EPA United States Environmental Protection Agency

MAKING THE RIGHT CHOICES FOR YOUR UTILITY

How EPA's Water Infrastructure Planning Tool Can Help Utilities Engage Community & Make Cost-Effective Multi-Benefit Investments

Today's Speakers

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Camden County Municipal Utility Authority

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Ross Strategic

Water Utilities are Anchor Institutions

Every day in America, water and wastewater utilities are on the front lines…

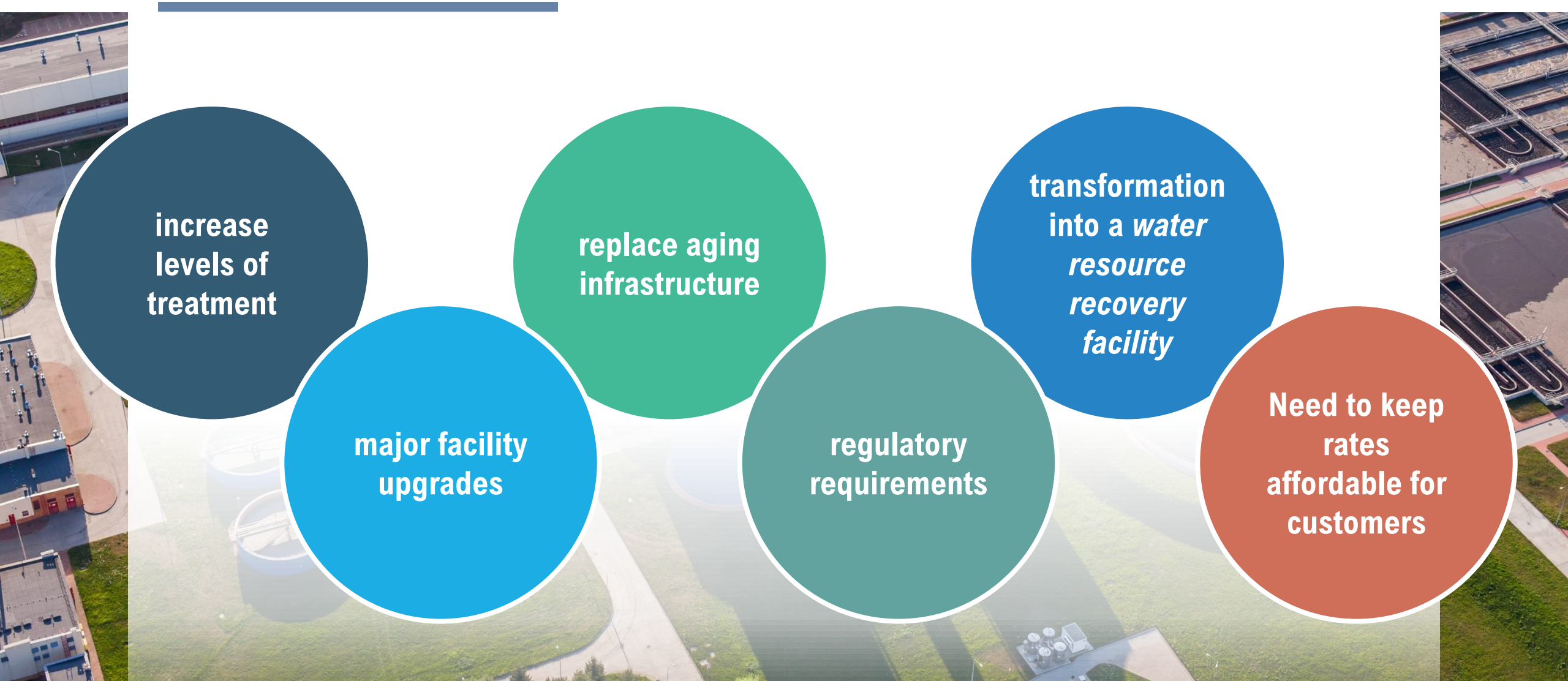
Safeguarding public health

Sustaining critical infrastructure investments

Providing clean and safe water for hundreds of millions

Protecting and enhancing the environment

Water Utilities & Large Capitol Investments



increase levels of treatment

major facility upgrades

replace aging infrastructure

regulatory requirements

transformation into a *water resource recovery facility*

Need to keep rates affordable for customers

Investments last for decades

Costly, Long Term Financial Commitment

Customer Funded

Service lives 50+ Years

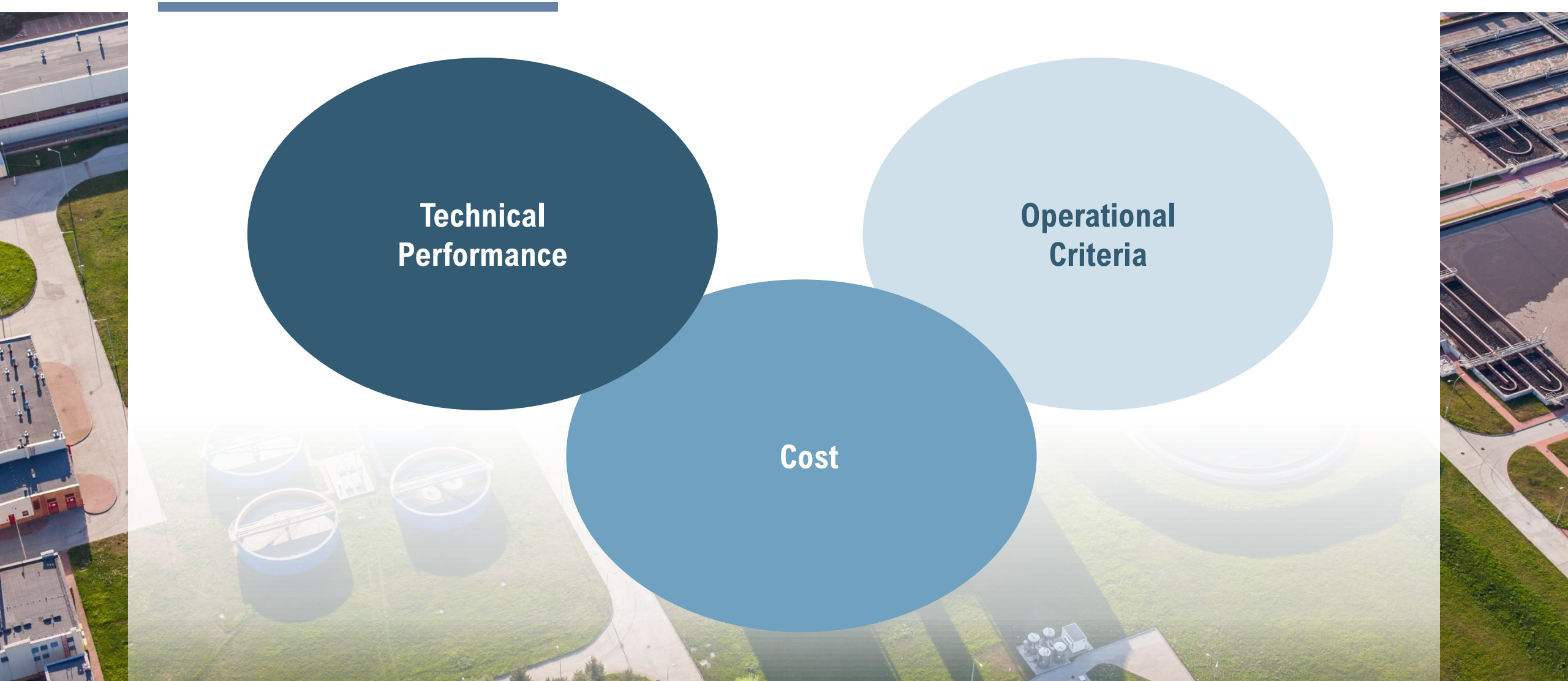
Today's capital project decisions are the foundation for decades of commitment to funding both the operating and capital costs over decades of service.

Investments last for decades – *and it's more than cost*

Investments can provide economic, environmental, and social benefits to the community

- Public Health
- Economic Development
- Regulatory Performance
- Public Understanding
- System Resiliency
- Workforce Enhancement
- Water Resource Reliability
- Community Livability

Conventional alternatives analysis



Conventional alternatives analysis *may fall short:*

- Technical Performance
- Cost
- Operational Criteria
- Proactively engaging the community
- Addressing and quantifying triple bottom line
- Selecting cost-effective option amidst multiple drivers

EPA's capital project decision-making method, ***Augmented Alternatives Analysis (AAA),*** *was developed to address these challenges in modern-day project decision-making.*

Augmented Alternatives Analysis (AAA)

Adds to the core tenets of conventional alternatives analysis benefitting your utility in a few key ways:

- Begins with goals, not cost
- Drills down from goals to metrics
- Creates common scale for metrics (-5 to +5)
- Considers cost as final step (cost-benefit ratio)

Pilot Tested Method, Real World Results

City of Saco Water Resource Recovery Department

- Small Town
- Water Resource Recovery Utility

High Line Canal Conservancy

- Non-profit
- Works with 11 jurisdictions and water districts

Camden County Municipal Utilities Authority

- Large City
- Water Resource Recovery Utility

Camden County Municipal Utilities Authority (2016)

Public wastewater utility serving City of Camden, City of Gloucester, and Camden County

Revenues: ~$100 million/annually

Residents served	510,0000
Lines	125 mi.
Plant capacity	58 mgd

Receiving water: Delaware River

LTCP required to be in place by 2020 (Camden Goal: 2018)

Average number of Combined Sewer Overflows annually: 70

Camden County Municipal Utilities Authority (2016)

AAA Provided:

- An organizing framework for **meaningful** community input
- Systematic process to identify optimal project from **a triple bottom line standpoint**

Outcomes:

- **Significantly more greenspace** created for community benefit
- **Fewer overflows and less flooding** for environmental and public health benefit
- Only **slightly greater cost**, mitigated by SRF funding

United States Environmental Protection Agency

AAA Process

A step-by-step walkthrough

How does AAA add to a conventional analysis?

Conventional Alternatives Analysis		Augmented Steps of AAA
1		Understand Community Priorities
2		Determine Project Goals
3		Define Objectives
4		Rank the Importance of Goals
5		Establish Criteria
6		Choose Metrics for Your Criteria
7		Create Performance Ranges
8		Evaluate Performance of Each Alternative
9		Compare Across Alternatives
10		Incorporate Cost Considerations

Step 1: Understand Community Priorities

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Who needs to be included?

- Impacted groups
- Board/Council
- Community leaders
- Chamber of commerce, watershed partners, etc.

What form of engagement is best?

- Fixed Seat Working Group
- Webinars
- Public Meetings
- Tabling Events
- Attending Community Meetings

Step 1: Understand Community Priorities

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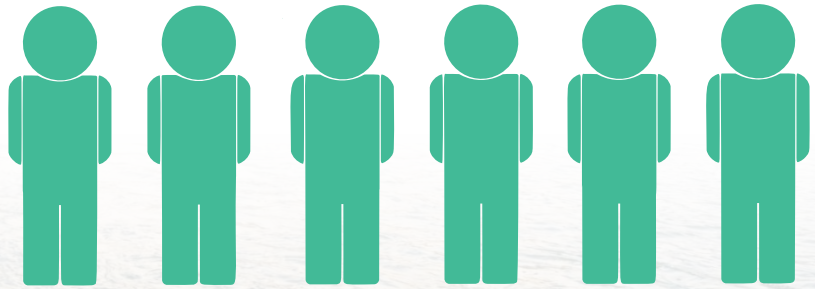
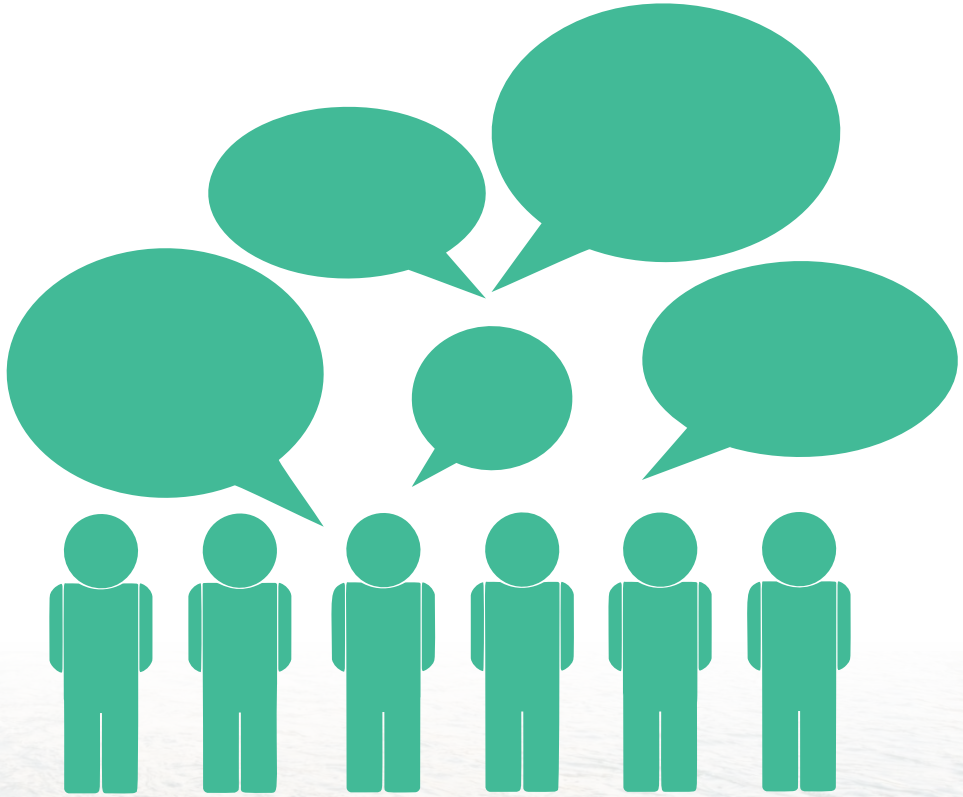
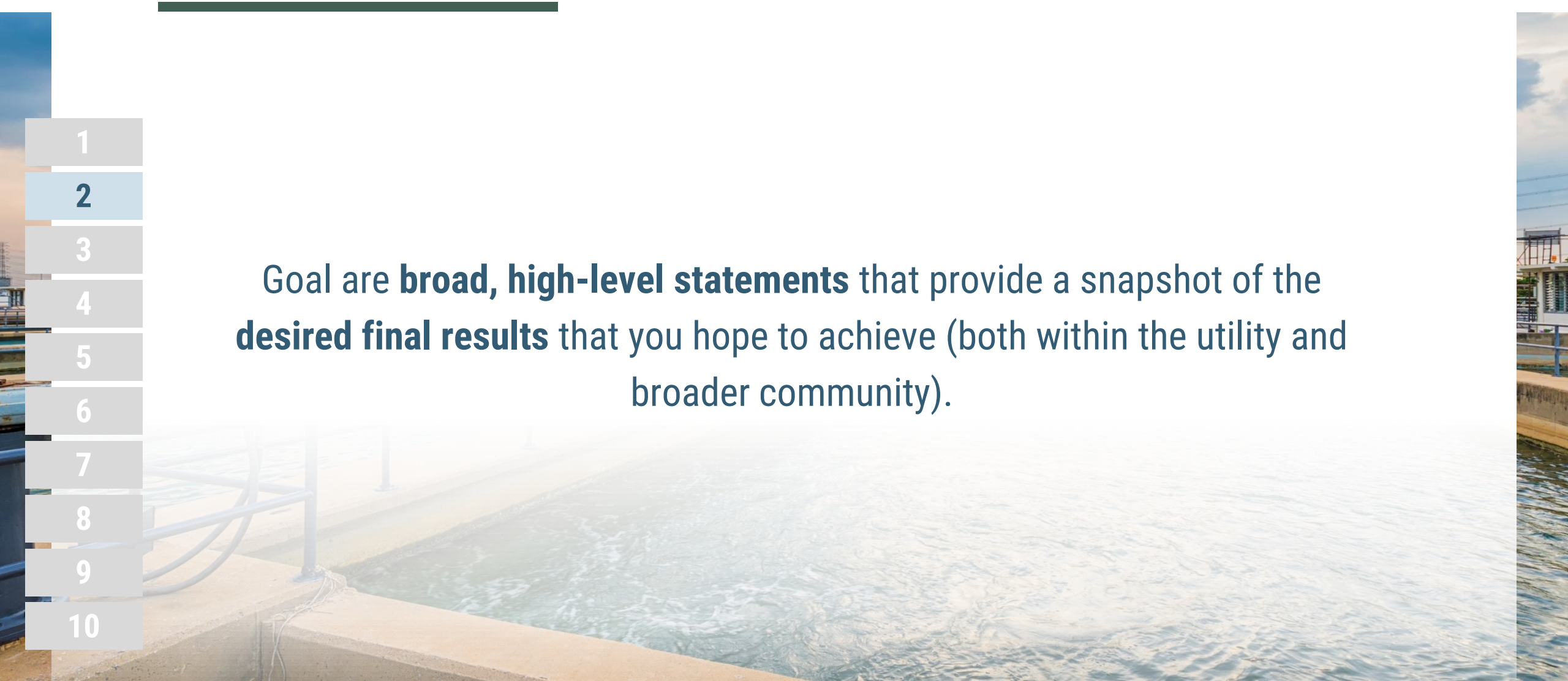


Step 1: Understand Community Priorities



Step 2: Determine Goals

Goal are **broad, high-level statements** that provide a snapshot of the **desired final results** that you hope to achieve (both within the utility and broader community).



Step 2: Determine Goals – Camden Example

- Enhance Public Health and Environment
- Meet or Exceed Permit Requirements
- Produce Economic and Neighborhood Benefits
- Enhance Overall System Resiliency
- Optimize Existing Public Resources
- Increase Public Understanding and Support for CSO Solutions

Step 2: Determine Goals – Camden Example

Goal Enhance Public Health and Environment

Step 3: Define Objectives– Camden Example

Goal	Enhance Public Health and Environment
Objective	Reduce human contact with sewage

An **objective** is an outcome that contributes to the achievement of the goal.

Step 3: Define Objectives– Camden Example

- Reduce human contact with sewage
- Improve receiving water quality

- Increase compatibility with regional redevelopment efforts
- Improve livability in neighborhoods

- Meet/exceed capture targets
- Meet/exceed treatment targets

- Identify and establish an affordable CSO strategy
- Reduce the amount of stormwater and groundwater entering system
- Support ongoing collection system operations

- Increase resilience to storm surges
- Increase adaptability to changing hydrologic conditions

- Transfer knowledge of CSO problems and value of wastewater services

Step 4: Rank the Importance of Goals – Camden Example

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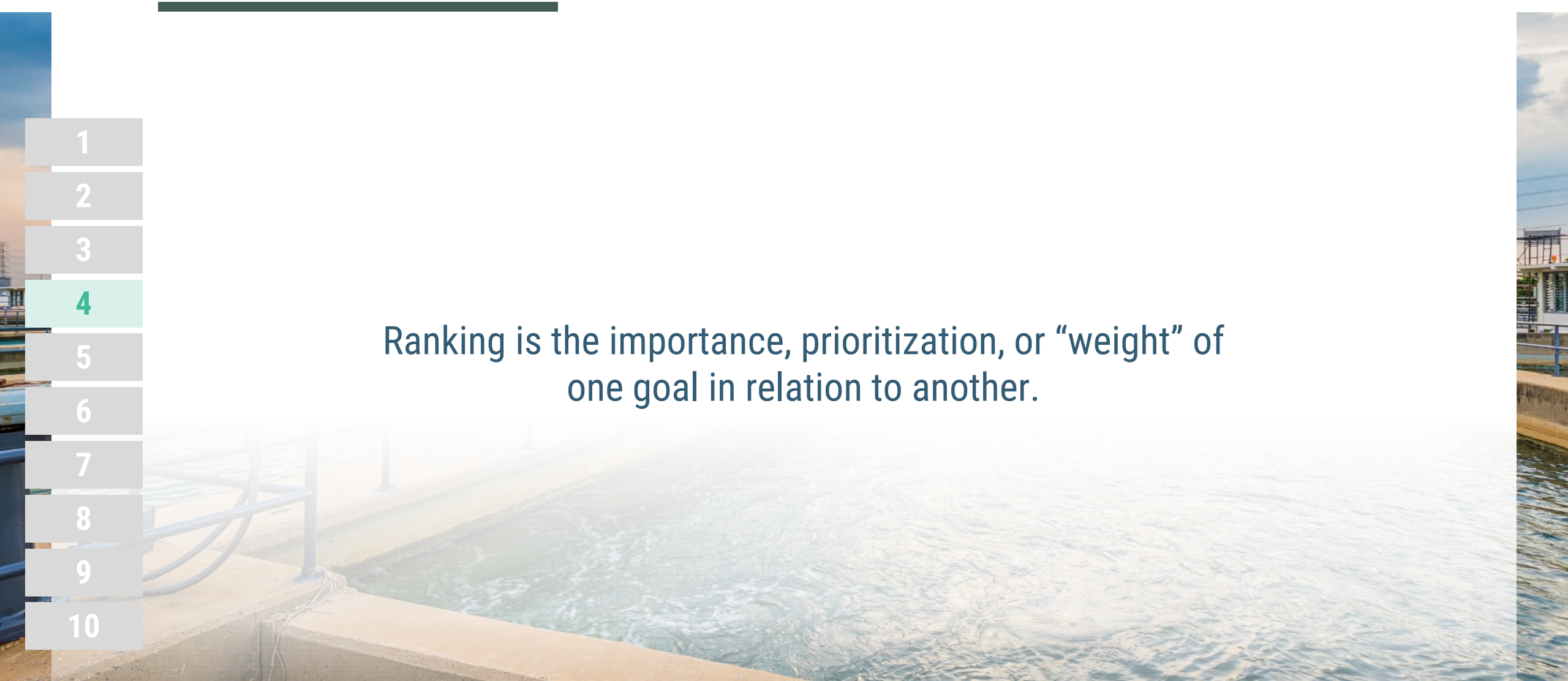
Ranking is the importance, prioritization, or “weight” of one goal in relation to another.



Step 4: Rank the Importance of Goals – Camden Example

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Enhance Public Health and Environment **10**

Meet or Exceed Permit Requirements **9**

Enhance Overall System Resiliency **8**

Produce Economic & Neighborhood Benefits **8**

Optimize Existing Public Resources **7**

Increase Public Understanding & Support for CSO Solutions **6**

Step 5: Establish Criteria – Camden Example

Goal	Enhance Public Health and Environment
Objective	Reduce human contact with sewage
Criteria	Reduction in street flooding events – emphasis on residential areas

Criteria reveal an alternative's strengths and weaknesses. They demonstrate how an alternative will perform relative to goal and objective.

Step 6: Choose Metrics– Camden Example

Goal	Enhance Public Health and Environment
Objective	Reduce human contact with sewage
Criteria	Reduction in street flooding events – emphasis on residential areas
Metric	flood quantity % reduction in residential areas of concern

Metrics measure performance of each alternative.
They can be quantitative or qualitative.

Step 7: Create Performance Ranges – Camden Example

-5	-4	-3	-2	-1	0	1	2	3	4	5

Step 7: Create Performance Ranges – Camden Example

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Goal Enhance Public Health and Environment

Objective Reduce human contact with sewage

Criteria Reduction in street flooding events – emphasis on residential areas

Metric flood quantity % reduction in residential areas of concern

-5	-4	-3	-2	-1	0	1	2	3	4	5
					Alternative has no impact on the flood quantity					

Step 7: Create Performance Ranges – Camden Example

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Goal Enhance Public Health and Environment

Objective Reduce human contact with sewage

Criteria Reduction in street flooding events – emphasis on residential areas

Metric flood quantity % reduction in residential areas of concern

-5	-4	-3	-2	-1	0	1	2	3	4	5
					Alternative has no impact on the flood quantity					Alternative reduces flood quantity by more than 40% annually

Step 7: Create Performance Ranges – Camden Example

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Objective Reduce human contact with sewage

Criteria Reduction in street flooding events – emphasis on residential areas

Metric flood quantity % reduction in residential areas of concern

-5	-4	-3	-2	-1	0	1	2	3	4	5
					Alternative has no impact on the flood quantity					Alternative reduces flood quantity by more than 40% annually

Step 7: Create Performance Ranges – Camden Example

1 2 3 4 5 6 7 8 9 10

Goal Enhance Public Health and Environment

Objective Reduce human contact with sewage

Criteria Reduction in street flooding events – emphasis on residential areas

Metric flood quantity % reduction in residential areas of concern

-5	-4	-3	-2	-1	0	1	2	3	4	5
					Alternative has no impact on the flood quantity	Alternative reduces flood quantity by up to 10% annually	Alternative reduces flood quantity by 11-20% annually	Alternative reduces flood quantity by 21-30% annually	Alternative reduces flood quantity by 31-40% annually	Alternative reduces flood quantity by more than 40% annually

Step 7: Create Performance Ranges – Camden Example

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Metric

flood quantity % reduction in residential areas of concern

-5	-4	-3	-2	-1	0	1	2	3	4	5
					has no impact on the flood quantity	reduces flood quantity by up to 10% annually	reduces flood quantity by 11-20% annually	reduces flood quantity by 21-30% annually	reduces flood quantity by 31-40% annually	reduces flood quantity by more than 40% annually

Metric

Area of recreational space in acres

-5	-4	-3	-2	-1	0	1	2	3	4	5
impacts or eliminates more than 50	impacts or eliminates 25-50 acres	impacts or eliminates 10-25 acres	impacts or eliminates 5-10 acres	impacts or eliminates up to 5 acres	does not change the number of acres	adds up to 5 acres	adds 5-10 acres	adds 10-25 acres	adds 25-50 acres	adds 25-50 acres

Step 8: Evaluate Performance – Camden Example

Alternative 1: All Grey
Alternative 2: Moderate Green
Alternative 3: Heavy Green

Step 8: Evaluate Performance – Camden Example

1 2 3 4 5 6 7 8 9 10

Metric flood quantity % reduction in residential areas of concern

-5	-4	-3	-2	-1	0	1	2	3	4	5
					has no impact on the flood quantity	reduces flood quantity by up to 10% annually	reduces flood quantity by 11-20% annually	reduces flood quantity by 21-30% annually	reduces flood quantity by 31-40% annually	reduces flood quantity by more than 40% annually

Alternative 1: All Grey	**0**
Alternative 2: Moderate Green	**3**
Alternative 3: Heavy Green	**3**

Step 8: Evaluate Performance – Camden Example

Criteria	Unweighted Score		
	Alternative A	*Alternative B*	*Alternative C*
Goal 1 - Reduction in flooding events	0	3	3

Step 8: Evaluate Performance – Camden Example

Criteria	Unweighted Score		
	Alt A	*Alt B*	*Alt C*
Goal 1 - Reduction in flooding events	0	3	3
Goal 1 - Reduction in CSO discharge volume			
Goal 2 - Annual system-wide CSO volume capture			
Goal 3 - Flexibility in siting project			
Goal 4 - Flexibility in timing of implementation of project			
Goal 4 - Flexibility in phasing implementation of alternatives			
Goal 4 - Green space			
Goal 4 - Reduction in heat island effect			
Goal 5 - Cost effectiveness			
Goal 6 - Visibility to citizens			

Step 8: Evaluate Performance – Camden Example

Criteria	Unweighted Score		
	Alt A	*Alt B*	*Alt C*
Goal 1 - Reduction in flooding events	0	3	3
Goal 1 - Reduction in CSO discharge volume	4	4	4
Goal 2 - Annual system-wide CSO volume capture			
Goal 3 - Flexibility in siting project			
Goal 4 - Flexibility in timing of implementation of project			
Goal 4 - Flexibility in phasing implementation of alternatives			
Goal 4 - Green space			
Goal 4 - Reduction in heat island effect			
Goal 5 - Cost effectiveness			
Goal 6 - Visibility to citizens			

Step 8: Evaluate Performance – Camden Example

Criteria	Unweighted Score		
	Alt A	*Alt B*	*Alt C*
Goal 1 - Reduction in flooding events	0	3	3
Goal 1 - Reduction in CSO discharge volume	4	4	4
Goal 2 - Annual system-wide CSO volume capture	5	5	5
Goal 3 - Flexibility in siting project	1	1	1
Goal 4 - Flexibility in timing of implementation of project	4	3	2
Goal 4 - Flexibility in phasing implementation of alternatives	3	3	3
Goal 4 - Green space	0	1	1
Goal 4 - Reduction in heat island effect	0	1	1
Goal 5 - Cost effectiveness	2	-1	-3
Goal 6 - Visibility to citizens	1	5	5

Step 8: Evaluate Performance – Camden Example

Criteria	Unweighted Score		
	Alt A	*Alt B*	*Alt C*
Goal 1 - Reduction in flooding events	0	3	3
Goal 1 - Reduction in CSO discharge volume	4	4	4
Goal 2 - Annual system-wide CSO volume capture	5	5	5
Goal 3 - Flexibility in siting project	1	1	1
Goal 4 - Flexibility in timing of implementation of project	4	3	2
Goal 4 - Flexibility in phasing implementation of alternatives	3	3	3
Goal 4 - Green space	0	1	1
Goal 4 - Reduction in heat island effect	0	1	1
Goal 5 - Cost effectiveness	2	-1	-3
Goal 6 - Visibility to citizens	1	5	5
TOTAL	**20**	**25**	**22**

Step 9 Compare Across Alternatives – Camden Example

Criteria	Unweighted Score		
	Alt A	*Alt B*	*Alt C*
Goal 1 - Reduction in flooding events	0	3	3
Goal 1 - Reductio	4	4	4
Goal 2 - Annual sy	5	5	5
Goal 3 - Flexibility	1	1	1
Goal 4 - Flexibility	4	3	2
Goal 4 - Flexibility	3	3	3
Goal 4 - Green sp	0	1	1
Goal 4 - Reductio	0	1	1
Goal 5 - Cost effe	2	-1	-3
Goal 6 - Visibility to citizens	1	5	5
TOTAL	**20**	**25**	**22**

Enhance Public Health and Environment	10
Meet or Exceed Permit Requirements	9
Enhance Overall System Resiliency	8
Produce Economic & Neighborhood Benefits	8
Optimize Existing Public Resources	7
Increase Public Understanding & Support for CSO Solutions	6

Step 9 Compare Across Alternatives – Camden Example

Criteria	Weight	Alt A	Alt B	Alt C
Goal 1 - Reduction in flooding events		0	3	3
Goal 1 - Reductio		4	4	4
Goal 2 - Annual sy		5	5	5
Goal 3 - Flexibility		1	1	1
Goal 4 - Flexibility		4	3	2
Goal 4 - Flexibility		3	3	3
Goal 4 - Green sp		0	1	1
Goal 4 - Reductio		0	1	1
Goal 5 - Cost effe		2	-1	-3
Goal 6 - Visibility to citizens		1	5	5
TOTAL		**20**	**25**	**22**

Step 9 Compare Across Alternatives – Camden Example

Criteria	Weight	Alt A	Alt B	Alt C
Goal 1 - Reduction in flooding events		0	3	3
Goal 1 - Reductio		4	4	4
Goal 2 - Annual sy		5	5	5
Goal 3 - Flexibility		1	1	1
Goal 4 - Flexibility		4	3	2
Goal 4 - Flexibility		3	3	3
Goal 4 - Green sp		0	1	1
Goal 4 - Reductio		0	1	1
Goal 5 - Cost effe		2	-1	-3
Goal 6 - Visibility to citizens		1	5	5
TOTAL		**20**	**25**	**22**

Enhance Public Health and Environment	10
Meet or Exceed Permit Requirements	9
Enhance Overall System Resiliency	8
Produce Economic & Neighborhood Benefits	8
Optimize Existing Public Resources	7
Increase Public Understanding & Support for CSO Solutions	6

Step 9 Compare Across Alternatives – Camden Example

Criteria	Weight	Alt A	Alt B	Alt C
Goal 1 - Reduction in flooding events	10	0	3	3
Goal 1 - Reductio	10	4	4	4
Goal 2 - Annual sy	9	5	5	5
Goal 3 - Flexibility	8	1	1	1
Goal 4 - Flexibility	8	4	3	2
Goal 4 - Flexibility	8	3	3	3
Goal 4 - Green sp	8	0	1	1
Goal 4 - Reductio	8	0	1	1
Goal 5 - Cost effe	7	2	-1	-3
Goal 6 - Visibility to citizens	6	1	5	5
TOTAL		20	25	22

Step 9 Compare Across Alternatives – Camden Example

Criteria	Weight	*Alt A*	*Alt B*	*Alt C*
Goal 1 - Reduction in flooding events	**10**	0	3	3
Goal 1 - Reduction in CSO discharge volume	**10**	4	4	4
Goal 2 - Annual system-wide CSO volume capture	**9**	5	5	5
Goal 3 - Flexibility in siting project	**8**	1	1	1
Goal 4 - Flexibility in timing of implementation of project	**8**	4	3	2
Goal 4 - Flexibility in phasing implementation of alternatives	**8**	3	3	3
Goal 4 - Green space	**8**	0	1	1
Goal 4 - Reduction in heat island effect	**8**	0	1	1
Goal 5 - Cost effectiveness	**7**	2	-1	-3
Goal 6 - Visibility to citizens	**6**	1	5	5
TOTAL				

Step 9 Compare Across Alternatives – Camden Example

Criteria	Weight	*Alt A*	*Alt B*	*Alt C*
Goal 1 - Reduction in flooding events	**10**	0	10	30
Goal 1 - Reduction in CSO discharge volume	**10**	40	40	40
Goal 2 - Annual system-wide CSO volume capture	**9**	45	45	45
Goal 3 - Flexibility in siting project	**8**	8	8	8
Goal 4 - Flexibility in timing of implementation of project	**8**	32	24	16
Goal 4 - Flexibility in phasing implementation of alternatives	**8**	24	24	24
Goal 4 - Green space	**8**	0	8	8
Goal 4 - Reduction in heat island effect	**8**	0	8	8
Goal 5 - Cost effectiveness	**7**	6	18	30
Goal 6 - Visibility to citizens	**6**	0	10	30
TOTAL				

Step 9 Compare Across Alternatives – Camden Example

Criteria	Weight	*Alt A*	*Alt B*	*Alt C*
Goal 1 - Reduction in flooding events	**10**	0	10	30
Goal 1 - Reduction in CSO discharge volume	**10**	40	40	40
Goal 2 - Annual system-wide CSO volume capture	**9**	45	45	45
Goal 3 - Flexibility in siting project	**8**	8	8	8
Goal 4 - Flexibility in timing of implementation of project	**8**	32	24	16
Goal 4 - Flexibility in phasing implementation of alternatives	**8**	24	24	24
Goal 4 - Green space	**8**	0	8	8
Goal 4 - Reduction in heat island effect	**8**	0	8	8
Goal 5 - Cost effectiveness	**7**	6	18	30
Goal 6 - Visibility to citizens	**6**	0	10	30
TOTAL		**155**	**185**	**209**

Step 9 Compare Across Alternatives – Camden Example

Criteria	Weight	*Alt A*	*Alt B*	*Alt C*
Goal 1 - Reduction in flooding events	**10**	0	10	30
Goal 1 - Reduction in CSO discharge volume	**10**	40	40	40
Goal 2 - Annual system-wide CSO volume capture	**9**	45	45	45
Goal 3 - Flexibility in siting project	**8**	8	8	8
Goal 4 - Flexibility in timing of implementation of project	**8**	32	24	16
Goal 4 - Flexibility in phasing implementation of alternatives	**8**	24	24	24
Goal 4 - Green space	**8**	0	8	8
Goal 4 - Reduction in heat island effect	**8**	0	8	8
Goal 5 - Cost effectiveness	**7**	6	18	30
Goal 6 - Visibility to citizens	**6**	0	10	30
TOTAL		**155**	**185**	**209**

Step 10: Incorporate Cost Considerations – Camden Example

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	Alt A	Alt B	Alt C
Total Score	**155**	**185**	**209**
Project Capital Cost (Millions)	25	27	30
Benefit-Cost Ratio			

Step 10: Incorporate Cost Considerations – Camden Example

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	Alt A	Alt B	Alt C
Total Score	**155**	**185**	**209**
Project Capital Cost (Millions)	25	27	30
Benefit-Cost Ratio	6.2	6.7	7

The AAA Process

Conventional Alternatives Analysis		Augmented Steps of AAA
1		Understand Community Priorities
2		Determine Project Goals
3		Define Objectives
4		Rank the Importance of Goals
5		Establish Criteria
6		Choose Metrics for Your Criteria
7		Create Performance Ranges
8		Evaluate Performance of Each Alternative
9		Compare Across Alternatives
10		Incorporate Cost Considerations

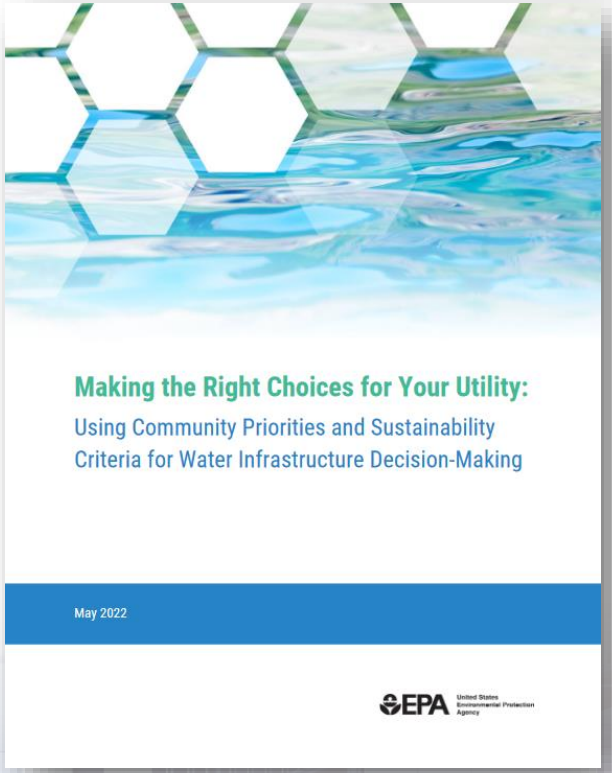
Camden Experience with AAA

- Identified an investment alternative with **significant community input**
- Improved **community & environmental benefits** (without significant cost & impact to ratepayers)
- Allowed Camden to **apply unique values** & weigh them systematically
- Put competing components of the project together to evaluate the full picture

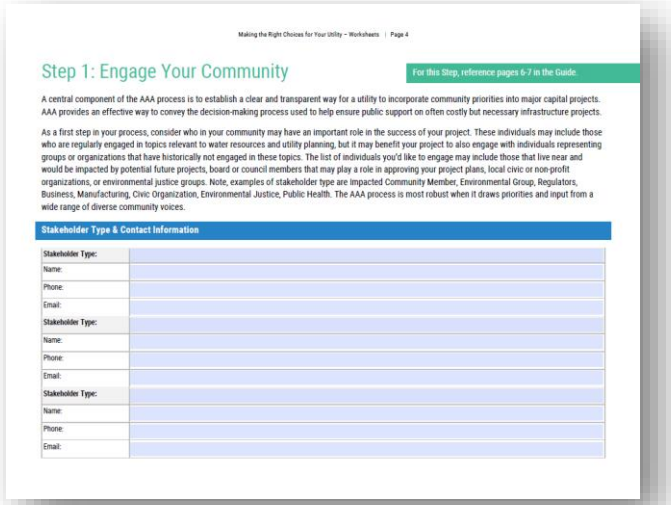
The AAA process was applied ***– not theoretical –*** and allowed us to talk about the **where** and **how** of green infrastructure

Questions?

AAA Resources

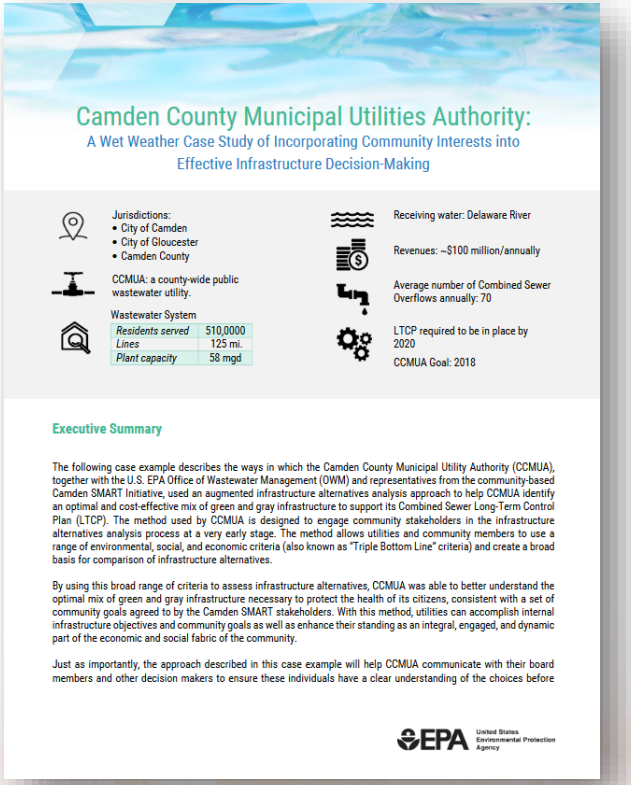


EPA's AAA Guide (Revised May 2022)



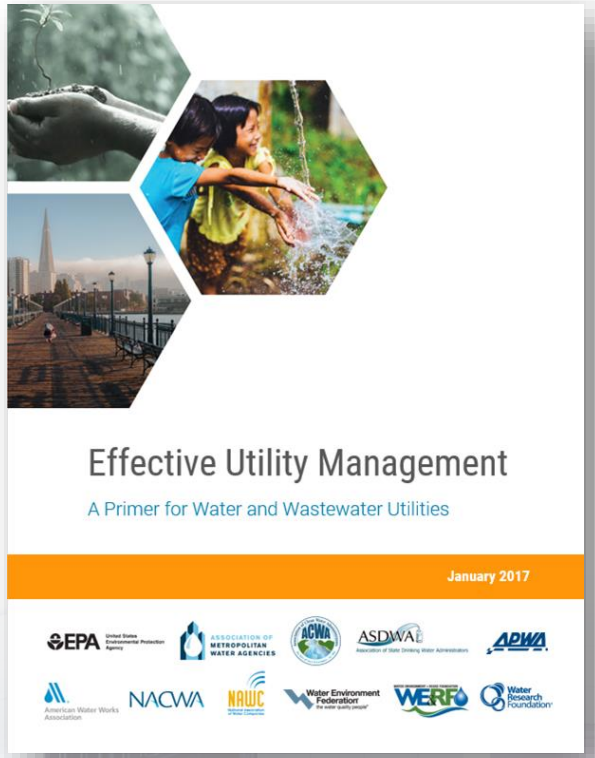
Worksheets
Fillable PDF & Excel

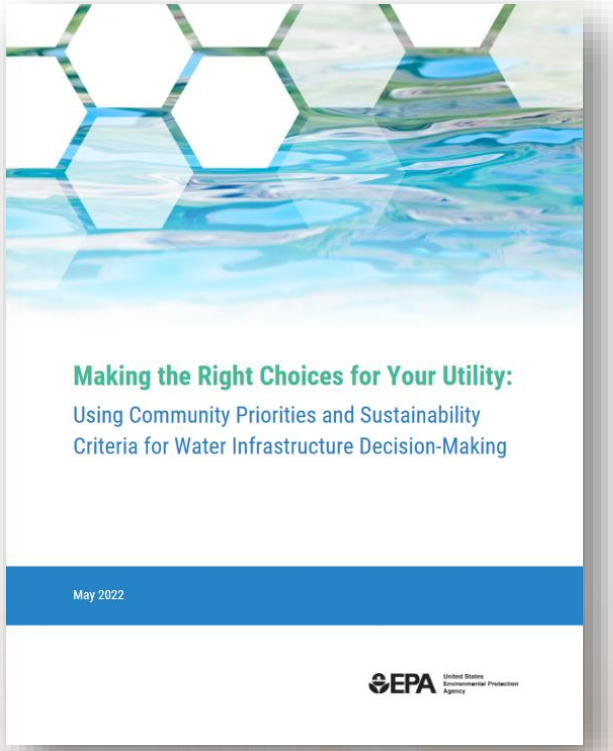
Webinar Recording



Case examples

EPA's Sustainable Utility Management





To view resources:

Or search online for EPA's

"Planning For Sustainability" webpage

Contact us with questions and to learn more!

Leslie Corcelli

EPA Office of Wastewater Management

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