

Barriers to Using Decentralized Wastewater For Community Solutions: 2007 to 2020

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Why Should We Consider Decentralized Wastewater Systems?

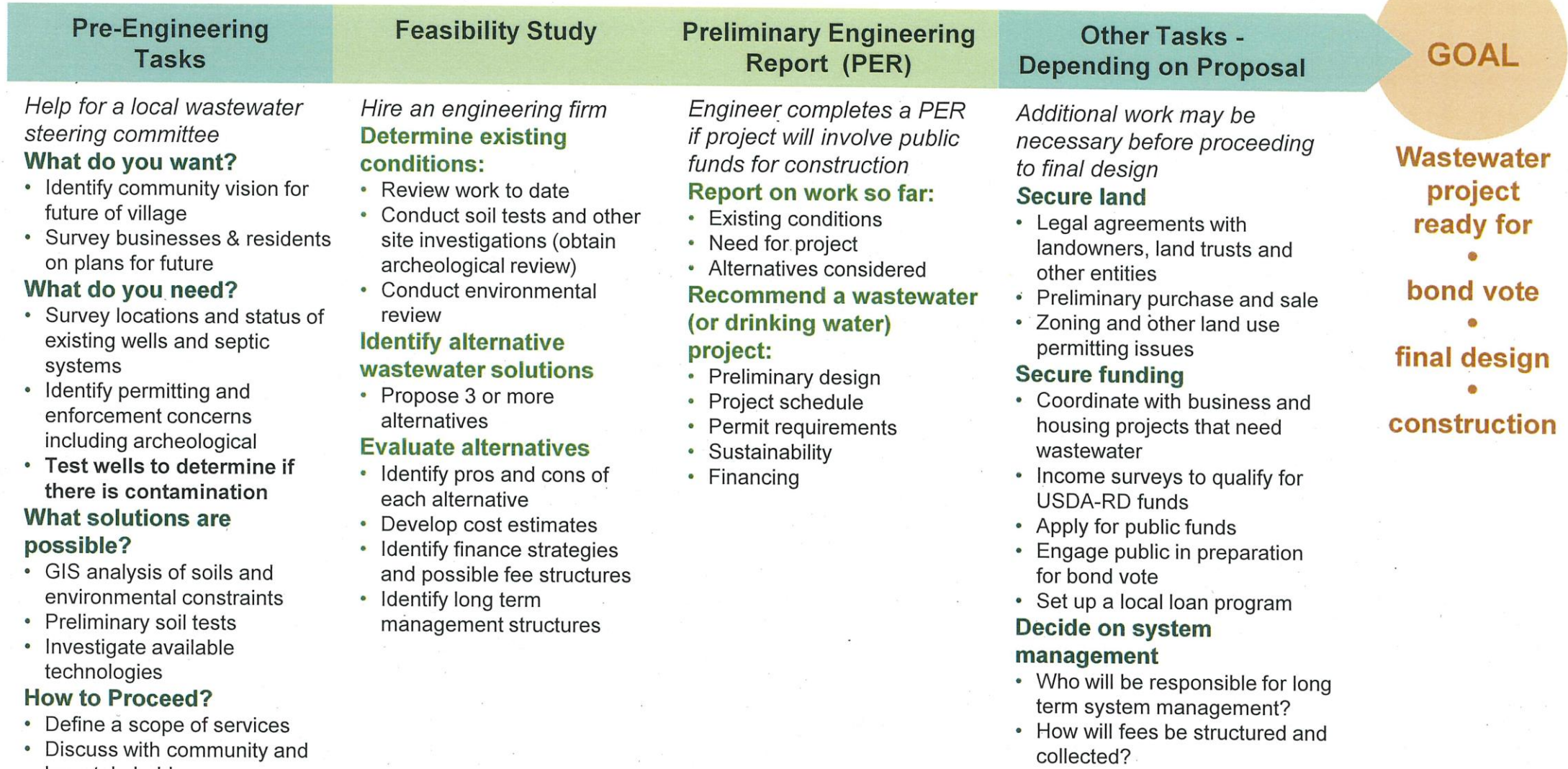
- ▶ Uses soils to treat and disperse water back into environment;
- ▶ Can provide similar or better treatment as direct discharge systems;
- ▶ Can be cost effective by saving piping wastewater distances;
- ▶ Scalable/phasing flexibility;
- ▶ Frees up land uses and facilitates economic growth.



20,000 GPD Community System in
Recreational Field, Warren, Vermont

Path to Wastewater Solutions for Villages

TYPICAL ENGINEERING STUDIES



U.S. EPA Funded Study Via the Water Research Foundation 2004-2007

- ▶ Led by Stone Environmental Inc.
http://ndwrcdp.werf.org/research/project_04-DEC-2.asp
- ▶ Summarizes perceptions of industry representatives to identify
 - ▶ Barriers to using decentralized wastewater solutions and
 - ▶ Opportunities for overcoming the barriers





Major Categories of Barriers

- ▶ Consulting engineer's financial reward for using centralized wastewater treatment systems
- ▶ Engineer's lack of knowledge of decentralized systems
- ▶ An unfavorable regulatory system for decentralized systems
- ▶ Lack of systems thinking applied to wastewater issues

Barriers: Funding

- ▶ Engineering contracts are higher for larger scaled projects
- ▶ Engineers are used to sewer-type projects with increased design and oversight fees vs. smaller scaled specs and limited inspections
- ▶ Funding programs like the Clean Water State Revolving Fund (SRF) are designed for large sewer projects
 - ▶ Priority point system categories
 - ▶ Federal and State limitations for qualified projects
 - ▶ Additional Federal paperwork/studies

Recommended Actions for Improving Funding

- ▶ SRF - expand eligibilities to allow decentralized solutions
 - ▶ Federal and state statutes changed to allow use
 - ▶ Priority point system ranking changes for better competition of funds
 - ▶ Expand eligibility to include individual upgrades
- ▶ USDA Rural Development
 - ▶ Better priority ranking system
 - ▶ Cost-effectiveness
- ▶ Incorporate integrated water resource management, public health and environmental risks to ranking factors

Funding: 2020 Snapshot

- ▶ CWSRF was expanded in 2008 ARRA infrastructure efforts
- ▶ CIDWT/Univ. of TN: Projecting Costs of Decentralized Wastewater Management Options, 2010
- ▶ Environmental Financial Advisory Board report titled: *“Funding Strategies for Decentralized Wastewater Systems Nov. 2017”*

Funding: 2020 Snapshot

- ▶ New Water Infrastructure and Resiliency Finance Center
 - ▶ <https://www.epa.gov/waterfinancecenter>
 - ▶ Includes database of local funding contacts
 - ▶ And a new septic system basics training module for homeowners
- ▶ New case studies
- ▶ Draft document “Getting to Yes” using CWSRF and other funding sources

The Center's Strategic Goals



Barriers: Education

- ▶ Decentralized designs not a part of engineering course curriculums
- ▶ Newer decentralized technologies and techniques may not have a proven track record, limited studies
- ▶ Engineer's soil and groundwater training may not be applicable to soil-based wastewater treatment and dispersal systems



Recommended Actions for Improving Engineer's Education

- ▶ Increase Curriculum Topics to Include Decentralized System Design
- ▶ Increase Funding for University Research of Decentralized Systems
- ▶ Increase Data Sharing on Decentralized System Performance
- ▶ Apply Reliability and Costing Tools in an Asset Management Framework

Education: 2020 Snapshot

- ▶ University-Sponsored Regional Onsite Wastewater Training Centers
- ▶ Universities including decentralized curriculum
- ▶ Consortium of Institutes for Decentralized Wastewater Treatment (CIDWT) Installer training modules
- ▶ NAWT, NOWRA, NEHA



Education: 2020 Snapshot Continued

- ▶ The Water Research Foundation (waterrf.org)
 - Research Projects and Webinars
 - ▶ 2019 Potable Reuse, CECs, PFAs, Phosphorus
 - ▶ 2018 LIFT Technology Webinar Series
 - ▶ 2016 Onsite Non-Potable Water Programs
 - ▶ 2010 When to Consider Distributed Systems in Urban and Suburban Context



RESEARCH RESOURCES

1 - 20 of 186 Results

Filter Topics

- + Treatment (60)
- + Reuse (27)
- + Utility Management (22)
- + Resource Recovery (19)
- + Risk Assessment (19)
- + Water Quality (19)
- + Advanced Treatment (17)

Project #4622

**Understanding the Source and
Polymer-Derived Nitrosamin
Precursors**

Education: 2020 Snapshot...continued

- ▶ Examples, Text Books And Guides
 - ▶ Engineering:
 - ▶ *Soil-based Wastewater Treatment (Jose A. Amador and George W. Loomis, 2018)*
 - ▶ *Decentralized Water Reclamation Engineering: A Curriculum Workbook (Robert L. Siegrist, 2017)*
 - ▶ UMN: *Small Community Wastewater Solutions, H2O&M, Community Septic System Owner's Guide*
- ▶ EPA's Efforts: Listening Sessions, developing plan of actions

Barriers: Complex Regulatory System

- ▶ Regulations may be:
 - ▶ Too lax
 - ▶ Too inflexible
 - ▶ Too prescriptive
- ▶ Decentralized regulatory jurisdictions at state, county and local boards of health
- ▶ No centralized approval process for new technologies/techniques that is universally accepted



Recommended Actions for Improving The Regulatory Climate



- ▶ Achieve greater uniformity in decentralized technologies
 - ▶ Model Regulations
 - ▶ Decentralized Wastewater Glossary
- ▶ Improve data sharing
 - ▶ Regulators have high-quality permit, maintenance and monitoring tools
- ▶ Work on how regulatory framework can facilitate use

Regulations: 2020 Snapshot

- ▶ Decentralized Glossary published
- ▶ No major changes to complex regulatory scheme
- ▶ SORA listserv important communications bridge amongst regulators
- ▶ EPA/Chesapeake Bay watershed nutrient data sharing agreement
- ▶ Use of proprietary and government data management programs

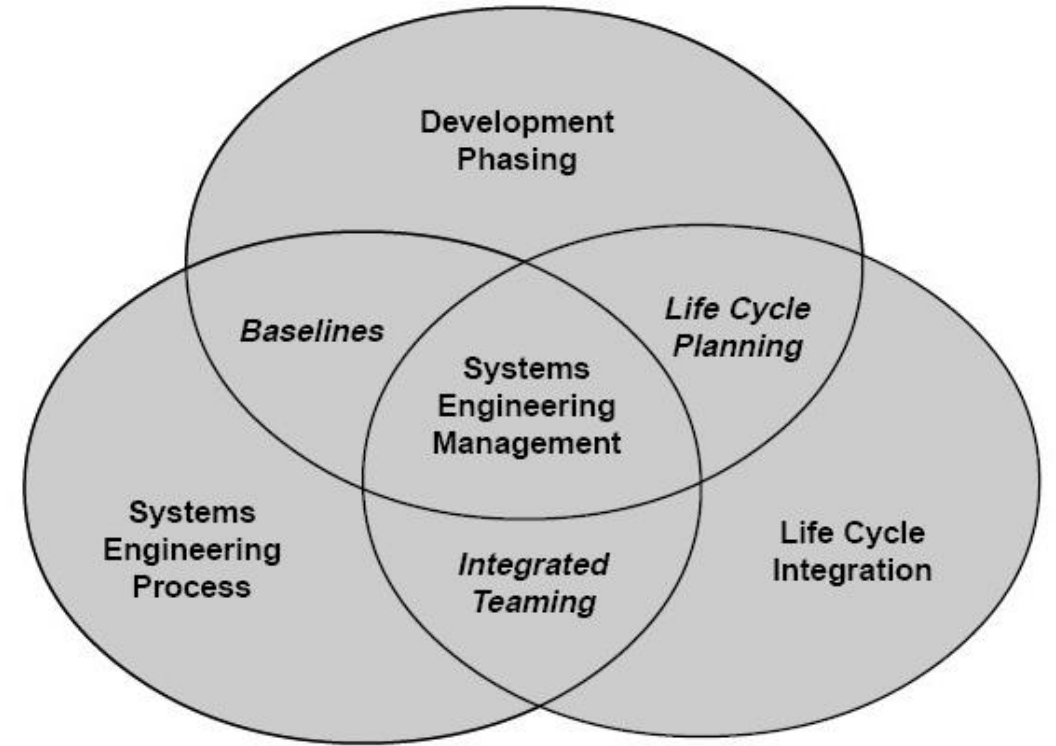


Barriers: Systems Engineering

- ▶ Consulting engineers are not required to consider decentralized solutions when conducting alternatives analyses
- ▶ Unintended consequences of siloed regulatory programs
- ▶ Lack of information on assessing needs, life-cycle costing, watershed impacts



Recommended Actions for Improving Use of Systems Engineering



- ▶ Encourage communities and utilities to use integrated water resources approaches
- ▶ Train engineers in broad systems thinking

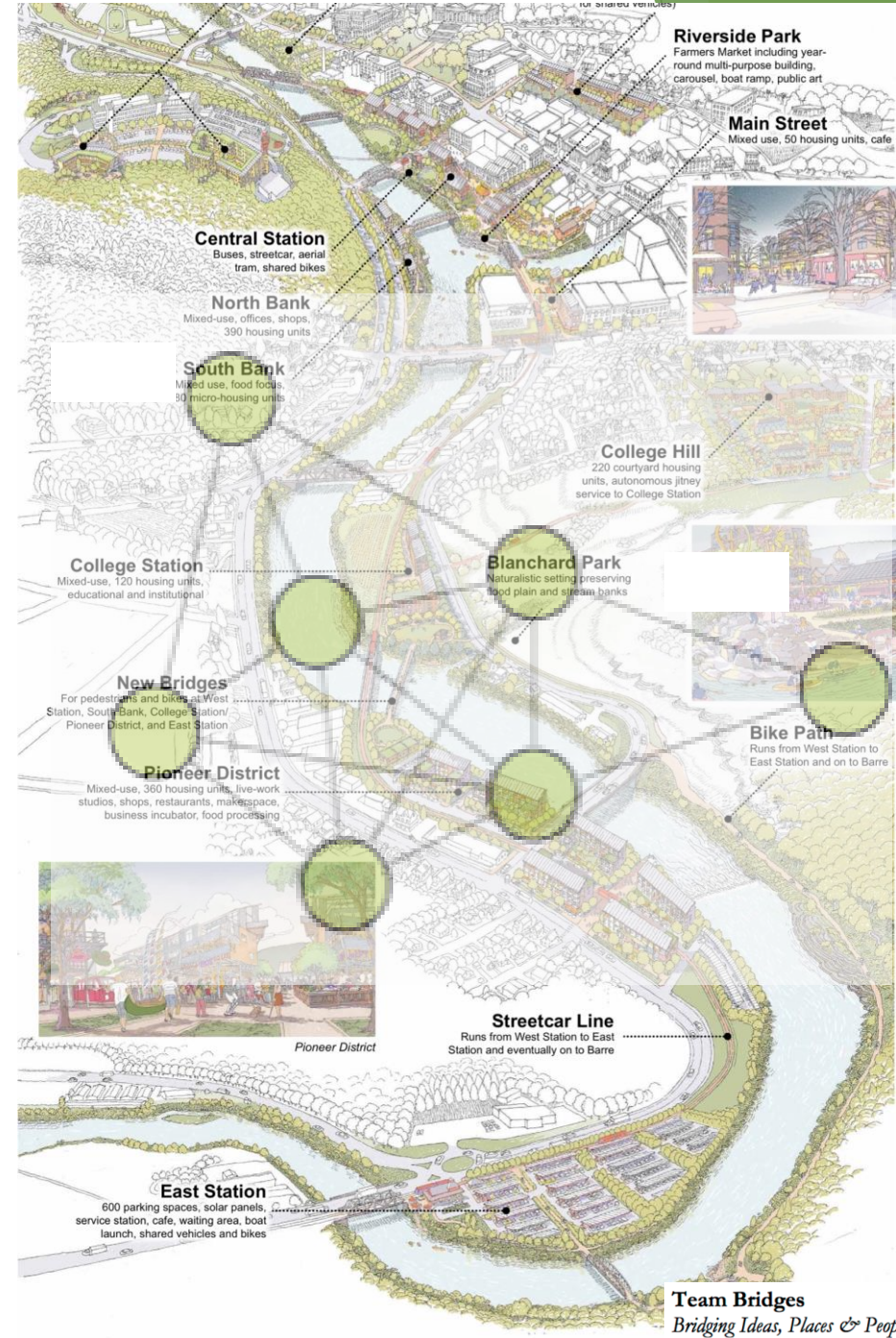
Systems Engineering: 2020 Snapshot

- ▶ Network Analysis
- ▶ Integrated Water Resources Project
(Burlington, Vermont)

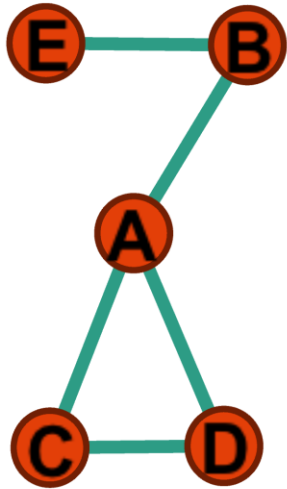


Network Analysis

- ▶ A tool to identify existing community network connections, key local features, and ways to enhance network functioning

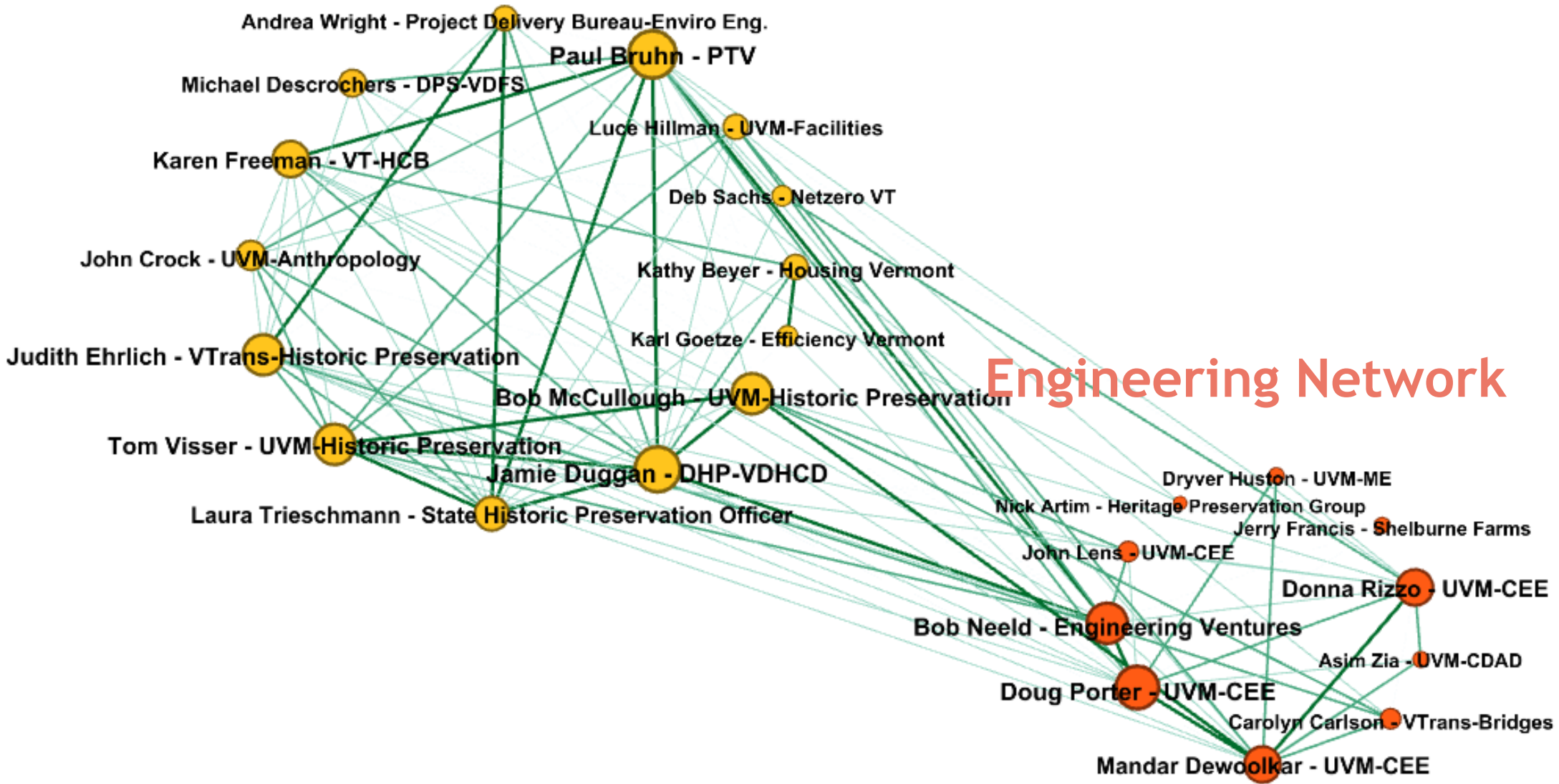


Network Analysis Overview



- ▶ Two main network features:
 - ▶ Nodes (Circles)
 - ▶ Edges (Links)
- ▶ Insights:
 - ▶ Spreading (resources, disease, ideas, etc.)
 - ▶ Robustness and fragility
 - ▶ Optimization

Cultural Resources Network



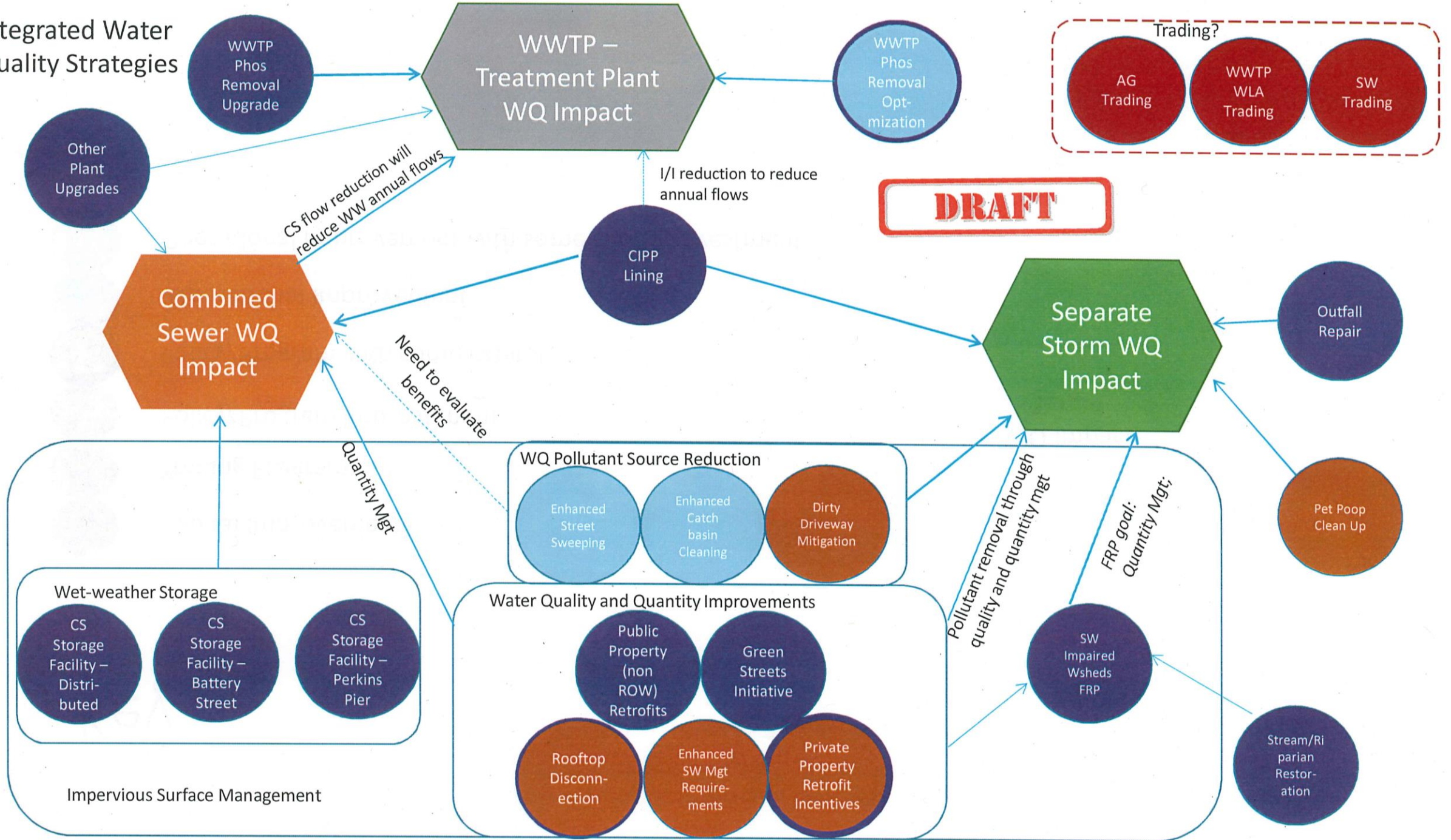
Engineering Network

Integrated Water Quality Planning: Municipal Wastewater and Stormwater



- ▶ Examine all of these obligations as a whole
- ▶ Identify the community's relative priorities for addressing human health and water quality improvements (and what tools will used preferentially, such as green infrastructure), and then
- ▶ Address these priorities through appropriate sequencing and scheduling of work based on implementing the projects with the highest cost benefit (including non-water quality related benefits) first.

Integrated Water Quality Strategies



Systems Engineering: 2020 Snapshot Continued

- ▶ Interdisciplinary Engineering
- ▶ Sustainable Community Development
- ▶ Ecological Design
- ▶ WRF & WEF LIFT
Intelligent Water
Systems Challenge



Conclusions: More Work to Do!

- ▶ Professional Organization Support/Training Opportunities
- ▶ Expanded financing opportunities for onsite and offsite community solutions
- ▶ EPA MOU Partner Work
- ▶ EPA Decentralized Team Wants to Hear from YOU!

Questions?

