

Sustainability in Infrastructure

How to Use the ENVISION™ Rating System to Guide Infrastructure Development



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Topics to be Covered

- What is sustainable infrastructure?
- How do you document sustainability?
- ENVISION™ rating system
- WEF Manual for Envision
- Case Study/ Example
- Wrap-up

What is Sustainability?

“To pursue sustainability is to create and maintain the conditions under which humans and nature can exist in productive harmony to support present and future generations.” (U.S. EPA)

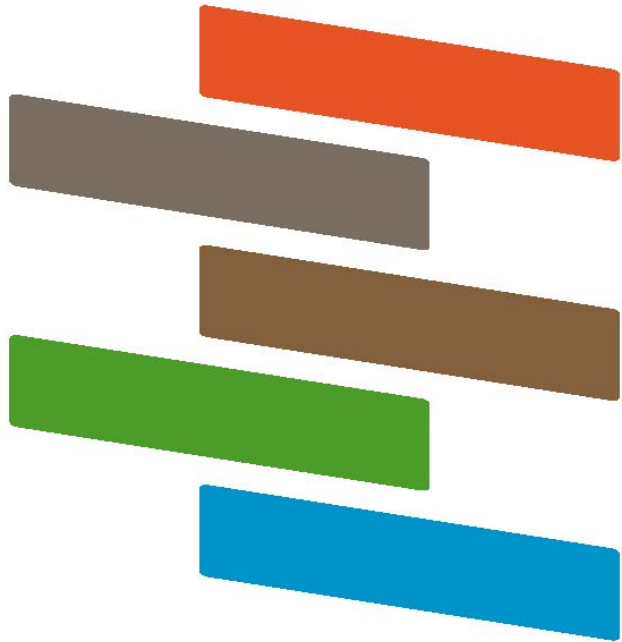
What does this mean?



- Change Planning
- Change Design
- Change Construction
- Stakeholder Engagement at all phases
- Collaboration

How do you accomplish this?





ENVISION

Institute for Sustainable Infrastructure (ISI) developed a rating system call Envision TM to allow professionals, planners, engineers, public works directors, etc., to plan and build sustainable infrastructure.

ENVISION™

–What is it?

- Similar in nature to the Leadership in Energy and Environmental Design (LEED) run by the US Green Building Council
- Envision™ is a complete guide to sustainable infrastructure
 - Best practices library
 - Checklist for infrastructure projects
 - Sustainability rating system
- Provides steps from planning & conceptual design to operation and decommissioning

Envision™ Sustainable Infrastructure Framework

- Current Version V3 released in 2018
- 5 categories
 - Quality of Life
 - Leadership
 - Resource Allocation
 - Natural World
 - Climate and Resilience
- 64 Sustainability and Resilience indicators
- Multiple levels of achievement in each indicator

Envision Approaches

– Checklist

- Yes/No Applicability of the Categories
- Helps Identify Areas for Sustainability Improvement
- No Cost to Use

– Envision System

- Detailed Evaluation of Each Category
- Identify Potential Points That Could Be Achieved
- Further Identifies Area for Sustainability Improvement
- No Cost to Use as an evaluation tool

Envision Approaches (con't)

– Envision Certification

- Submit System Evaluation for Certification
- Achieve a Level of Certification Based on Points Achieved
 - Platinum (50%)
 - Gold (40%)
 - Silver (30%)
 - Verified (20%)
- Requires Third Party Verification
- Registration Fee - \$2,000
- Verification Fee Based on Project Cost
 - Two Different Paths
 - Design & Construction
 - Post Construction

Category: Quality of Life



Wellbeing

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

Mobility

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

Community

- QL3.1 Advance Equity & Social Justice
- QL3.2 Preserve Historic & Cultural Resources
- QL3.3 Enhance Views & Local Character
- QL3.4 Enhance Public Space & Amenities

Category: Leadership

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 System
- LD2.2 Plan for Sustainable Communities
- LD2.3 Plan for Long Term Monitoring and 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



Category: Resource Allocation



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 Use

Category: Natural World



Siting

- NW1.1 Preserve Sites of High Ecological Value
- NW1.2 Provide Wetland & Surface Water Buffers
- NW1.3 Preserve Prime Farmland
- MW1.4 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

Category: Climate & Resilience



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

Types of Projects

– Energy

- Distribution, Natural Gas, Wind, Solar, Biomass

– Water, Wastewater

- Treatment, Distribution, Stormwater, Nutrient Management

– Waste

- Solid Waste, Recycling, collection and transfer

– Transportation

- Road/ Highways, Bike/ Pedestrian

– Landscape

- Parks, Natural Infrastructure, Environmental Remediation

– Information

- Telecom, cable, phone, internet

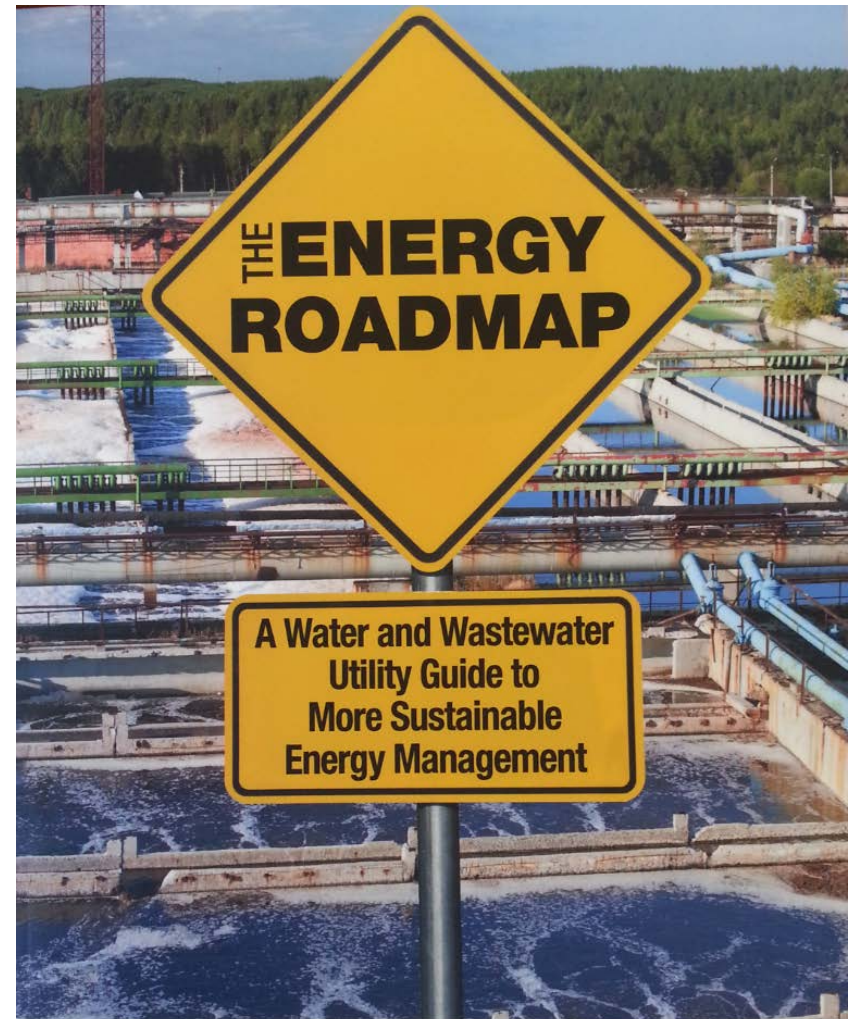
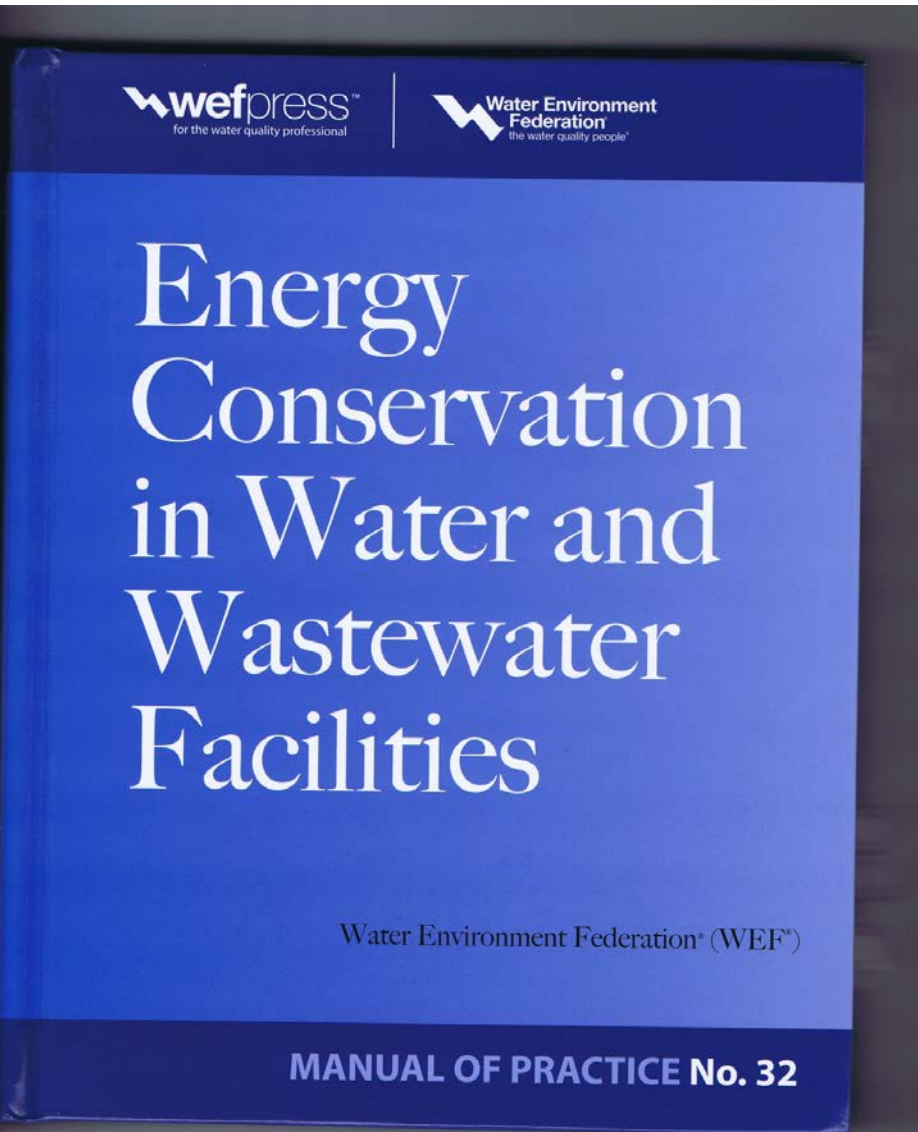
“Envision not only asks, are we doing the project right?, but also are we doing the right project?”

- Long term viability through increased resiliency and preparedness
- Lower costs through management and stakeholder collaboration
- Reduced negative impacts on the community and the environment
- Potentially save money over time through efficiency
- Increased public confidence and involvement in decision making



How do you apply ENVISION™
to Wastewater Projects?

WEF Emphasis on Sustainability and Energy







How do you apply ENVISION to Wastewater projects?

- Water Environment Federation (WEF) – ENVISION Taskforce
 - Evaluated the applicability and relevance of each ENVISION credit as it relates to the water industry.
 - Looked at 4 categories of water projects
 - Collection Systems (CS)
 - Stormwater (SW)
 - Biosolids (BS)
 - Municipal Resource Recovery Facility (MRRF)
 - Manual Published in 2016
 - Available for Free on WEF Website











Applying Envision 1.0 to Wastewater Projects

Created Four Recommendation Levels with Symbols

- **Highly Applicable**  Many opportunities and pathways to achieve high point levels, especially towards the conservative and restorative levels
- **Applicable**  Quite a few opportunities and pathways to achieve relative average point levels at the enhanced to superior levels.
- **Moderately Applicable**  Multiple potential opportunities and pathways to achieve sufficient points at the improved to enhanced levels.
- **Limited Applicability**  Relatively few to no opportunities and pathways to achieve sufficient points to obtain even the improved level. To achieve the smallest amount of points may not justify the cost.

Example Page from WEF Envision Book

Envision Credit	Collection Systems (CS)	Stormwater (SW)	Biosolids (BS)	Municipal Resource Recovery Facility (MRRF)
QUALITY OF LIFE				
Purpose				
QL 1.1 Improve Community Quality of Life				
QL 1.2 Stimulate Sustainable Growth and Development				
QL 1.3 Develop Local Skills & Capabilities				
Well-Being				
QL 2.1 Enhance Public Health & Safety				
QL 2.2 Minimize Noise and Vibration				
QL 2.3 Minimize Light Pollution				
QL 2.4 Improve Community Mobility & Access				
QL 2.5 Encourage Alternative Modes of Transportation				

Example Project Applications

Madison MSD – Envision Checklist

- Planning for Net Zero Energy
- Used Envision Checklist
 - Energy generation alternatives positive for sustainability
 - Checklist can be used for validation and verification of sustainability.
 - Natural World category impacted solar and wind
 - Digestion alternatives favorable for energy-related (Resource Allocation) category
- Checklist appears to be a useful tool
 - More for improvements to a basic plan or design
 - Making any conceptual project more sustainable
 - Less suited comparing similarly beneficial alternatives
 - Potentially used to prioritize energy generation alternatives

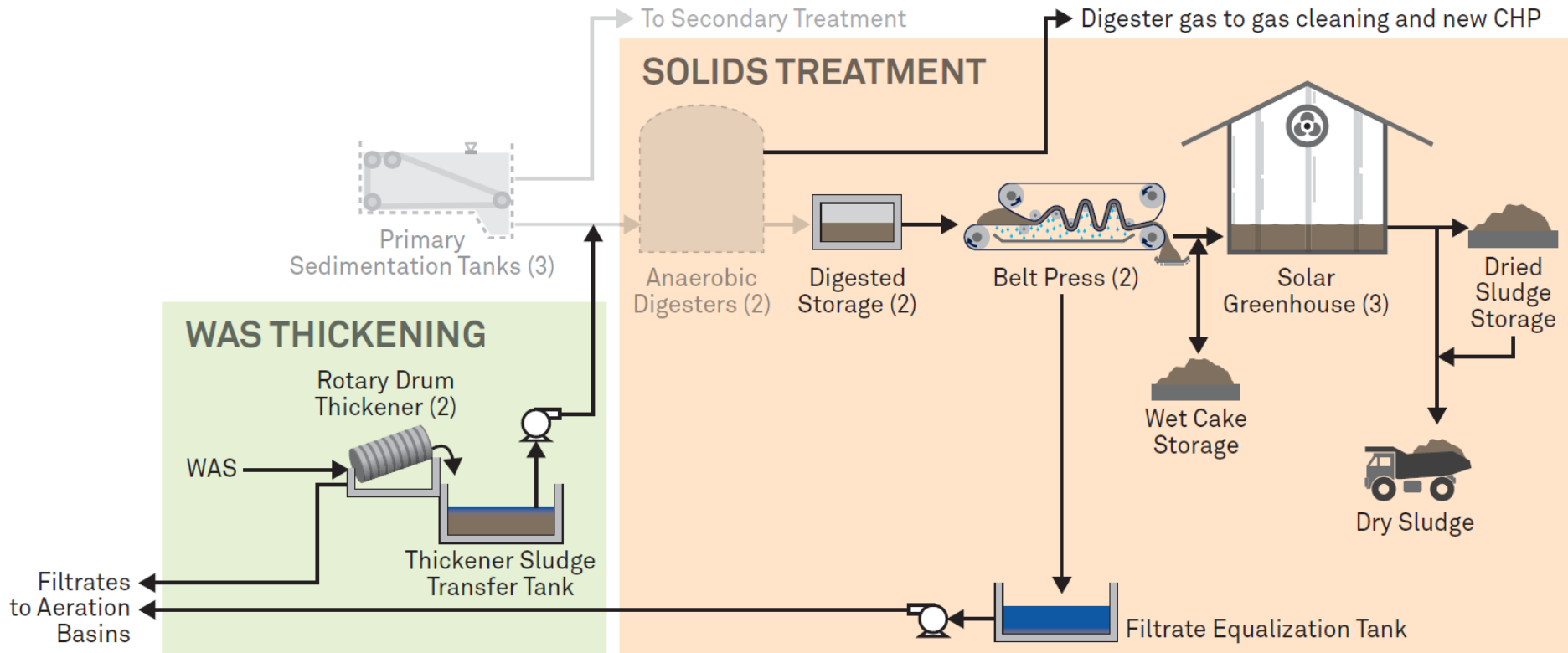
Davis, California

- 6 mgd Design Average Flow
- Major Plant Upgrade
- Sustainability Management Plant Used Envision



Davis Solids Handling Improvements

Sludge Management and Digester Gas Utilization Was Key



Envision Evaluation for Davis Treatment Plant

Envision Credit	Overall Project Phase		
	Design	Construction	Post-Construction
QL1.3 Develop Local Skills and Capabilities	X		
QL2.2 Minimize Noise and Vibration	X	X	
QL2.3 Minimize Light Pollution	X	X	
QL2.6 Improve Site Accessibility, Safety and Wayfinding	X		
RA1.2 Support Sustainable Procurement Practices	X	X	
RA1.4 Use Regional Materials	X	X	
RA1.5 Divert Waste from Landfills	X	X	
RA1.6 Reduce Excavated Materials Taken off Site	X	X	
RA1.7 Provide for Deconstruction and Recycling	X		
RA2.1 Reduce Energy Consumption	X		
RA2.3 Commission and Monitor Energy Systems	X		X
RA3.2 Reduce Potable Water Consumption	X		
NW2.1 Manage Stormwater	X		
NW3.3 Restore Disturbed Soils	X	X	

Davis Envision Credits Identification

Category	Subcategory	Credit
QUALITY OF LIFE	PURPOSE	QL1.1 Improve community quality of life
		QL1.2 Stimulate sustainable growth and development
		QL1.3 Develop local skills and capabilities
	COMMUNITY	QL2.1 Enhance public health and safety
		QL2.2 Minimize noise and vibration
		QL2.3 Minimize light pollution
		QL2.4 Improve community mobility and access
		QL2.5 Encourage alternative modes of transportation
		QL2.6 Improve site accessibility, safety and wayfinding
	WELLBEING	QL3.1 Preserve historic and cultural resources
QL3.2 Preserve views and local character		
QL3.3 Enhance public space		
LEADERSHIP	COLLABORATION	LD1.1 Provide effective leadership and commitment
		LD1.2 Establish a sustainability management system
		LD1.3 Foster collaboration and teamwork
		LD1.4 Provide for stakeholder involvement
	MANAGEMENT	LD2.1 Pursue by-product synergy opportunities
		LD2.2 Improve infrastructure integration
	PLANNING	LD3.1 Plan for long-term monitoring and maintenance
		LD3.2 Address conflicting regulations and policies
		LD3.3 Extend useful life
RESOURCE ALLOCATION	MATERIALS	RA1.1 Reduce Net Embodied Energy
		RA1.2 Support Sustainable Procurement Practices
		RA1.3 Use Recycled Materials
		RA1.4 Use Regional Materials
		RA1.5 Divert Waste from Landfills
		RA1.6 Reduce Excavated Materials Taken off Site
		RA1.7 Provide for Deconstruction and Recycling
	ENERGY	RA2.1 Reduce energy consumption
		RA2.2 Use renewable energy
		RA2.3 Commission and monitor energy systems
	WATER	RA3.1 Protect fresh water availability
		RA3.2 Reduce potable water consumption
RA3.3 Monitor water systems		

Legend

	Contract requirements
	Potential Points
	Pursued by City
	Potentially Not Applicable

Davis Envision Credits Identification (con't)

NATURAL WORLD	SITING	NW1.1 Preserve prime habitat
		NW1.2 Protect wetlands and surface water
		NW1.3 Preserve prime farmland
		NW1.4 Avoid adverse geology
		NW1.5 Preserve floodplain functions
		NW1.6 Avoid unsuitable development on steep slopes
		NW1.7 Preserve greenfields
	LAND & WATER	NW2.1 Manage stormwater
		NW2.2 Reduce pesticide and fertilizer impacts
		NW2.3 Prevent surface and groundwater contamination
	BIODIVERSITY	NW3.1 Preserve species biodiversity
		NW3.2 Control invasive species
		NW3.3 Restore disturbed soils
NW3.4 Maintain wetland and surface water functions		
CLIMATE	EMISSION	CR1.1 Reduce greenhouse gas emissions
		CR1.2 Reduce air pollutant emissions
	RESILIENCE	CR2.1 Assess climate threat
		CR2.2 Avoid traps and vulnerabilities
		CR2.3 Prepare for long-term adaptability
		CR2.4 Prepare for short-term hazards
		CR2.5 Manage heat islands effects

Legend

	Contract requirements
	Potential Points
	Pursued by City
	Potentially Not Applicable

Conclusions and Recommendations

- Wastewater Projects Can Be Evaluated for Sustainability
- The Envision System Can Be Used to Evaluate Wastewater Projects
- There are References Available to Assist in the Application of Envision to a Wastewater Projects
- Consider Evaluation of Sustainability that is Best Suited to Your Project or Facility

Questions?

Thank You!

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