QL2.1 Advance Equity & Social Justice
QL2.2 Preserve Historic & Cultural Resources
QL2.3 Enhance Views & Local Character
QL2.4 Enhance Public Space & Amenities

QL0.0 Innovate or Exceed Credit Requirements

COLLABORATION
LD1.1 Provide Effective Leadership & Commitment
LD1.2 Foster Collaboration & Teamwork
LD1.3 Provide for Stakeholder Involvement
LD1.4 Pursue Byproduct Synergies

PLANNING
LD2.1 Establish a Sustainability Management Plan
LD2.2 Plan for Sustainable Communities
LD2.3 Plan for Long-Term Monitoring & Maintenance
LD2.4 Plan for End-of-Life

ECONOMY
LD3.1 Stimulate Economic Prosperity & Development
LD3.2 Develop Local Skills & Capabilities
LD3.3 Conduct a Life-Cycle Economic Evaluation

LD0.0 Innovate or Exceed Credit Requirements

MATERIALS
RA1.1 Support Sustainable Procurement Practices
RA1.2 Use Recycled Materials
RA1.3 Reduce Operational Waste
RA1.4 Reduce Construction Waste
RA1.5 Balance Earthwork On Site

ENERGY
RA2.1 Reduce Operational Energy Consumption
RA2.2 Reduce Construction Energy Consumption
RA2.3 Use Renewable Energy
RA2.4 Commission & Monitor Energy Systems

WATER
RA3.1 Preserve Water Resources
RA3.2 Reduce Operational Water Consumption
RA3.3 Reduce Construction Water Consumption
RA3.4 Monitor Water Systems

RA0.0 Innovate or Exceed Credit Requirements

SITING
NW1.1 Preserve Sites of High Ecological Value
NW1.2 Provide Wetland & Surface Water Buffers
NW1.3 Preserve Prime Farmland
NW1.4 Preserve Undeveloped Land

CONSERVATION
NW2.1 Reclaim Brownfields
NW2.2 Manage Stormwater
NW2.3 Reduce Pesticide & Fertilizer Impacts
NW2.4 Protect Surface & Groundwater Quality

ECOLOGY
NW3.1 Enhance Functional Habitats
NW3.2 Enhance Wetland & Surface Water Functions
NW3.3 Maintain Floodplain Functions
NW3.4 Control Invasive Species
NW3.5 Protect Soil Health

NW0.0 Innovate or Exceed Credit Requirements

EMISSIONS
CR1.1 Reduce Net Embodied Carbon
CR1.2 Reduce Greenhouse Gas Emissions
CR1.3 Reduce Air Pollutant Emissions

RESILIENCE
CR2.1 Avoid Unsuitable Development
CR2.2 Assess Climate Change Vulnerability
CR2.3 Evaluate Risk & Resilience
CR2.4 Establish Resilience Goals and Strategies
CR2.5 Maximize Resilience
CR2.6 Improve Infrastructure Integration

CR0.0 Innovate or Exceed Credit Requirements

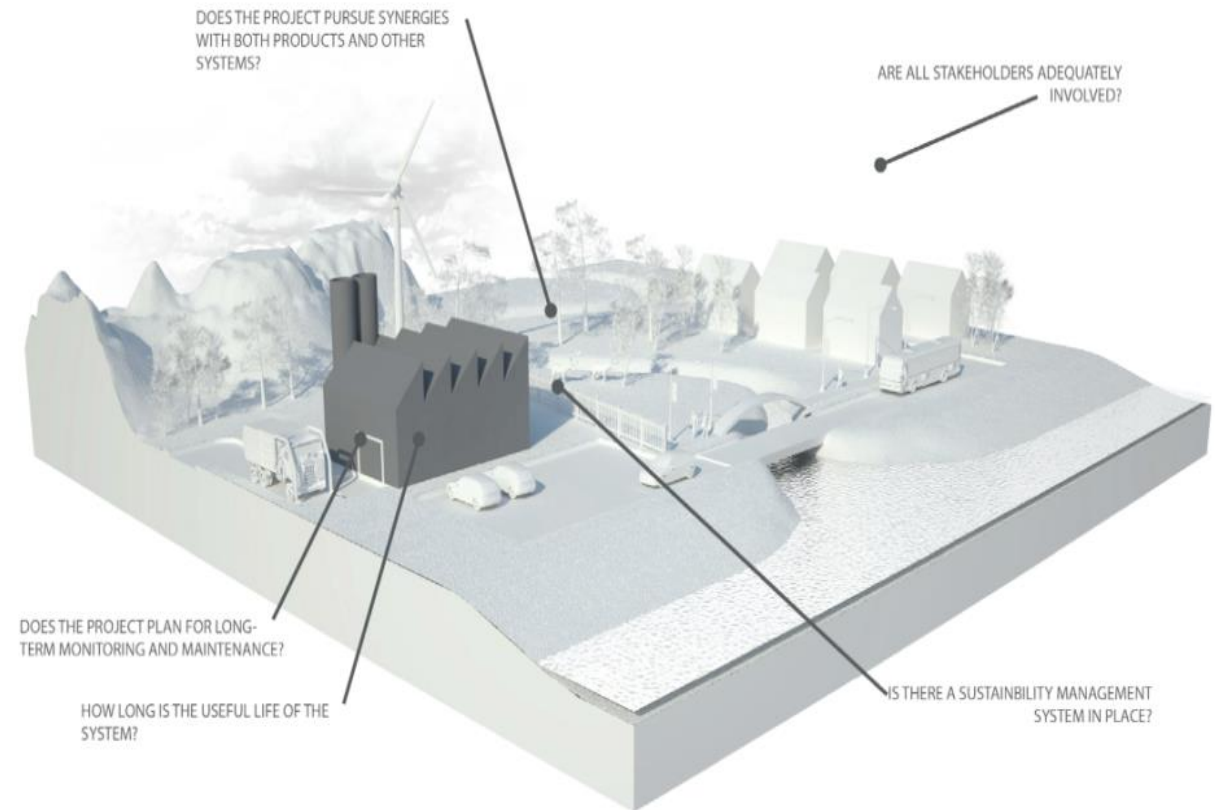**59 Credits = Best Management Practices**

Quality of Life

- Community's plan
- Job creation
- Impact on health and wellbeing
- Mobility; access; safety
- Historic and cultural preservation
- Enhancing public space
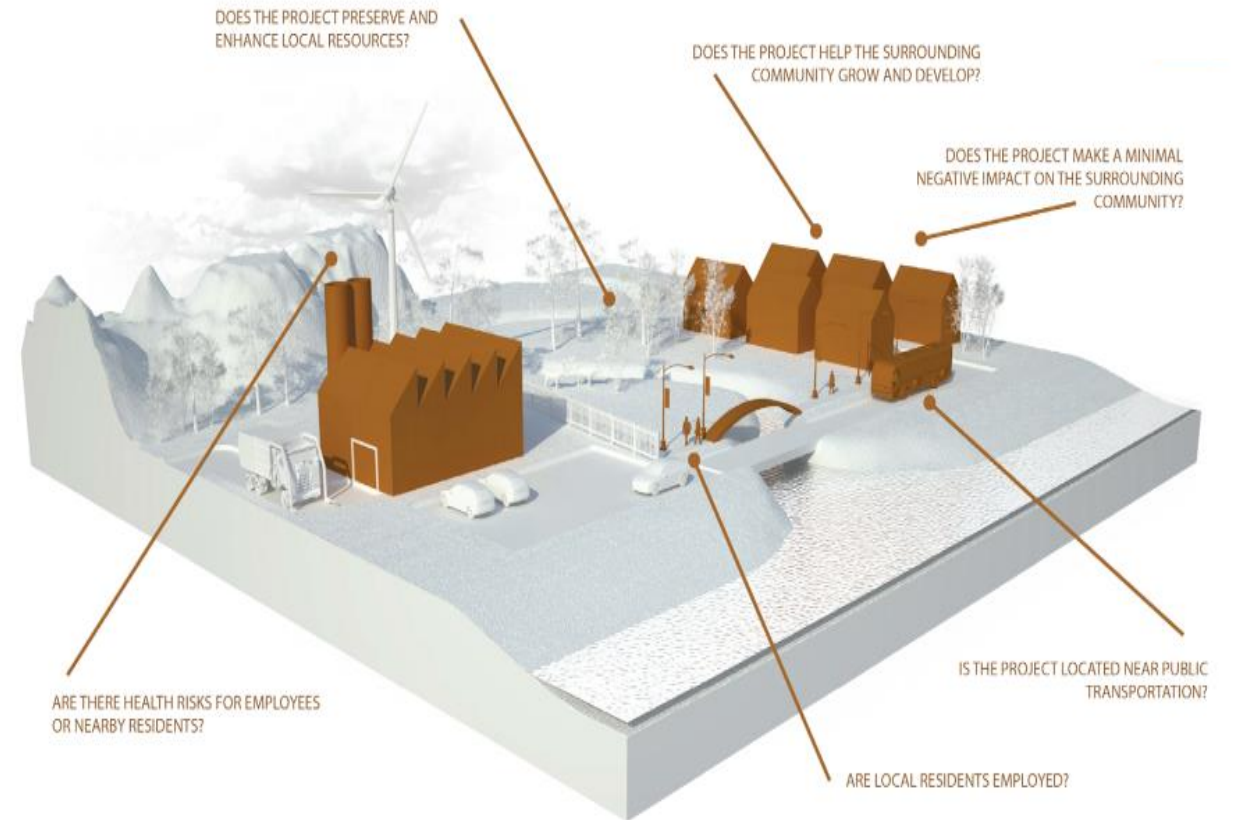
Leadership

- Commitment at all levels
  - Management to operations
- Foster collaboration
- Stakeholder involvement
- Monitoring and maintenance
- Extend useful life

DOES THE PROJECT PURSUE SYNERGIES WITH BOTH PRODUCTS AND OTHER SYSTEMS?

ARE ALL STAKEHOLDERS ADEQUATELY INVOLVED?

DOES THE PROJECT PLAN FOR LONG-TERM MONITORING AND MAINTENANCE?

HOW LONG IS THE USEFUL LIFE OF THE SYSTEM?

IS THERE A SUSTAINBILITY MANAGEMENT SYSTEM IN PLACE?

Resource Allocation

- Efficient use of materials

- Diversion of waste from the landfill

- Reducing overall energy consumption

- Commission and monitor systems

- Protect fresh water source

- Reduce potable water consumption
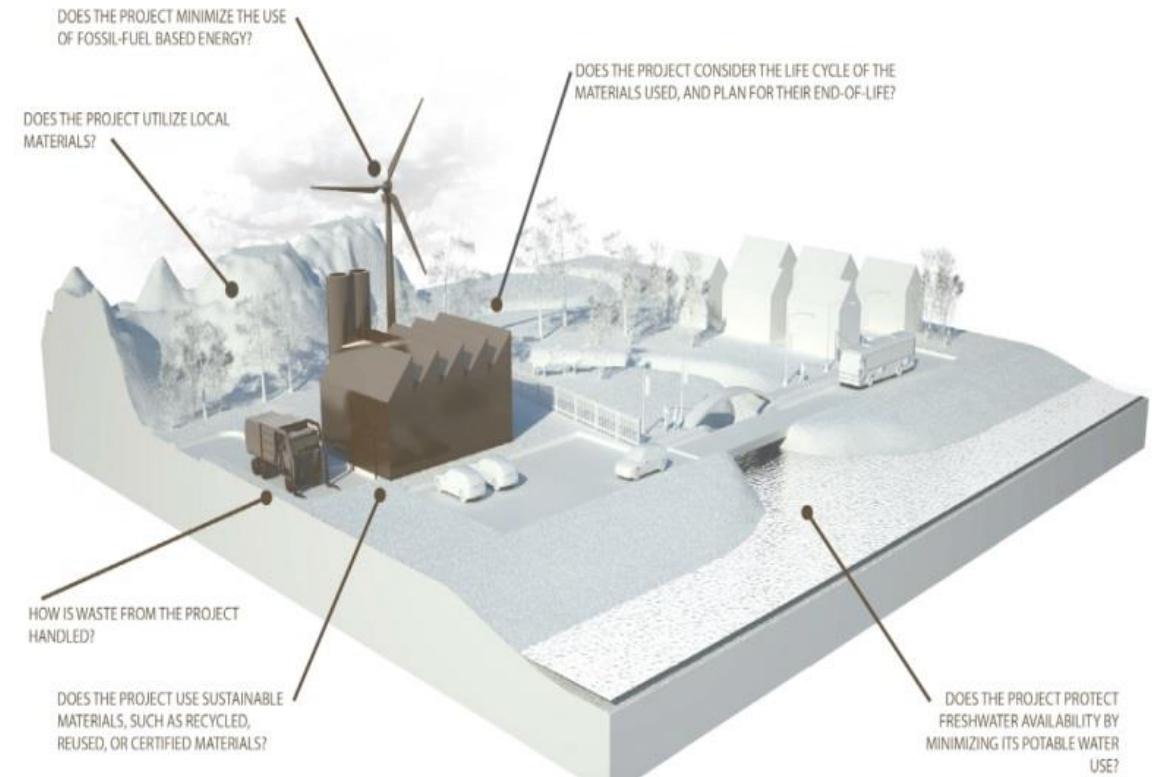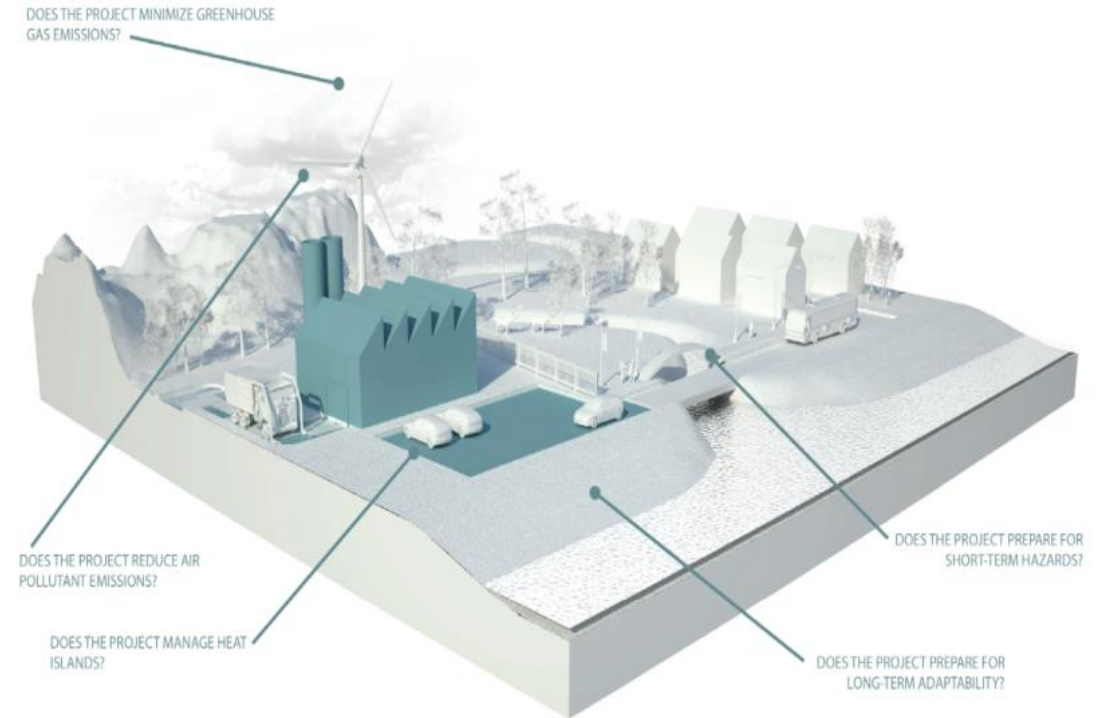
Natural World

- Habitat, wetlands, floodplains, farmland protection

- Avoid geological hazards

- Stormwater runoff quality and quantity

- Prevent fragmentation

- Soil preservation or restoration

- Maintain ecosystem's functions
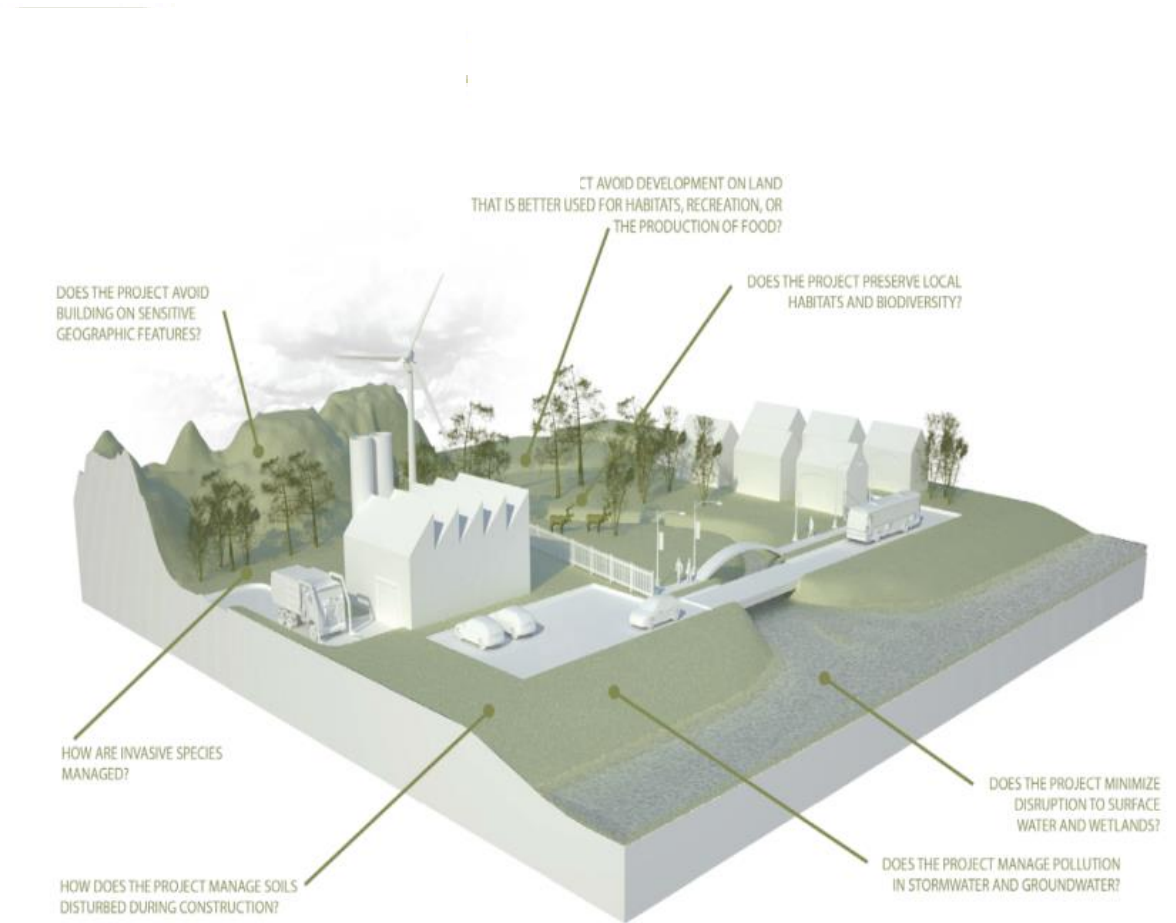
Climate and Resilience

- Reduction in GHG emissions, pollution

- Resilience
  - Identify climate threats and risk
  - Assess vulnerabilities
  - Identify short term hazards
  - Plan for long term adaptability

Emergency Response Planning

DOES THE PROJECT MINIMIZE GREENHOUSE GAS EMISSIONS?

DOES THE PROJECT REDUCE AIR POLLUTANT EMISSIONS?

DOES THE PROJECT MANAGE HEAT ISLANDS?

DOES THE PROJECT PREPARE FOR SHORT-TERM HAZARDS?

DOES THE PROJECT PREPARE FOR LONG-TERM ADAPTABILITY?

NOR·EX Engineering Ltd. | an ASSOCIATED ENGINEERING COMPANY

"Climate Lens' - Funding Application Support

- **Envision** is recognized as a viable tool for **GHG Emissions Assessments**

  - Investing in Canada Infrastructure Program (ICIP)
  - Disaster Mitigation and Adaptation Fund (DMAF)
  - Smart Cities Challenge
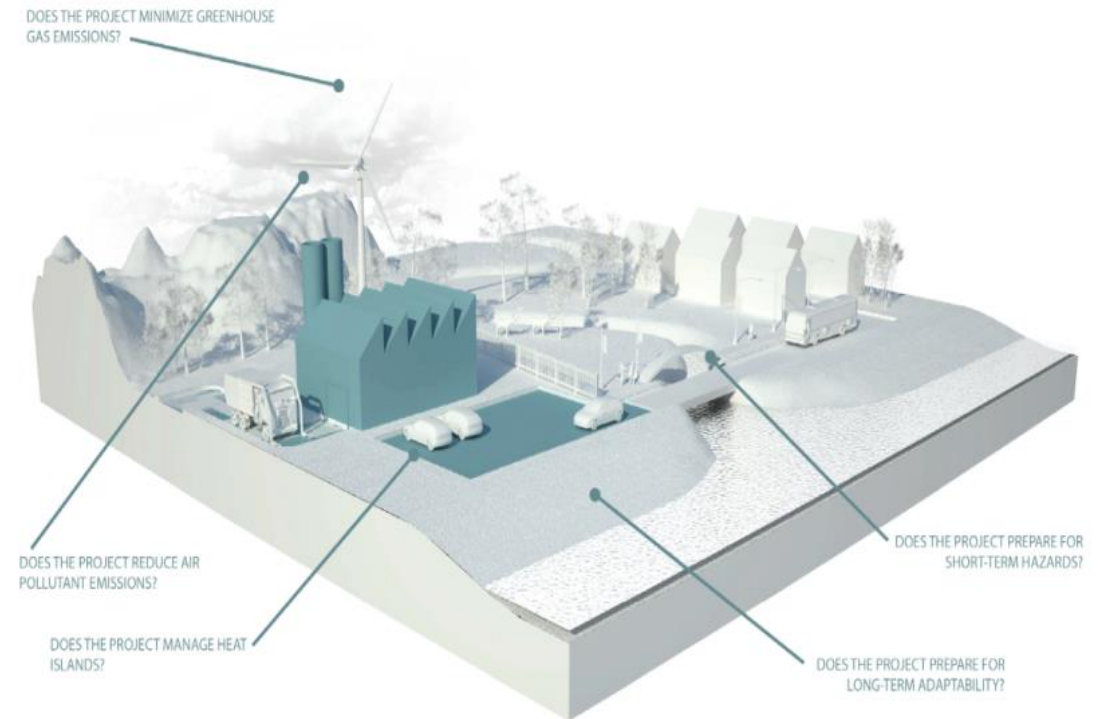
Envision's Self-Assessment Checklist

- Addresses 59 best practices (*credits*) under the 5 Categories

- Conducts preliminary check on a project's potential performance

- Provides communication tool for **Project Planning** and early **Stakeholder Engagement**

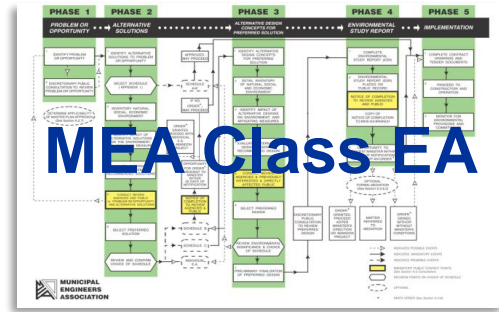| NW 1.2 Protect Wetlands and Surface Water			
Intent: Protect, buffer, enhance and restore areas designated as wetlands, shorelines, and waterbodies by providing natural buffer zones, vegetation and soil protection zones.			
Metric: Size of natural buffer zone established around all wetlands, shorelines, and waterbodies.			
Assessment Questions:	Yes	No	N/A
Will the project avoid development on wetlands, shorelines, and waterbodies?	○	○	○ ?
Will the project maintain soil protection zones (VSPV) around all wetlands, shorelines, and waterbodies?	○	○	○ ?
Will the project restore degraded existing buffer zones to a natural state?	○	○	○ ?

Accreditation & Awards

Project Size ($M)	Registration Fee	Verification Fee			
		Pathway A: Design + Post-Construction		Pathway B: Post-Construction	
		Member	Non-Member	Member	Non-Member
< 5	$2,000	$12,000	$14,000	$9,000	$11,000
5 – 25	$2,000	$17,000	$20,000	$14,000	$17,000
25 – 100	$2,000	$26,000	$30,000	$21,000	$25,000
100 – 250	$2,000	$33,000	$39,000	$28,000	$34,000
250 – 500	$2,000	$41,000	$48,000	$35,000	$42,000
500 – 1000	$2,000	$48,000	$56,000	$42,000	$50,000
> 1000	$2,000	Contact ISI for a quote.			

2015 US$, Requires 3rd party audit by ISI

Institute for Sustainable Infrastructure

ENVISION™

PLATINUM

2016

Ohio River Bridges
East End Crossing

In recognition of your leadership
in helping the East End Crossing Project achieve the
ENVISION™ - Platinum Award

ENVISION™

Louisville-Southern Indiana
Ohio River Bridges Project
East End Crossing

IFA/INDOT East End Crossing

December 18, 2016

Using the Envision Process

MEA Class EA

THE ENVISION™ RATING SYSTEM

Self Assessment

Level of Achievement

Registration and Documentation

Verification and Audit

Award and Recognition

FEES
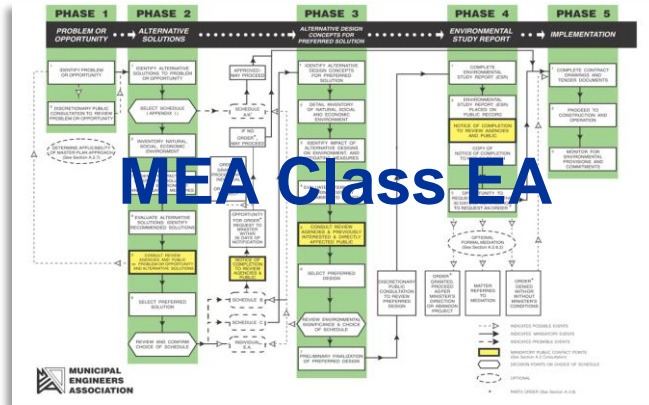
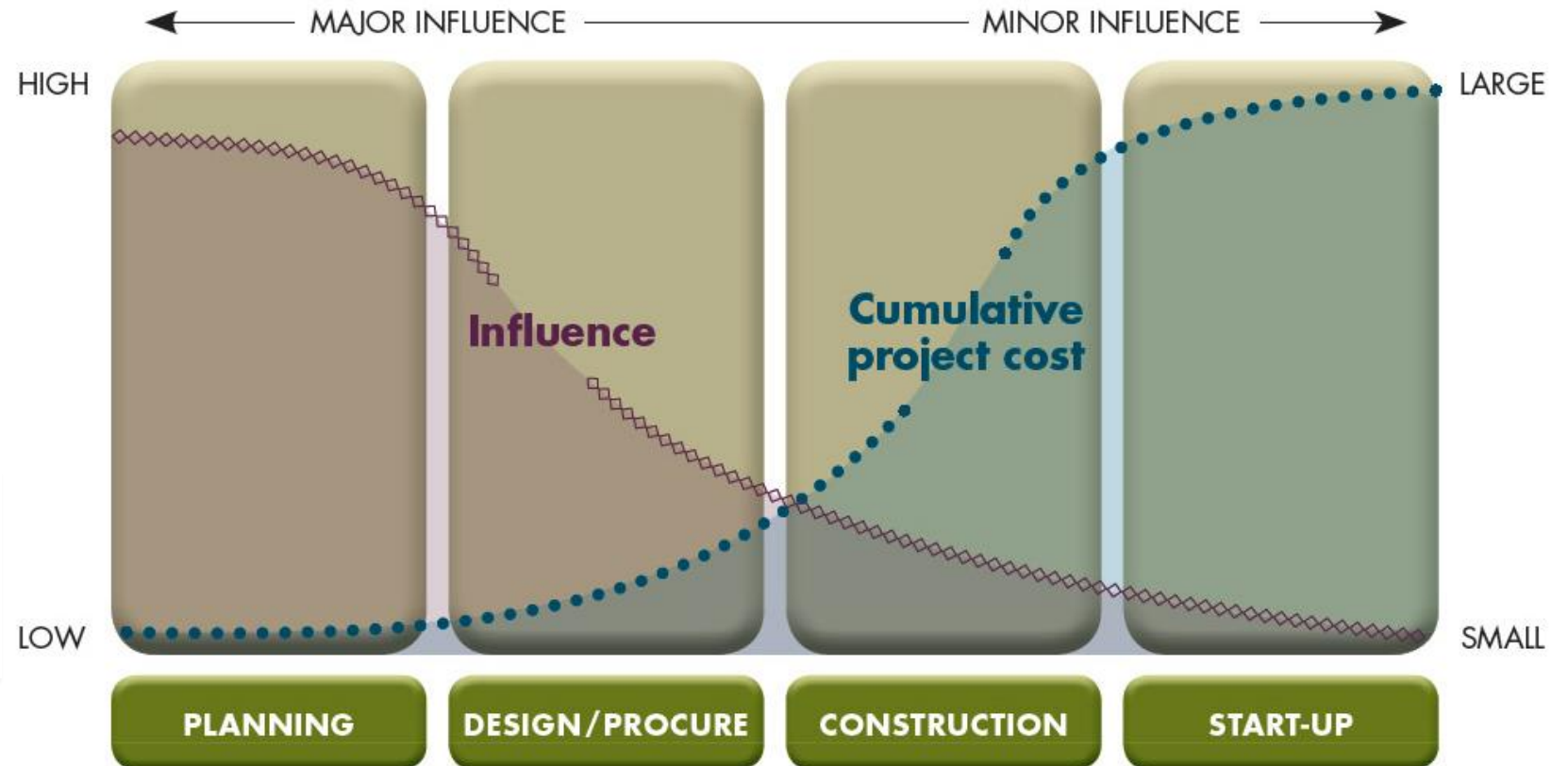Apply sustainability principles in projects **without certification**

Opportunity to Influence

MEA Class EA

THE ENVISION™ RATING SYSTEM

Project Cost / Influence Curve

MAJOR INFLUENCE — MINOR INFLUENCE →

HIGH — LARGE

Influence

Cumulative project cost

LOW — SMALL

PLANNING | DESIGN/PROCURE | CONSTRUCTION | START-UP

The Future is in Your Hands

**Our Children
Thank You**